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11. Noise and Vibration

11.1 Introduction

- 11.1.1 This chapter presents the findings of an assessment of the likely significant effects from noise and vibration as a result of the Scheme. For more details about the Scheme, refer to **Chapter 2: The Scheme** of the Environmental Statement (ES) [EN010118/APP/6.1].
- 11.1.2 This chapter identifies and proposes measures to address the potential impacts of the Scheme due to noise and vibration.
- 11.1.3 It assesses noise and vibration effects on human receptors. This chapter does not include the assessment of noise and vibration on ecological or heritage receptors. The impacts of noise and vibration on heritage receptors are assessed in **Chapter 7: Cultural Heritage** of the ES [EN010118/APP/6.1]. The impacts of noise and vibration on ecological receptors are assessed in **Chapter 8: Ecology** of the ES [EN010118/APP/6.1].
- 11.1.4 A glossary of acoustic terminology is provided in **Appendix 11A: Acoustic Terminology** of the ES [EN010118/APP/6.2].
- 11.1.5 Supporting information for the baseline noise surveys is provided in **Appendix 11B: Baseline Noise Surveys** of the ES [EN010118/APP/6.2].
- 11.1.6 Supporting information for the construction noise assessments is provided in **Appendix 11C: Construction Noise Modelling** of the ES [EN010118/APP/6.2].
- 11.1.7 Supporting information for the operational noise assessments is provided in **Appendix 11D: Operational Noise Modelling** of the ES [EN010118/APP/6.2].
- 11.1.8 This chapter is supported by the following figures [EN010118/APP/6.3]:
- Figure 11-1: Order limits, Receptor Locations, and Noise Monitoring Positions;
 - Figure 11-2: Noise Contour Plot – Operational Noise;
 - Figure 11-3: 1,800 String Inverter Sensitivity Test; and
 - Figure 11-4: Battery Energy Storage System (BESS) Acoustic Barrier Testing.

11.2 Legislation and Planning Policy

- 11.2.1 This section provides an overview of the legislative and planning policy framework against which the Scheme will be considered for noise and vibration. These policies identify the need for a site-specific noise assessment to consider the impacts of construction / decommissioning and operational phase noise on local noise-sensitive receptors.

Legislation

Control of Pollution Act 1974

- 11.2.2 The Control of Pollution Act 1974 (CoPA) (Ref 11-1) requires that Best Practicable Means (BPM), as defined in Section 72 of the CoPA, are adopted to control construction noise on any given site. Sections 60 and 61 of the CoPA provide the main legislation regarding enabling works and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by the Local Authority imposing requirements as to the way in which the works are to be carried out.
- 11.2.3 Section 61 of the CoPA provides a means to apply for prior consent to carry out noise generating activities during construction and allows the Local Authority to attach conditions to the consent.
- 11.2.4 An Outline Construction and Environmental Management Plan (OCEMP) **[EN010118/APP/7.10]** will be secured through the DCO and will set out how the project will seek to manage noise generated during construction.
- 11.2.5 Construction noise and vibration related assessments are presented in Section 11.8.1 to 11.8.42 of this chapter.

Environmental Protection Act 1990

- 11.2.6 The Environmental Protection Act 1990 (EPA) (Ref 11-2) prescribes a statutory nuisance as noise (and vibration) emitted from premises (including land) that is prejudicial to health or a nuisance.
- 11.2.7 Local Authorities are required to investigate any public complaints of noise, and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they must serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either simply the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity.
- 11.2.8 In determining if a noise complaint amounts to a statutory nuisance the Local Authority can take account of various guidance documents and existing case law as no statutory noise limits currently exist for defining a statutory nuisance. Demonstrating the use of BPM to minimise noise levels is an accepted defence against failure to comply with a noise abatement notice.
- 11.2.9 The DCO Application includes a Statutory Nuisance Statement **[EN010118/APP/7.5]**, which has been informed by the ES and the operational noise assessments which are presented in sections 11.8.25 to 11.8.40.

National Planning Policy

- 11.2.10 As outlined in **Chapter 1: Introduction** of the ES **[EN010118/APP/6.1]**, the Environmental Impact Assessment (EIA) for the Scheme must have regard to the relevant policies of the National Planning Policy Framework (NPPF) (Ref 11-3) and relevant National Policy Statements (NPS). Key aspects of the NPPF and relevant NPSs, which have been considered during the development of this chapter, are outlined below.

11.2.11 NPS EN-1 (Ref 11-4) with particular reference to Section 5.11 and Paragraphs 5.11.4 to 5.11.7, states the following in relation to the assessment of noise:

- a. 5.11.4 *“Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment: a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise; identification of noise sensitive premises and noise sensitive areas that may be affected; the characteristics of the existing noise environment; a prediction of how the noise environment will change with the proposed development; in the shorter term such as during the construction period; in the longer term during the operating life of the infrastructure; at particular times of the day, evening and night as appropriate. an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and measures to be employed in mitigating noise. The nature and extent of the noise assessment should be proportionate to the likely noise impact.”*
- b. 5.11.5 *“The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.”*
- c. 5.11.6 *“Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards 137 and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards 138 and other guidance which also give examples of mitigation strategies.”*
- d. 5.11.7 *“The applicant should consult EA and Natural England (NE), or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.”*

11.2.12 To aid the IPC in decision making, paragraph 5.11.9 of NPS EN-1 sets out the three aims relating to noise emissions from new developments:

- a. *“avoid significant adverse impacts on health and quality of life from noise;*
- b. *mitigate and minimise other adverse impacts on health and quality of life from noise; and*
- c. *where possible, contribute to improvements to health and quality of life through the effective management and control of noise”.*

11.2.13 NPS EN-3 (Ref 11-5) with particular reference to Paragraphs 2.4.2, states the following in relation to the design of a project to mitigate noise impacts:

- a. 2.4.2 *“Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology.”*

11.2.14 Draft versions of NPS EN-1 (Ref 11-6) and EN-3 (Ref 11-7) were published for consultation by the Department for Business, Energy & Industrial Strategy in September 2021. With relation to noise, the draft EN-1 repeats the three aims for decision makers from the 2011 NPS EN-1. Key additional points that expand on requirements in NPS EN-1 and are relevant to the Scheme are referenced from paragraph 5.12.4 and require:

- a. *“an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and well-being where appropriate, and noise-sensitive areas”*
- b. *“measures to be employed in mitigating the effects of noise - applicants should consider using best available techniques to reduce noise impacts”*

11.2.15 Additionally, the draft NPS EN-1 allows for some flexibility in design, stating that:

“Some noise impacts will be controlled through environmental permits and parallel tracking is encouraged where noise impacts determined by an environmental permit interface with planning issues (i.e. physical design and location of development)”.

11.2.16 The draft EN-3 includes the consideration of transport noise and vibration associated with solar photovoltaic generation schemes. While no specific guidance is provided in the draft EN-1 of EN-3 for assessment of these noise impacts, these issues have been addressed in this chapter.

11.2.17 NPPF, with particular reference to Paragraph 174 and 185, states the following relevant to noise:

- a. 174: *“Planning policies and decisions should contribute to and enhance the natural and local environment by:... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”*
- b. 185: *“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; b) identify and protect tranquil areas*

which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...

Noise Policy Statement for England

11.2.18 The Noise Policy Statement for England (NPSE) (Ref 11-8) seeks to clarify the underlying principles and aims in existing policy documents, legislation, and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

11.2.19 The NPSE sets out the long-term vision of the government's noise policy, which is 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"*.

11.2.20 This long-term vision is supported by three aims: *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- a. *"Avoid significant adverse impacts on health and quality of life;*
- b. *Mitigate and minimise adverse impacts on health and quality of life; and*
- c. *Where possible, contribute to the improvements of health and quality of life."*

11.2.21 The 'Explanatory Note' within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the concepts:

- a. No Observed Effect Level (NOEL) – the level below which no effect can be detected. Below this level, there is no detectable effect on health and quality of life due to noise;
- b. Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- c. Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

11.2.22 With reference to the SOAEL, 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."

11.2.23 For situations where noise levels are between the LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur.

11.2.24 LOAEL and SOAEL are defined in this chapter in sections 11.5.20 (construction and decommissioning noise), 11.5.23 (construction and

decommissioning vibration), 11.5.28 (construction and decommissioning traffic noise), and 11.5.39 (operational noise).

11.2.25 Some effects might not be significant in EIA noise terms, but may be in health/policy terms if they are at or above SOAEL (i.e. where there may be “significant adverse effects on health and quality of life”). Where exceedances of LOAEL have been identified (i.e. where “adverse effects on health and quality of life” can be detected), mitigation measures are proposed to reduce noise as far as reasonably practicable.

11.2.26 Further consideration of health effects and the interaction of noise with other effects (e.g. land quality, transport, and landscape and visual amenity) is presented in **Chapter 15: Health**, and **Chapter 17: Effect Interactions** of the ES [EN010118/APP/6.1]. **Chapter 15: Health** of the ES concludes that overall human health effects are **negligible to minor adverse** and considered **not significant**.

National Guidance

Planning Practice Guidance Noise

11.2.27 The Planning Practice Guidance concerned with noise (PPG) (Ref 11-9) advises that

“Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)...”.

11.2.28 It also provides guidelines that are designed to assist with the implementation of the NPPF.

11.2.29 The PPG states that local planning authorities should take account of the acoustic environment and in doing so consider:

- a. *“whether or not a significant adverse effect is occurring or likely to occur;*
- b. *whether or not an adverse effect is occurring or likely to occur; and*
- c. *whether or not a good standard of amenity can be achieved.”*

11.2.30 Factors to be considered in determining whether noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise, and cumulative effects.

11.2.31 Further details on the hierarchy of noise effects are presented in **Table 11-1**, which has been reproduced from PPG.

Table 11-1: Planning Practice Guidance Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No effect	No Observed Effect	No specific measures required

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level			
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			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area	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

Local Planning Policy

11.2.32 The following local planning policy has been taken into account in the preparation of this chapter:

- a. Braintree District Council Core Strategy (2021) (Ref 11-10): with particular reference to Policy CS8: Natural Environment and Biodiversity: *“All development proposals will take account of the potential impacts of climate change and ensure the protection and enhancement of the natural environment, habitats and biodiversity and geo-diversity of the District. This will include where appropriate protection from: Air, noise, light and other types of pollution...”*
- b. Braintree District Council Local Plan Section 1 (2021) (Ref 11-11), with particular reference to Policy SP7: Place Shaping Principles: *“All new development should reflect the following place shaping principles, where applicable: ... Protect the amenity of existing and future residents and users with regard to noise, vibration, smell, loss of light, overbearing and overlooking.”*
- c. Chelmsford Local Plan Full Council Version (2020) (Ref 11-12), with particular reference to Policy DM8: New buildings and structures in the rural area; Policy DM19: Renewable and low carbon energy; and Policy DM29: Protecting living and working environments.

11.3 Assessment Assumptions and Limitations

- 11.3.1 This ES Chapter has assessed a hybrid of the Concept Design and the Design Principles, as described below.
- 11.3.2 The traffic flows and non-road mobile machinery are based on a worst-case scenario of all infrastructure being built to its maximum Design Principles, which may slightly overestimate the number of vehicles and equipment.
- 11.3.3 It has been assumed for the purpose of the assessment that the Battery Energy Storage System (BESS) will be built out in a single phase, which is considered the worst-case in terms of road traffic numbers and operational noise. Should the BESS construction be phased, it is not considered likely to change the conclusions of this assessment (i.e., the construction noise of Phase 2 would be the same or less than Phase 1).
- 11.3.4 The methodology requires specific locations to be modelled for operational phase noise sources, which has been achieved by modelling the Concept Design (with heights of infrastructure increased to the maximum allowed by the Design Principles) and adding an additional 25 BoSS/Solar Station locations with centralised inverters (the noisier type of inverters), to ensure the maximum number of locations and areas of equipment allowed by the Design Principles has been assessed. Where lateral movements of the BoSS/Solar Stations is allowed by the Rochdale Envelope and Works Plans, the noise levels are controlled by a requirement to the DCO to demonstrate the Scheme achieves or betters the predicted noise levels at sensitive receptors in this chapter, therefore setting the magnitude of impact and significance of effect at the level presented in this chapter. As a result, effects for any scheme built within the Design Principles and in accordance with Works Plans and the DCO requirements, wouldn't have a worse effect than that assessed using the Concept Design based approach taken here.
- 11.3.5 Should the final, detailed design have fewer BoSS/Solar Station locations and a smaller area of BESS than allowed in the Design Principles, and more solar

PV or habitat/landscape areas (as allowed by the Design Principles and Works Plans), (and given the DCO requirement) it is not expected to change the conclusions of this assessment. This is because the BESS is the noisiest equipment allowed in this location and fewer BoSS/Solar Station locations would introduce fewer noise sources in the Order limits. Other optionality within the Rochdale Envelope - specifically the ability to build utility string inverters rather than centralised inverters - will also not be worse than the conclusions of this assessment. A sensitivity test (see **Appendix 11D: Operational Noise Modelling** of the ES) of the utility string inverter option (with 1,800 units) has been undertaken to confirm this.

- 11.3.6 Further information regarding the Scheme parameters assessed can be found in **Chapter 2: The Scheme**, and **Chapter 5: EIA Methodology** of the ES [EN010118/APP/6.1].

Baseline Assumptions and Limitations

- 11.3.7 It is considered that the baseline noise measurements are representative of the typical noise environment of identified receptors at the time of preparation of this assessment. There may have been reduced road traffic during this time period due to the lockdown measures for the Covid-19 pandemic, and in turn lower levels of existing ambient noise. However, it is very likely that this provides a more conservative assessment (as any change associated with the Scheme would be more noticeable against a lower background) and therefore is considered appropriate for use for the assessment of noise effects.

- 11.3.8 Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort has been made such that measurements were undertaken in such a way as to provide a representative sample of conditions, 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 Assumptions and Limitations

- 11.3.9 The assessment of construction noise (and vibration) has considered construction activities that have the potential to result in significant effects on identified receptors, based on information presented in **Chapter 2: The Scheme [EN010118/APP/6.1]** of the ES and experience of construction sites and professional judgement. These assessments are based on a reasonable representative worst-case scenario.

- 11.3.10 Construction noise predictions have been undertaken using British Standard (BS) 5228-1:2014+A1:2019 'Code of practice for noise and vibration control on construction and open sites' (Ref 11-13) methodologies and example sound level data presented in BS 5228-1 for plant associated with the proposed construction activities. Construction phase vibration has been assessed based on historic vibration measurement data from relevant guidance documents. As a contractor is yet to be appointed and actual work

methods and plant/equipment to be used are not yet finalised, noise and vibration predictions representing a reasonable worst-case have been undertaken at this stage to represent the potential noise and vibration sources throughout the works programme.

- 11.3.11 Construction phase impacts have been assessed based on a 24-month construction programme. However, the BESS may be built in two phases with the first part built alongside the solar PV and a second phase after five years of operation, as mentioned in **Chapter 2: The Scheme [EN010118/APP/6.1]** of the ES. Any construction noise associated with Phase 2 is not expected to change the findings of the assessment. The conclusions of the construction impact assessment would therefore remain valid and represent the reasonable worst-case scenario.
- 11.3.12 A piling method has not been finalised at this stage of the assessment. Consequently, it is assumed that an auger piling technique would be adopted if any piling is required. This is the typical piling technique that is adopted in construction projects and is considered to represent a reasonable worst-case.
- 11.3.13 Noise effects during the decommissioning phase of the Scheme will be similar to or less than noise effects during the construction phase; therefore construction and decommissioning impacts are considered together. The noise assessment presented is considered representative (or an overestimate) of the decommissioning phase.

Operational Assumptions and Limitations

- 11.3.14 As discussed in **Chapter 2: The Scheme [EN010118/APP/6.1]** of the ES, the Scheme may utilise either a 'central inverter solution' which comprises inverters, transformers and switchgear which form the Balance of Solar System (BoSS) (collectively known as Solar Stations) or a 'utility scale string inverter solution'. While there would be more string inverters (up to 1,800 utility scale inverters per **Chapter 2: The Scheme** of the ES **[EN010118/APP/6.1]**) compared to centralised inverters (up to 150, as per **Chapter 2: The Scheme** of the ES), the overall sound outputs of the utility scale and small scale string inverter solutions will be substantially quieter than the centralised inverter solution. From a noise perspective it is therefore assumed that the central inverter solution is a reasonable worst case scenario when in operation and is therefore the basis of the assessment. Sensitivity testing of a scenario with 1,800 utility scale inverters has been carried out to confirm the centralised inverter solution is a reasonable worst-case scenario. The sensitivity test is presented in **Appendix 11D: Operational Noise Modelling** of the ES **[EN010118/APP/6.2]** of the ES.
- 11.3.15 The BESS may be constructed in two phases, with the first phase during construction of the solar photovoltaic (PV) panels and the second phase an estimated five years after operation. Constructing the BESS in full alongside other noisy construction activities onsite represents the worst-case noise emissions. From a noise perspective it is therefore worse to assume that the BESS is built out in full prior to operation, which has been the basis of the assessment.
- 11.3.16 The final BESS arrangement has not been fixed for the DCO application. Rochdale Envelope principles have therefore been applied to ensure that

maximum and worst-case parameters have been assessed, in line with the concept design (and applying maximum heights allowed by the Design Principles). For noise this is based on the maximum energy generation and maximum number of battery cubes; increasing the peak power capacity of the BESS would reduce the number of battery cubes and increase the number of inverters and transformers within the BESS compound, which would lower the noise emissions. Additionally, the BESS has been modelled with a source height of 4.5 m, which is the maximum allowed height in the Design Principles. The worst-case BESS parameters have therefore been assessed, which allow for iterations at detailed design stage that may emit the same or lower noise emissions.

11.3.17 Digital noise modelling of the operational Scheme has been based on the parameters set out in the drawings, plans, and operation details as set out in **Chapter 2: The Scheme** of the ES [EN010118/APP/6.1]. Sound level data for operational noise-producing plant (i.e. inverters, transformers and BESS units, but not PV Panels or overhead cables) have been updated following production of the Preliminary Environmental Information (PEI) Report as advised by equipment supplier/manufacturers, (see **Appendix 11D: Operational Noise Modelling** of the ES [EN010118/APP/6.2]).

11.4 Stakeholder Engagement

11.4.1 Consultation undertaken to date in relation to noise and vibration is outlined in **Table 11-2**.

Table 11-2: Main Matters Raised during Consultation

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
Boreham Parish Council	Further development needed on the siting of key elements of infrastructure and whether battery storage is used overnight to determine the impact on residences close to the site boundary.	Operational plant noise has been assessed at sensitive receptors following BS4142:2014+A1:2019, BS8233:2014 and World Health Organization guidance. The assessment of noise effects is based on the best available information and is considered to represent a reasonable worst-case scenario.	Assessment of operational plant noise is presented in sections 11.8.25 to 11.8.40. Additional mitigation measures are discussed in section 11.9.
Chelmsford City Council	The Scoping Opinion makes reference to superseded Development Plans. Reference should only be made to the adopted Local Plan	Reference to Local Plans and 'DM8 New buildings and structures in the rural area' have been made in the Legislation and	DM8 is referenced in section 11.2.32.

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
	Policies. In addition, the chapter should reference Policy DM8 New buildings and structures in the rural area.	Planning Policy section.	
Chelmsford City Council	The assessment needs to have regard to the impact of noise and vibration upon the quality of life of local residents within the boundaries of and within close proximity to the Site.	Sensitive receptors have been identified and noise monitoring locations have been determined through desktop study during the scoping process and confirmed during site visits.	The methodology for selection of assessment receptor positions and monitoring locations is discussed in sections 11.5.11 to 11.5.17.
Chelmsford City Council	In addition to individual households, consideration shall be given to the communities of Boreham and the Chelmsford Garden Community.	Sensitive receptors have been identified and noise monitoring locations have been determined through desktop study during the scoping process and confirmed during site visits.	The methodology for selection of assessment receptor positions and monitoring locations is discussed in sections 11.5.11 to 11.5.17.
Chelmsford City Council	The siting of the solar panels, associated infrastructure including plant rooms, cabling and accessway shall be undertaken such that it does not materially affect residential amenity.	An assessment has been carried out of solar plant infrastructure to identify potential noise effects on nearby receptors as part of this ES. This incorporates further design development and noise reduction measures following the PEI Report.	Assessment of operational plant noise is presented in sections 11.8.25 to 11.8.40. Additional mitigation measures are discussed in section 11.9.
Chelmsford City Council	The siting of overhead powerlines should not lead to material harm or loss of residential amenity.	Chapter 2: The Scheme of the ES [EN010118/APP/6.1] advises that the route of the existing overhead power lines will not be altered significantly. Therefore no changes to noise associated with overhead powerlines is expected.	Discussed in paragraphs 11.5.3 and 11.5.4.
Chelmsford City Council	The effect of the construction implications of the	Construction works noise and vibration (including traffic) has	Assessment of construction works noise and vibration

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
	proposal, including the use of the local highways network, should be assessed to ensure that residential amenity is safeguarded and mitigated at all times.	been further reviewed as information has been made available, and its assessment has been included in this ES.	(including traffic) is presented in sections 11.8.1 to 11.8.42.
Essex County Council	Noise from transport sources could be factored into the criteria to be used for assessing the environmental impacts of road traffic.	Operational traffic will be minimal with a clear and obvious negligible effect and has not been further assessed. Construction traffic has been further reviewed as information has been made available, and an assessment has been included in this ES.	Operational traffic noise is scoped out of the assessment as discussed in paragraph 11.5.5. Assessment of construction traffic noise is presented in sections 11.8.21 to 11.8.25.
Great and Little Leighs Parish Council	Foundations of Grade 2 listed buildings, Parish Church and War Memorial near Boreham Road will not stand the vibrations caused by HGVs transporting equipment to and from site.	Construction traffic vibration levels are below levels at which there is potential for cosmetic damage to structures. Assessment of noise and vibration impacts on heritage receptors are discussed in the Chapter 7: Cultural Heritage of the ES [EN010118/APP/6.1].	Assessment of construction vibration is presented in section 11.8.13. Noise and vibration impacts on heritage receptors is discussed in Chapter 7: Cultural Heritage of the ES [EN010118/APP/6.1].
Hatfield Peverel Parish Council	Further detail on the proposed plant is required to fully evaluate the operational noise.	Operational plant noise has been assessed at sensitive receptors following BS4142:2014+A1:2019 guidance. The assessment of noise effects is based on the best available information and is considered to represent a reasonable worst-case scenario.	Assessment of operational plant noise is presented in sections 11.8.25 to 11.8.40. Additional mitigation measures are discussed in section 11.9. Sound level data for operational noise-producing plant has been based on manufacturer level data for proposed plant selections and similar rated plant.

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
Terling and Fairstead Parish Council	The effect of construction traffic on the quiet rural lanes should be considered.	Construction traffic has been further reviewed as information made available, and assessment has been included in the ES.	Assessment of construction traffic noise is presented in sections 11.8.21 to 11.8.25.
Terling and Fairstead Parish Council	Properties within the 500m range (such as Fairstead Lodge, Grade II) should be considered.	Sensitive receptors have been identified and noise monitoring locations have been determined through desktop study during the scoping process and confirmed during site visits.	The methodology for selection of assessment receptor positions and monitoring locations is discussed in sections 11.5.11 to 11.5.17.
Terling and Fairstead Parish Council	Analysis of noise generated from substation and battery storage enclosures during day and night should be included. Reference to WHO standards.	Operational plant noise has been assessed at sensitive receptors during the day, evening and night periods following BS 4142:2014+A1:2019, BS 8233:2014 and World Health Organization guidance.	Assessment of operational plant noise is presented in sections 11.8.25 to 11.8.40. Additional mitigation measures are discussed in section 11.9.
Terling and Fairstead Parish Council	The Report acknowledges that the dominant sources of sound in the potential site area are limited to specific areas. None of these sound sources apply in two of the areas being considered for the substation/battery storage at the north and in the middle of the proposed site. This indicates the Bulls Lodge site, close to the A12 is preferable, as it is located within an area already blighted by noise.	Chapter 3: Alternatives and Design Evolution of the ES [EN010118/APP/6.1] describes the design process including options that have been considered and discounted or amendments made to the Scheme design to date.	Assessment of operational plant noise is presented in sections 11.8.25 to 11.8.40. Additional mitigation measures are discussed in section 11.9.
Terling and Fairstead	Accepts there will be operational noise.	Noted. Operational plant noise has been assessed at sensitive	Assessment of operational plant noise is presented in

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
Parish Council		receptors following BS4142:2014+A1:2019 guidance and following WHO Community Noise guidelines.	sections 11.8.25 to 11.8.40. Additional mitigation measures are discussed in section 11.9.
Terling and Fairstead Parish Council	Clarity on whether temperature regulation in battery storage facilities will involve vibration. If so, operational vibration should be considered.	No major vibration sources are envisaged to be introduced as part of the Scheme and as such there will be no associated operational vibration effects.	N/A
Terling and Fairstead Parish Council	Vibration limits during construction, operation and de-commissioning phases are expected.	Vibration effects during construction or decommissioning stages have been assessed following BS 5228-2 guidance.	Assessment of construction vibration is presented in sections 11.8.13 to 11.8.20.
Planning Inspectorate	Clear cross-referencing in the Noise and Vibration ES aspect chapter to the Ecology and Cultural Heritage ES aspect chapters should be provided.	Noted	Cross-referenced in section 11.1.3.
Planning Inspectorate	The Scoping Report proposes to scope out an assessment of operational vibration from the ES. The Inspectorate has considered the nature and characteristics of the Proposed Development and locations of the potential sensitive receptors and is content with this approach.	Noted.	N/A
Planning Inspectorate	Table 16-1 of the Scoping Report proposes that an assessment of ground-borne vibration arising from	No major operational vibration sources are envisaged to be introduced as part of the Scheme and as such there will be no	Assessment of construction and decommissioning vibration is presented in section 11.8.13 to 11.8.18.

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
	<p>construction, operation and decommissioning of the Proposed Development is scoped out of the ES, stating that there will be no associated vibration effects. This is contradicted by paragraphs 11.5.1 and 11.6.10 of the Scoping Report which set out potential vibration effects during construction and decommissioning and state that this matter will be assessed. As such, the Applicant's proposed ES scope is unclear.</p>	<p>associated operational vibration effects. Ground-borne vibration during the operational phases of the Scheme has been scoped out of the assessment.</p> <p>Vibration effects during construction or decommissioning stages have been assessed following BS 5228-2 guidance.</p>	
<p>Planning Inspectorate</p>	<p>The ES should either include evidence to confirm that ground-borne vibration generated by plant/activities on site and HGV movements during construction and decommissioning would not result in significant effect on sensitive receptors or provide an assessment of the likely significant effects.</p>	<p>Vibration effects during construction or decommissioning stages have been assessed following BS 5228-2 guidance.</p>	<p>Assessment of construction and decommissioning vibration is presented in sections 11.8.13 to 11.8.20.</p>
<p>Planning Inspectorate</p>	<p>If a new substation is constructed, any noise impacts resulting from the operational substation which are like to result in significant effects on noise-sensitive receptors should be assessed.</p>	<p>Operational plant noise has been assessed at sensitive receptors following BS4142:2014+A1:2019, BS8233:2014 and World Health Organization guidance.</p>	<p>Assessment of operational plant noise is presented in sections 11.8.25 to 11.8.40.</p> <p>Additional mitigation measures are discussed in section 11.9.</p>
<p>Planning Inspectorate</p>	<p>The ES should explain how the study area and sensitive receptors have been selected with</p>	<p>Sensitive receptors have been identified and noise monitoring locations have been determined through</p>	<p>The methodology for selection of assessment receptor positions and monitoring locations is</p>

Consultee	Main matter raised	How has the concern been addressed	Location of response in chapter
	reference to the extent of the likely impacts.	desktop study during the scoping process and confirmed during site visits.	discussed in sections 11.5.11 to 11.5.17.
Planning Inspectorate	The ES should explain how the baseline noise monitoring locations were chosen with reference to relevant information including noise contour mapping.	Sensitive receptors have been identified and noise monitoring locations have been determined through desktop study during the scoping process and confirmed during site visits.	The methodology for selection of assessment receptor positions and monitoring locations is discussed in sections 11.5.11 to 11.5.17.
Planning Inspectorate	Consistent with the Noise Policy Statement for England, Significant Observed Adverse Effect Level (SOAEL) and Lowest Observed Adverse Effect Level (LOAEL) should be defined for all of the construction, operational and decommissioning noise matters assessed.	SOAEL and LOAEL has been defined according to the Noise Policy Statement for England.	Construction noise LOAEL and SOAEL defined in section 11.5.20. Construction vibration LOAEL and SOAEL defined in section 11.5.23. Construction traffic noise LOAEL and SOAEL defined in section 11.5.28. Operational noise LOAEL and SOAEL defined in 11.5.39.

11.4.2 In addition to the matters covered in **Table 11-2**, a meeting was set up on 21st June 2021 with the Host Authorities to discuss the following aspects of the noise and vibration assessment:

- a. locations where baseline noise monitoring has been undertaken or is planned to be undertaken, and the locations of sensitive receptors for which it is designed to provide representative baseline noise levels;
- b. overview of main potentially noise generating elements of the Scheme and their locations;
- c. whether Council's would suggest the addition of any important receptors that may have not been included; and
- d. review of the baseline monitoring and impact assessment methodology.

11.4.3 Essex County Council and Braintree District Council were represented at the meeting with apologies received from Chelmsford District Council. No comments were received on the points listed above.

11.5 Assessment Methodology

Assessment Scope

Matters scoped in

11.5.1 The noise and vibration assessment considers the following assessments:

- a. construction noise;
- b. construction vibration;
- c. construction traffic noise; and
- d. operational Scheme noise.

Matters Scoped Out

11.5.2 The following assessments have been scoped out.

Temporary Overhead Power Line Construction Noise and Vibration

11.5.3 **Chapter 2: The Scheme** of the ES [EN010118/APP/6.1] explains that the route of the existing overhead power lines will not be altered significantly, and there will be a tie in point for the existing National Grid Substation at Bulls Lodge which may involve the construction of additional temporary pylons. The nearest sensitive receptor (R3 as defined in Table 11-3) is approximately 350 m from the nearest pylon location. As this is outside the study area for construction activities (see paragraph 11.5.6 and 11.5.7), an assessment of construction noise and vibration has been scoped out of the assessment.

Temporary Overhead Power Line Operational Noise

11.5.4 The temporary overhead power lines will be located approximately 80m farther from the nearest sensitive receptor (R3 as defined in Table 11-3) compared to the existing overhead power lines. Consequently, it is not expected that there will be any notable changes to noise associated with existing overhead power lines and, therefore, an assessment of temporary overhead line noise has been scoped out of the assessment.

Operational Road Traffic Noise

11.5.5 **Chapter 2: The Scheme** of the ES [EN010118/APP/6.1] details that there will be up to eight permanent staff onsite during the operational phase. It would take an approximate increase in traffic of 25% (assuming the vehicle composition remains consistent) to result in an increase in noise of 1 dB. As noise is not sensitive to small changes in traffic, the increase in traffic that may result from eight permanent staff is not considered to be significant. Consequently, an assessment of operational traffic noise has been scoped out of the assessment.

Study Area

Construction Noise and Vibration Study Area

11.5.6 BS 5228-1 defines a distance of 300m as the distance at which caution should be applied to calculations using the methodology in BS 5228-1. This distance is also referenced in the Design Manual for Roads and Bridges (DMRB) (Ref 11-14), which states that:

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

- 11.5.7 Consequently, based on guidance within BS 5228-1 and DMRB, a study area of 300m from the Order limits has been defined for construction noise. This area encompasses the area where potential vibration effects, which is defined in DMRB as a distance of 100m from the closest activity.

Construction Traffic Noise Study Area

- 11.5.8 The construction traffic study area is defined with reference to guidance in DMRB, which defines a distance of 50m from the kerb line of public roads.

Operational Noise Study Area

- 11.5.9 As guidance does not define study area extents for operational noise, the study area has been defined by the LOAEL, which is identified in the NPSE. The LOAEL is defined in PPGN as the level above which, as an average response, adverse effects on health and quality of life can be detected. Noise below the LOAEL is identified in PPGN as No Observed Adverse Effect, which PPGN states that noise can be heard but does not affect the quality of life.
- 11.5.10 For the purposes of providing an assessment of likely significant noise effects the study area for the noise and vibration assessment comprises receptors within 500m of the Order limits. Receptors farther than 500m will experience levels of operation noise that are unlikely to affect quality of life. The extent of the study area was consulted on through statutory consultation and no feedback was received regarding the area.

Sensitive Receptors

- 11.5.11 The identified noise-sensitive receptors are presented in **Figure 11-1** of the ES [EN010118/APP/6.3] and summarised in **Table 11-3**. These receptors have been determined in the defined study area through a desktop study during the scoping process and confirmed during site visits. The selection of receptors presented initially in the Preliminary Environmental Information Report were agreed with Local Authorities (see paragraph 11.4.2).
- 11.5.12 Following production of the PEI Report (May 2021), the Order limits were revised, as presented in **Chapter 2: The Scheme** of the ES [EN010118/APP/6.1]. This has resulted in removing R28 (Woodhouse, Amin Road, Boreham, Chelmsford, CM3 3AJ), which was assessed in the PEI Report but is now clearly outside the operational noise study area. Although R13 is also outside the operational noise study area, it has been retained in the assessment as it is not clearly outside the study area extents.
- 11.5.13 Additionally, two new receptors were identified from the revised Order limits that are included in the assessment of noise effects. These receptors are as follows:
- a. Receptor R20 of the PEI Report has been relocated from Six Elms, Braintree Road, Terling, Chelmsford, CM3 2AX to 6 Braintree Road, Fuller Street, Chelmsford CM3 2AZ; and

- b. Receptor R23 of the PEI Report has been relocated from Three Ashes Farm/Cottage, Braintree Road, Terling, CM3 2AR to Porridge Pot Cottages/Porridge Pot Lane, Chelmsford CM3 2BZ.

11.5.14 Sensitive receptors have not explicitly been defined in the construction traffic study area. The assessment of construction traffic noise considers the change in road traffic noise due to construction traffic on public roads using the calculated Basic Noise Level (BNL). Where a significant change in noise due to construction traffic is identified, additional studies are undertaken to identify sensitive receptors affected.

Table 11-3: Sensitive Receptor Locations

Reference	Location	Description	Approx. coordinates (Lat/Long)	Distance to Order limits (m)
R1	Beggars Hall, Terling, Chelmsford, CM3 2RA	Residential property	51°47'58.81"N 0°32'50.19"E	9
R2	Birds Farm, Little Waltham, Chelmsford, CM3 3NE	Residential property	51°47'34.16"N 0°31'48.66"E	17
R3	Brent Hall Lodge, Waltham Road, Boreham, Chelmsford, CM3 3BA	Residential property	51°47'4.51"N 0°32'13.21"E	20
R4	Brick House Farm, Boreham, Chelmsford, CM3 3HU	Residential property	51°45'54.87"N 0°32'27.03"E	68
R5	Hankins Farm, Terling, Chelmsford, CM3 2RA	Residential property	51°47'52.47"N 0°32'26.33"E	4
R6	Kenwood House, Waltham Road, Boreham, Chelmsford, CM3 3AX	Residential property	51°46'35.37"N 0°32'55.75"E	57
R7	Ashlea, Boreham Road, Little Waltham, Chelmsford, CM3 3NF	Residential property	51°47'33.91"N 0°31'23.12"E	357
R8	Leyland's Farm, Terling, Chelmsford, CM3 2QY	Residential property	51°48'18.49"N 0°32'13.93"E	94

Reference	Location	Description	Approx. coordinates (Lat/Long)	Distance to Order limits (m)
R9	Little Weathers, Terling, Chelmsford, CM3 2RA	Residential property	51°47'56.83"N 0°32'38.58"E	9
R10	Noakes Farm, Noakes Lane, Little Waltham, Chelmsford, CM3 3NG	Residential property	51°47'45.52"N 0°31'39.29"E	12
R11	Properties South of A12, Boreham, Chelmsford, CM3 3JJ	Residential property	51°45'52.44"N 0°32'44.88"E	80
R12	Dog & Gun Public House, Boreham Road, Little Waltham, Chelmsford, CM3 3NF	Public House	51°47'43.68"N 0°31'17.77"E	93
R13	Ridley Hall, Braintree Road, Terling, Chelmsford, CM3 2AX	Residential property	51°48'34.27"N 0°32'46.10"E	557
R14	Ringers Farm, Terling Hall Road, Terling, Chelmsford, CM3 2BX	Residential property	51°47'26.94"N 0°33'12.27"E	193
R15	Roll's Farm, Terling, Chelmsford, CM3 2RA	Residential property	51°47'51.26"N 0°32'56.24"E	20
R16	Russell Green Bungalow, Boreham, Chelmsford, CM3 3BB	Residential property	51°47'9.53"N 0°32'4.40"E	2
R17	Russell Green Cottages, Boreham, Chelmsford, CM3 3BB	Residential property	51°47'11.61"N 0°31'44.10"E	5
R18	Russell Green House, Boreham, Chelmsford, CM3 3BD	Residential property	51°47'18.55"N 0°31'44.34"E	28
R19	Scarlett's Farm, Terling, Chelmsford, CM3 2QZ	Residential property	51°48'3.79"N 0°31'49.89"E	48

Reference	Location	Description	Approx. coordinates (Lat/Long)	Distance to Order limits (m)
R20	Rose Cottage, Fuller Street, Chelmsford CM3 2AZ	Residential property	51°48'53.0"N 0°32'09.5"E	312
R21	Sparrow's Farm, Terling, Chelmsford, CM3 2QY	Residential property	51°48'5.44"N 0°32'34.60"E	12
R22	Stocks Farm, Waltham Road, Boreham, Chelmsford, CM3 3BA	Residential property	51°46'59.08"N 0°32'29.25"E	41
R23	Porridge Pot Cottages/Porridge Pot Lane, Chelmsford CM3 2BZ	Residential property	51°47'08.2"N 0°33'30.4"E	20
R24	Toppinghoe Hall, Terling Hall Road, Hatfield Peverel, Chelmsford, CM3 2EX	Residential property	51°46'28.66"N 0°34'6.62"E	433
R25	Wallace Farm Cottages, Wallace's Lane, Boreham, Chelmsford, CM3 3AU	Residential property	51°46'28.29"N 0°32'32.45"E	499
R26	Waltham Road Properties, Boreham, Chelmsford, CM3 3AX	Residential property	51°46'11.73"N 0°33'1.96"E	9
R27	Whitehouse Farm / Cottages, Boreham Road, Little Waltham, Chelmsford, CM3 3NF	Residential property	51°48'10.30"N 0°31'12.67"E	26

Baseline Noise Surveys

11.5.15 Baseline noise monitoring has been carried out to establish the existing noise climate in the area. The monitoring procedures followed guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' (Ref 11-15) and BS 4142:2014+A1:2019

'Methods for rating and assessing industrial and commercial sound' (Ref 11-16). All noise measurements included $L_{Aeq,T}$ and $L_{A90,T}$ sound level indicators.

11.5.16 Long-term noise measurements were undertaken from 26 February 2021 to 8 March 2021 at locations representative of noise sensitive receptors around the Order limits.

11.5.17 Monitoring locations are shown in **Figure 11-1** of the ES [EN010118/APP/6.1] and summarised in **Table 11-4**. Based on their surroundings and relative distance to nearby sound sources (in particular road traffic), the monitoring locations have been allocated as representative of the local noise environment at each of the various noise-sensitive receptors (**Table 11-3**).

Table 11-4: Noise monitoring locations

Monitoring location	Monitoring dates	Representative of receptor
NM1	26 February to 3 March 2021	R4 Brick House Farm, R11 Properties South of A12
NM2	26 February to 3 March 2021	R24 Toppinghoe Hall, R26 Waltham Road Properties
NM3	3 March to 8 March 2021	R6 Kenwood House, R25 Wallace Farm Cottages
NM4	26 February to 3 March 2021	R3 Brent Hall Lodge, R16 Russell Green Bungalow, R17 Russell Green Cottages, R18 Russell Green House, R22 Stocks Farm
NM5	26 February to 3 March 2021	R2 Birds Farm, R7 Lawns Farm, R10 Noakes Farm, R12 Public House
NM6	3 March to 8 March 2021	R8 Leyland's Farm, R19 Scarlett's Farm, R27 Whitehouse Farm / Cottages
NM7	3 March to 8 March 2021	R13 Ridley Hall, R20 6 Braintree Road
NM8	3 March to 8 March 2021	R1 Beggars Hall, R5 Hankins Farm, R9 Little Weathers, R15 Roll's Farm, R21 Sparrow's Farm
NM9	3 March to 7 ^t March 2021	R14 Ringers Farm, R23 Porridge Pot Cottages

Receptor Sensitivity

11.5.18 Sensitive receptors as listed in **Table 11-3** have been classed depending on their use and subsequent sensitivity to noise and vibration based on previous experience of impact assessments for various development types and professional judgement. The sensitivity of receptors to noise and vibration has been defined in **Table 11-5**.

Table 11-5: Receptor sensitivity

Sensitivity	Description	Examples of receptor usage
High	Receptors where noise will significantly affect the function of a receptor.	Auditoria/studios; Specialist medical/teaching centres; and Libraries.
Medium	Receptors where people or operations are particularly susceptible to noise.	Residential and student accommodation; Hotels; Places of worship; Conference facilities; Schools in daytime; and Hospitals/residential care homes.
Low	Receptors of low sensitivity to noise, where it may cause some distraction or disturbance.	Public rights of way users; Liveries, stables and racing schools; ¹ Offices; Restaurants; and Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf).
Very low	Receptors where distraction or disturbance from noise is minimal.	Factories and working environments with existing high noise levels; and Sports grounds when spectator or noise is a normal part of the event.

11.5.19 Receptors R1 to R27 comprise a public house (which may include staff accommodation) and residential properties; as such they are considered to be of medium sensitivity. Additionally, users of Public Rights of Way (PRoW) have been considered as sensitive receptors. Due to the transient nature of users, users of the PRoW will not be subject to long-term noise exposure. Any noise experienced by PRoW users will be limited to when they are in proximity to the Scheme and when they are away from the Scheme will not be affected by noise (from construction, operation or decommissioning phases). Consequently, PRoW users are considered to be of low sensitivity to noise.

Construction and Decommissioning Noise

11.5.20 Annex E of BS 5228-1 provides example methods for the assessment of the significance of construction noise effects. With reference to the NPSE, the LOAEL and SOAEL thresholds have been set as follows:

- a. Weekday daytime (07:00 – 19:00) and Saturday daytime (07:00 – 13:00)
 LOAEL 65 dB $L_{Aeq,T}$ / SOAEL 75 dB $L_{Aeq,T}$;

¹ Note to table: Assigned 'low' as these receptors are considered less sensitive to noise since are not subject to sleeping/listening/teaching scenarios which would be assigned as 'medium'. There are no relevant design criteria for noise in these uses so this is based on professional judgement.

- b. Weekday evening (19:00 – 23:00), Saturday afternoon (13:00 – 23:00), and Sunday daytime (07:00 – 23:00) LOAEL 55 dB LAeq,T / SOAEL 65 dB LAeq,T; and
- c. Night-time (23:00 – 07:00) LOAEL 45 dB LAeq,T / SOAEL 55 dB LAeq,T.

11.5.21 There is precedent for the use of LOAEL and SOAEL for construction noise in other EIAs² and are also defined in DMRB.

11.5.22 In terms of sound insulation or temporary rehousing due to construction noise, BS 5228-1 states that a property would be eligible if exposed to significant levels of noise “for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months”. Consequently, these durations will be considered where a significant effect is identified.

Construction and Decommissioning Vibration

11.5.23 BS 5228-2 provides further guidance on the perception of vibration within occupied buildings. This provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with construction and decommissioning induced vibration. **Table 11-6** details Peak Particle Velocity (PPV) levels (a standard measure of vibration effects) and their potential effect on humans.

Table 11-6 Criteria for construction and decommissioning vibration (human response)

Effects Level	PPV Vibration Level	BS 5228-2 Description of Impact
LOAEL	0.3 mm/s	“Vibration might be just perceptible in residential environments.” *
SOAEL	1.0 mm/s	“It is likely that vibration of this level in residential environments will cause complaint, but it can be tolerated if prior warning and explanation has been given to residents.”

* Note to table: This includes similar uses e.g. hotels, bed and breakfasts.

11.5.24 The recommended PPV vibration limits for transient vibration, above which cosmetic damage could occur for different types of buildings are provided in BS 5228-2 and presented in **Table 11-7**. For these limits, 'minor damage' is possible at vibration magnitudes that are greater than twice those given in **Table 11-7**, and 'major damage' can occur at values greater than four times the tabulated values. Consequently, the significance of effect has been provided based on the sensitivity of a building to vibration induced cosmetic damage.

² For example High Speed 2, A14 Cambridge to Huntingdon and Thames Tideway

Table 11-7: Criteria for construction and decommissioning vibration (building response)

Type of building	Peak component particle velocity in frequency range of predominant pulse, at which cosmetic damage could occur	
	4 Hz to 15 Hz	4 Hz to 15 Hz
Reinforced or framed structures, Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures, Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 1: A potential negligible effect (not significant) is indicated at vibration levels up to the threshold values.

Note 2: A potential minor adverse effect (not significant) is indicated at vibration levels up to a magnitude of twice the threshold values.

Note 3: A potential moderate adverse effect (significant) is indicated at vibration levels up to a magnitude of four times the threshold values.

Note 4: A potential major adverse effect (significant) is indicated at vibration levels equal to or greater than a magnitude of four times the threshold values.

11.5.25 Given that criteria in **Table 11-7** relates to the risk of cosmetic damage, they are dependent on the type of building and its physical sensitivity to vibration. The criteria presented relates to the potential for cosmetic damage, not structural damage; cosmetic damage would precede the onset of any structural damage.

Construction and Decommissioning Traffic Noise

11.5.26 Construction and decommissioning traffic noise have been assessed for a representative worst-case day during the construction stage based on information in **Chapter 2: The Scheme** of the ES [EN010118/APP/6.1]. Predicted construction traffic noise levels along the main access routes have been compared to measured ambient noise levels so a potential change in noise can be derived.

11.5.27 There will be a daily maximum of 96 HGVs on the strategic road network, of which 50 HGVs would use the local highway network to access the Site via Wheelers Hill, Waltham Road and Cranham Road, with the remainder travelling to/ from Bull's Lodge Substation via Generals Lane. This is a worst-case figure, as this assumes that the peak phases of the Solar PV Site construction works and Bull's Lodge Substation extension works coincide.

11.5.28 Road traffic noise levels have been calculated with reference to methodology within CRTN which contains an equation for the calculation of the Basic Noise Level (BNL) from a road in terms of the 18-hour Average Annual Weekday Traffic (AAWT) flow from 06:00 to 24:00. The temporary changes in road traffic

noise levels along the local road network due to construction traffic have been assessed based on guidance from the Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014) (Ref 11-17) and short-term changes in noise from Table 3.54a of DMRB. Assessment criteria are presented in **Table 11-8**.

Table 11-8: Criteria for Construction Traffic Noise

Magnitude of Impact	Difference between baseline and construction traffic noise levels, $L_{Aeq,T}$
Very Low	≥ 0 dB and < 1 dB
Low	≥ 1 dB and < 3 dB
Medium	≥ 3 dB and < 5 dB
High	≥ 5 dB

11.5.29 DMRB defines the LOAEL as 55 dB LA10,18h and the SOAEL as 68 dB LA10,18h. DMRB goes on to state that:

“Where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB or over results in a likely significant effect”.

11.5.30 This implies that receptors experiencing noise levels exceeding the SOAEL are more sensitive to smaller changes in noise than receptors experiencing absolute noise levels below the SOAEL. As the BNL is calculated at 10m from the roadside, the absolute noise level is not considered to be representative of what nearby receptors may experience; however, it is appropriate for defining a change in noise level. Should an increase in noise of greater than 1 dB be identified from a road where the BNL exceeds the SOAEL, additional calculations are undertaken to identify the absolute noise levels at nearby receptors and the likelihood of significant effects.

Operational Noise

11.5.31 The Design Principles has been assessed, which comprises 150 central inverter units. To ensure that this option is a reasonable worst-case, sensitivity testing has been undertaken of an alternative inverter option using 1,800 small scale string inverter units. Source data for operational noise emissions and sensitivity testing are presented in **Appendix 11D: Operational Noise Modelling** of the ES [EN010118/APP/6.2].

11.5.32 Operational noise from fixed plant associated with the Longfield substation, BoSS and BESS elements of the Scheme has been assessed quantitatively at receptor locations in **Table 11-3** through noise predictions. As the proposed extension to the Bulls Lodge substation does not change the nature of noise at nearby sensitive receptors, a qualitative assessment of noise effects has been undertaken.

11.5.33 Noise predictions of the operational Scheme have been undertaken using CadnaA® (v2020) (Ref 11-18), which implements the calculation procedures

of ISO 9613 'Acoustics – Attenuation of Sound During Propagation Outdoors' (**Ref 11-19**), to predict the propagation of noise away from the Scheme in all directions and to quantify resultant noise levels at the identified noise sensitive receptor locations.

11.5.34 Operational noise has been assessed following BS 4142 guidance, whereby the rating level of noise emissions from activities are compared against the background level of the pre-development noise climate. Source data for operational noise emissions is presented in **Appendix 11D: Operational Noise Modelling** of the ES [EN010118/APP/6.1]. The relevant parameters in this instance are as follows:

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

11.5.35 BS 4142 recognises that certain acoustic features of a sound source can increase the impact over that expected based purely on the sound level. The standard identifies the following features to be considered:

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

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

- a. *"Typically, the greater this difference, the greater the magnitude of the impact.*
- b. *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c. *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

- d. *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

11.5.37 BS4142 advises that where rating levels and background levels are low, which is the case in rural areas surrounding the Order limits, the assessment of operational noise should take into context the absolute noise level. Assuming that, at night, residents will be inside their property, they would benefit from noise attenuation from the building envelope. BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (**Ref 11-20**) suggests that a building envelope with a partially open window is generally accepted to attenuate noise by up to 15 dB.

11.5.38 BS 8233 and the World Health Organization (WHO) 'Guidelines for Community Noise' (1999) (**Ref 11-21**) provide guidance levels for internal noise within dwellings and bedrooms of 35 dB $L_{Aeq,16hr}$ during the daytime and 30 dB $L_{Aeq,8hr}$ during the night-time. BS 8233 also advises that internal noise levels 5 dB greater than the guidance levels are 'reasonable'. As such, where predicted rating levels exceed the background level at a receptor, but are limited to an absolute external noise level of 50 dB $L_{Ar,Tr}$ during the daytime and 45 dB $L_{Ar,Tr}$ during the night-time then this will be considered as a low adverse magnitude impact. Absolute external noise levels up to 55 and 50 dB $L_{Ar,Tr}$ during the daytime and night-time will be considered as a medium adverse magnitude impact, and any greater will be considered a high adverse magnitude impact.

11.5.39 The assessment criteria for noise from fixed plant installations in low background noise environments are presented in **Table 11-9**, following guidance from BS 4142, BS 8233, and the WHO Guidelines. For assessment purposes, the LOAEL has been set as equal to the typical background level ($L_{A90,T}$) and the SOAEL as a rating level ($L_{Ar,Tr}$) of 50 and 45 dB during the daytime and night-time, respectively.

Table 11-9: Criteria for Fixed Plant Noise

Magnitude of Impact	Rating level (external) at façade of receptor, $L_{Ar,Tr}$
Very Low	Less than typical background level ($L_{A90,T}$)
Low	Equal to or greater than background level ($L_{A90,T}$) but not exceeding 50 dB (day) or 45 dB (night)
Medium	Greater than background level ($L_{A90,T}$) but not exceeding 55 dB (day) or 50 dB (night)
High	Greater than background level ($L_{A90,T}$) and exceeding 55 dB (day) or 50 dB (night)

Significance Criteria

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

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

11.5.41 Where adverse or beneficial noise and vibration effects have been identified, these are described using the following scale:

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

11.5.42 The duration of noise and vibration effects is defined as follows:

- a. Short-term - period with regular daily noise and/or vibration events lasting for no longer than one month;
- b. Medium-term - period with regular daily noise and/or vibration events lasting for no longer than six months; or
- c. Long-term - period with regular daily noise and/or vibration events lasting for longer than six months.

11.5.43 The magnitude of impact for each receptor is considered against its sensitivity to determine the significance of effect in accordance with the matrix presented in **Table 11-10**. This aligns with the methodology in **Chapter 5: EIA Methodology** of the ES [EN010118/APP/6.1].

Table 11-10: Classification of Effects

Sensitivity or value of resource /	Magnitude of impact			
	High	Medium	Low	Very low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

11.5.44 Generally, effects determined to be negligible or minor are considered to be **not significant**, whereas effects classed from moderate to major adverse are considered to be **significant**.

11.6 Baseline Conditions

11.6.1 This section describes the baseline environmental characteristics for the Site and surrounding areas with specific reference to noise. Further details of the

methodology and results of the baseline noise surveys are presented in in **Appendix 11B: Baseline Noise Surveys** of the ES [EN010118/APP/6.1].

Existing Baseline

11.6.2 The dominant noise source at the majority of the locations was observed to be road traffic from the surrounding road network, particularly at monitoring locations NM1, NM2 and NM3 which are located near to the A12. At more distant monitoring locations (i.e. NM4 to NM9) noise from the A12 was less audible although noise from passing vehicles on nearby roads was still observed.

11.6.3 A summary of the noise monitoring results is presented in **Table 11-11**. Typical ambient ($L_{Aeq,1hr}$) and background ($L_{A90,1hr}$) sound levels are presented for the relevant daytime, evening and weekend periods as per the construction noise assessment criteria.

Table 11-11: Summary of Long-Term Noise Monitoring Results

Monitor	Receptor	Sound level indicator, dB	Weekday Daytime (07:00 - 19:00)	Weekday Evening (19:00 - 23:00)	Saturday Morning (07:00 - 13:00)	Saturday Afternoon / Evening (13:00 - 23:00)	Sunday Daytime (07:00 - 23:00)	Night-time (23:00 - 07:00)
NM1	R4, R11	$L_{Aeq,1hr}$	62	59	62	57	60	49
		$L_{A90,1hr}$	55	46	52	51	52	36
NM2	R24, R26	$L_{Aeq,1hr}$	58	55	57	58	57	44
		$L_{A90,1hr}$	52	49	49	48	49	40
NM3	R6, R25	$L_{Aeq,1hr}$	73	70	71	72	70	62
		$L_{A90,1hr}$	46	40	44	42	39	31
NM4	R3, R16, R17, R18, R22	$L_{Aeq,1hr}$	73	70	71	73	72	63
		$L_{A90,1hr}$	42	35	43	37	38	33
NM5	R2, R7, R10, R12	$L_{Aeq,1hr}$	51	48	55	49	54	28
		$L_{A90,1hr}$	31	24	36	29	31	21
NM6	R8, R19, R27	$L_{Aeq,1hr}$	51	32	50	51	49	30
		$L_{A90,1hr}$	33	24	30	24	26	18
NM7	R13, R20	$L_{Aeq,1hr}$	45	31	43	40	40	38
		$L_{A90,1hr}$	37	25	32	29	28	22
NM8	R1, R5, R9, R15, R21	$L_{Aeq,1hr}$	53	33	52	56	52	27
		$L_{A90,1hr}$	30	26	31	27	27	19

Monitor	Receptor	Sound level indicator, dB	Weekday Daytime (07:00 - 19:00)	Weekday Evening (19:00 - 23:00)	Saturday Morning (07:00 - 13:00)	Saturday Afternoon / Evening (13:00 - 23:00)	Sunday Daytime (07:00 - 23:00)	Night-time (23:00 - 07:00)
NM9	R14, R23	L _{Aeq,1hr}	47	33	44	47	52	33
		L _{A90,1hr}	33	30	34	28	27	27

Future Baseline

- 11.6.4 In the absence of the Scheme it is considered that the future baseline noise environment will be higher than represented by the February 2021 measurement ambient sound levels. This is due to gradual increases in road traffic noise levels and the introduction of new noise-generating development in the local area.
- 11.6.5 The Chelmsford Garden Village is part of the Chelmsford Local Plan and is located directly to the west of the Scheme. It will include around 10,000 new homes, 400 hectares of green space, 46 hectares of employment space, 19.5 hectares of retail/commercial space, five new schools, five new healthcare and community spaces, and new transport infrastructure.
- 11.6.6 It is likely the development of the Chelmsford Garden Village will increase the local noise environment in the immediate area to the west of the Order limits due to the introduction of new sound sources, in particular road traffic. However information on the scale of increase to the local noise environment with all associated development in place (as opposed to noise increases associated with individual developments within the Chelmsford Garden Village) is not readily available.
- 11.6.7 As such, the measured ambient sound levels (taken in February 2021) have been considered as representative of a future baseline scenario, with construction anticipated to commence not earlier than 2024, operation to commence no earlier than 2026 and decommissioning to commence in 2066. This provides a more conservative assessment (as a lower baseline will be more sensitive to changes from the Scheme) and therefore is considered appropriate for use for the assessment of noise effects associated with the Scheme programme for construction and operational phases.

11.7 Embedded Design Mitigation

- 11.7.1 The way that potential environmental impacts have been or will be avoided, prevented, reduced, or off-set through design and/or management of the Scheme are outlined below and will be taken into account as part of the assessment of the potential effects. Proposed environmental enhancements are also described where relevant. The mitigation measures for both the construction/decommissioning and operational phases, are outlined below. Embedded mitigation measures demonstrate compliance with paragraph 5.11.9 of the NPS EN-1 to mitigate and minimise adverse impacts on health and quality of life.

Construction and Decommissioning Phase

- 11.7.2 Measures to control noise as defined in Annex B of BS 5228-1 and measures to control vibration as defined in Section 8 of BS 5228-2 will be adopted as far as reasonably practicable. These measures represent BPM and are included within the OCEMP and the Decommissioning Strategy [EN010118/APP/7.12] as outlined in **Chapter 2: The Scheme** of the ES.
- 11.7.3 BPM that will be implemented during construction and decommissioning works and secured through the CEMP and Decommissioning Strategy are presented below:
- a. Ensuring that all appropriate processes, procedures and measures are in place to minimise noise before works begin and throughout the construction programme;
 - b. All contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which should form a prerequisite of their appointment;
 - c. Ensuring that, where reasonably practicable, noise and vibration is controlled at source (e.g. the selection of inherently quiet plant and low vibration equipment), review of the construction programme and methodology to consider quieter methods, consideration of the location of equipment on-site and control of working hours;
 - d. Use of modern plant, complying with applicable UK noise emission requirements;
 - e. Hydraulic techniques for breaking to be used in preference to percussive techniques, where reasonably practicable;
 - f. Drop heights of materials will be minimised;
 - g. Plant and vehicles will be sequentially started up rather than all together;
 - h. Off-site pre-fabrication where reasonably practicable;
 - i. Use of screening locally around significant noise producing plant and activities;
 - j. Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications;
 - k. All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;
 - l. Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Order limits to be conducted in such a manner as to minimise noise generation, as far as reasonably practicable;
 - m. All vehicles used on-site shall incorporate reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance where reasonably practicable;
 - n. Appropriate routing of construction and decommissioning traffic on public roads and along access tracks pursuant to the CTMP;

- o. Provision of information to the relevant local authority and local residents to advise of potential noisy works that are due to take place; and
 - p. Monitoring of noise complaints and reporting to the Applicant for immediate investigation and action. A display board will be installed on-site and a website will be set up. These will include contact details for the Site Manager or alternative public interface with whom nuisance or complaints can be lodged. A logbook of complaints will be prepared and managed by the Site Manager.
 - q. Construction working hours on the Solar Farm Site will run from 07:00 to 19:00 Monday to Saturday. Construction working hours on the Bulls Lodge Substation Extension will run from 07:00 to 19:00 Monday to Saturday with the exception of overhead line works which will run from 07:00 to 19:00 Monday to Sunday.
 - r. Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use.
 - s. Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas
- 11.7.4 A construction noise monitoring scheme shall be developed as per requirements of the OCEMP following appointment of a principal contractor and prior to commencement of construction works. Requirements for monitoring during the decommissioning stages will be outlined in the Decommissioning Strategy.
- 11.7.5 The effect of noise and vibration on nearby sensitive receptors can be minimised through a good communication strategy. Prior to construction works being undertaken, liaison will be undertaken with occupiers of sensitive receptors that may be adversely affected by construction noise and vibration. All communications will contain contact details to direct any questions or complaints to.
- 11.7.6 Consideration has been given to traffic routing, timing and access points to the Scheme to minimise noise impacts at existing receptors as detailed in **Chapter 13: Transport and Access** of the ES [EN010118/APP/6.1]. Management of Heavy Goods Vehicles (HGV) within the Scheme and being let onto the highway network will be managed through a Framework Construction Traffic Management Plan (CTMP) as outlined in **Chapter 2: The Scheme** of the ES and secured in a requirement attached to the DCO.

Operational Phase

- 11.7.7 Embedded mitigation measures for the operational phase have been considered with reference to paragraph 5.11.8 of the NPS EN-1.
- 11.7.8 The Design Principles of the Scheme has incorporated measures such as distancing of inverters away from sensitive receptors, and locating the BESS compound in an area away from large concentrations of receptors as well as towards the A12 where existing ambient noise levels are higher (such that noise emissions from the BESS are less impactful).

11.7.9 The embedded design within the Design Principles will ensure the use of acoustic barriers around inverters within 250m of receptors, which achieve a minimum 10dB(A) sound reduction, or an inverter selected with sound power levels at least 10dB lower than 96dB, which has been applied to inverters in this assessment. In the case of the layout covered by the Design Principles, inverters within 250 m of receptors R2, R3, R5, R6, R8, R9, R10, R15, R16, R19, R21 and R23 are treated with acoustic barriers. Acoustic barriers may comprise close-boarded impervious wooden fencing or a similar construction, which can provide at least 10 dB of attenuation to noise emissions from inverters.

11.7.10 Solar PV modules will be mounted on fixed structures which will not produce any noise emissions.

11.8 Assessment of Likely Impacts and Effects

11.8.1 The impacts and effects associated with the construction/decommissioning and operational phases of the Scheme are outlined in the sections below. The assessments have been assessed following consideration of the embedded mitigation measures as described in section 11.7.

Construction and Decommissioning Noise

11.8.2 The following main noise-generating activities have been assessed, although this does not cover all activities that could take place (e.g. works involving other static or moving plant items that will produce lower levels of noise):

- a. Site preparation, which will likely include the use of excavators and dozers;
- b. Installation of solar PV panels, which will likely include the use of piling rigs and excavators, or concrete foundations excavated to a depth of 0.5 m;
- c. Construction of the BESS , where the main components will be mounted on a reinforced concrete foundation slab or concrete piles;
- d. Trenching and installation of the Grid Connection Route, which will likely include the use of excavators and dozers;
- e. The Bulls Lodge Substation Extension Site, which will include construction of a main substation building, air insulated switchgear, associated civil works, a drainage system, temporary overhead line alterations and an access road; and
- f. Decommissioning of the Solar PV Array Works Area and related components, Ancillary Infrastructure, Longfield Substation and the BESS.

11.8.3 Typical noise levels from these types of activities with multiple plant carrying out heavy ground works can be up to 85 dB $L_{Aeq,T}$ at a distance of 10m, without the use of any noise reduction measures e.g. equipment in continuous use and no site hoarding or acoustic barriers in place.

11.8.4 While exact working methods, plant schedules and locations are to be finalised, an estimate of construction and decommissioning noise levels at varying distances is presented in **Table 11-12** based on an upper range noise

level of 85 dB $L_{Aeq,T}$ at 10m. This level of noise is only likely to occur during site clearance activities and noise levels are likely to be no higher during other phase of construction and decommissioning works. This is considered to be representative of a worst-case scenario. Further details of the predictions are presented in the **Appendix 11C: Construction Noise Modelling** of the ES [EN010118/APP/6.1].

Table 11-12: Construction and Decommissioning Noise Levels at Varying Distances

Distance from works, m	Construction noise level, dB $L_{Aeq,T}$
10	85
25	77
50	71
75	67
100	65
150	61
200	59
250	57
300	55

- 11.8.5 Construction and decommissioning noise levels at surrounding receptors will vary depending on the locations and types of works taking place. Due to the variation in work activities and locations across the Scheme, it is considered that any periods of regular high construction noise levels experienced at a receptor would be of a limited short-term duration (i.e. less than one month). Occupants of nearby receptors are likely to be more tolerable of these events if they are regularly communicated to, and kept informed of timings and duration of high noise generating events.
- 11.8.6 When works take place at their closest approach to a receptor, noise levels could theoretically approach and exceed the daytime SOAEL of 75 dB $L_{Aeq,T}$ when heavy ground works take place within approximately 30m (as indicated in **Table 11-12**), and the Saturday afternoon/ Sunday daytime SOAEL of 65 dB $L_{Aeq,T}$ when within 100m in the absence of embedded mitigation.
- 11.8.7 Exceedances of the SOAEL should be avoided through provision of mitigation. Embedded mitigation measures cover the implementation of BPM (secured through the OCEMP and Decommissioning Strategy), which includes local screening of construction activities. Partial screening of construction activities can conservatively reduce noise by approximately 5 dB. Additionally, implementation of BPM will provide a means to reduce noise from construction activities. Table B.1 of BS 5228-1 provides information on levels of noise reduction that may be achieved through reduction of noise at source. Based on the information in Table B.1 of BS 5228-1, it is assumed that an additional

5 dB reduction in predicted noise levels can be achieved through implementation of BPM.

11.8.8 Accounting for mitigation discussed in the preceding paragraph that will be secured through the OCEMP and the Decommissioning Strategy, construction and decommissioning noise may exceed the daytime SOAEL of 75 dB $L_{Aeq,T}$ when heavy ground works take place within approximately 10 m (as indicated in **Table 11-12**), and the Saturday afternoon/ Sunday daytime SOAEL of 65 dB $L_{Aeq,T}$ when within 30 m. Receptors that may experience exceedances of the SOAEL are R1-R3, R5, R9, R10, R15-R18, R21, R23 and R25.

11.8.9 The effect of noise on nearby sensitive receptors can be minimised through a good communication strategy. Paragraph 6.3 of BS 5228-1 states that

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

11.8.10 Consequently, the communication strategy secured through the OCEMP and Decommissioning Strategy will ensure that occupants of affected properties will be notified of the timings and duration of works. As works are unlikely to occur for a period of 10 or more days in close proximity to sensitive receptors, noise effects due to construction and decommissioning activities are **not significant**.

11.8.11 In addition to residential receptors, the PROW passes approximately 25 to the west of the BESS. Consequently, there is potential for users of the PROW to experience exceedances of the SOAEL. Users of the PROW will be exposed to high levels of noise for the duration it takes them to walk past the Site. Due to the limited exposure time and the low sensitivity to noise of PROW users (see paragraph **11.5.19**), construction noise effects are **not significant**.

11.8.12 For the majority of the construction and decommissioning activities, high-noise works will take place at distances from a receptor such that construction noise levels would only likely exceed the LOAEL. Exceedances of the LOAEL should be mitigated and reduced to a minimum, which would be achieved through mitigation secured in the OCEMP and Decommissioning Strategy.

Construction and Decommissioning Vibration

11.8.13 BS 5228-2 makes reference to the Transport Research Laboratory (TRL) report 429 'Groundborne Vibration Caused by Mechanised Construction Works' (2000) (Ref 11-22). Figure 50 of the TRL report indicates that ground vibration from miscellaneous vehicle operations on construction sites (including scrapers, rollers, dumpers, breakers, dozers and HGVs) are in the region of 1 mm/s PPV at approximately 10m, decreasing to the region of 0.1 mm/s PPV at approximately 50m.

11.8.14 Actual vibration levels from works are dependent on a number of factors including ground conditions, plant or vehicle size, the nature of the works (in particular piling methods), the speed of HGV movements, and the quality of surface of haul or other temporary roads. Based on the assumed HGV speeds on access routes and regular maintenance of access route road surfaces, vibration from vehicles on the access roads will be minimised.

- 11.8.15 BS 5228-2 indicates that impact or vibratory piling activities generally only generate vibration impacts when they are located less than 20 m from sensitive locations. The impact depends on the type of piling, ground conditions, and receptor distance. Vibration from auger piling techniques, which may be used at the BESS compound and is considered to represent a reasonable worst-case, are generally limited to 1mm/s for distances up to 10 m.
- 11.8.16 Based on the distances between the Order limits and surrounding receptors to locations where heavy ground works (excavation, piling) may take place, it is considered that vibration from construction works experienced at sensitive receptors will be below the LOAEL and **not significant**.
- 11.8.17 When considering traffic generated vibration, DMRB states that: "*Ground-borne vibrations are produced by the movement of rolling wheels on the road surface and can be perceptible in nearby buildings if heavy vehicles pass over irregularities in the road*" (Paragraph A5.25).
- 11.8.18 Occupants of buildings would be at risk to disturbance from traffic generated vibration if buildings were "...*founded on soft soils close to heavily trafficked older roads where the road surface is uneven or constructed from concrete slabs which can rock under the weight of passing heavy vehicles*" (paragraph A5.25).
- 11.8.19 Given that construction and decommissioning traffic will access/egress the Order limits using main roads, construction traffic will use routes that are required to be kept in good condition due to heavy density traffic flows. Additionally, haul routes and access roads will be kept well maintained to minimise construction and decommissioning traffic induced vibration (see **Appendix 2A** of the ES [EN010118/APP/6.2]). Consequently, the conditions described above for risk of disturbance from construction and decommissioning traffic vibration are unlikely to occur on roads used by construction traffic and construction traffic vibration is **not significant**.
- 11.8.20 It is considered that any periods of construction and decommissioning vibration experienced at a receptor would unlikely exceed one month, with no permanent residual effect once works are completed. As such, any construction vibration effects are considered to be short-term in duration.

Construction and Decommissioning Traffic Noise

- 11.8.21 As per information in **Chapter 2: The Scheme** of the ES there will be a daily maximum of 96 HGVs on the strategic road network, of which 46 HGVs would travel to/ from Bull's Lodge Substation via Generals Lane. No receptors are within the study area along this route, so an assessment of construction traffic noise effects has not been undertaken for Bulls Lodge Substation associated construction traffic.
- 11.8.22 The remaining 50 HGVs would use the local highway network to access the Site at the corner of Waltham Road and Cranham Road via Wheelers Hill. In addition, there will be approximately 330 vehicle movements per day associated with construction worker arrivals and departures, including shuttle buses. Traffic during decommissioning is expected to be similar (or lesser) to the construction phase.

- 11.8.23 Road traffic flows on Cranham Road/ Wheelers Hill are approximately an AAWT of 3,940 with 2% HGVs. This calculates to be a BNL of 67.6 dB assuming traffic move at the speed limit of 60 miles per hour. Adding 330 light vehicle movements and 100 HGV movements (arrivals and departures) to the baseline AAWT data increases the BNL to 68.3 dB, which is an increase of 0.7 dB. This change in noise due to construction traffic will occur at medium sensitivity receptors within the study are along Cranham Road/ Wheelers Hill.
- 11.8.24 BNL calculations indicate that construction and decommissioning traffic noise experienced at sensitive receptors will be limited to very low magnitude impacts as per the criteria in **Table 11-8**. For receptors of medium sensitivity this would be equivalent to a **negligible** effect, which is **not significant**. The construction programme is assessed as 24-months duration so any construction traffic noise effects are considered to be temporary and long-term in duration.

Operational Noise

- 11.8.25 The assessment of predicted operational noise levels at surrounding receptors from operational plant is presented in **Table 11-13** (daytime periods), **Table 11-14** (weekday evening) and **Table 11-15** (night-time/early morning periods). Predicted rating levels ($L_{Ar,1hr}$) have been assessed per the criteria in **Table 11-9**.
- 11.8.26 For the assessment of operational noise during the daytime (07:00 to 19:00 hours), the typical background level has been defined from a Sunday daytime period with lower noise levels compared to a weekday or Saturday, as to provide a worst-case assessment scenario. It has been assumed that all plant is in operation continuously during the daytime.
- 11.8.27 Operational noise has been assessed with all plant being in maximum operation. This is likely to overestimate of the actual effects from operational noise, as typically, the inverters and transformers will not be operational or operating at maximum capacity during night-time, early morning, or evening hours (during which hours there is typically less or no sunlight).
- 11.8.28 BESS cooling fans will also operate dependent on ambient temperatures and would not be in a full mode of operation during cooler temperatures.
- 11.8.29 Sound level data for inverters and cooling fans in reduced modes of operation is not available from manufacturers and therefore not available for the purposes of this assessment. The noise levels presented in **Table 11-15** are based on inverters and cooling fans operating at full load so are likely to be overestimated. Consequently, this is considered to represent a reasonable worst-case assessment scenario.
- 11.8.30 Plant will operate continuously so there will not be any noticeable impulsive or intermittent characteristics from plant noise emissions experienced at the surrounding receptors. Transformers within the BESS compound can have tonal features, although noise emissions from the BESS will be dominated by the cooling fans such that any tonal features of the transformers will not be noticeable. However, overall plant noise emissions will likely be experienced at receptors as a distinctive continuous and steady hum; therefore a 3 dB

correction to account for noise that is ‘distinctive against the residual acoustic environment’ has been applied in determining the rating level

11.8.31 Details of the calculations are provided in **Appendix 11D: Operational Noise Modelling** of the ES [EN010118/APP/6.2] and a noise contour plot is presented in **Figure 11-2** of the ES [EN010118/APP/6.3].

Table 11-13: Operational Noise Assessment – Sunday Daytime

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level $L_{A90,1hr}$	Predicted rating level $L_{Ar,1hr}$	Difference between background and rating level	Estimated internal level $L_{Ar,1hr}$		
R1	27	42	+15	28	Low	Minor adverse
R2	31	43	+12	30	Low	Minor adverse
R3	38	44	+6	31	Low	Minor adverse
R4	52	28	-24	13	Very low	Negligible
R5	27	43	+16	30	Low	Minor adverse
R6	39	43	+4	31	Low	Minor adverse
R7	31	40	+9	26	Low	Minor adverse
R8	26	44	+18	30	Low	Minor adverse
R9	27	42	+15	29	Low	Minor adverse
R10	31	43	+12	29	Low	Minor adverse
R11	52	30	-22	15	Very low	Negligible
R12	31	41	+10	27	Low	Minor adverse
R13	28	37	+9	22	Low	Minor adverse
R14	27	42	+15	28	Low	Minor adverse
R15	27	43	+16	29	Low	Minor adverse

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	L _{A90,1hr}	L _{Ar,1hr}		L _{Ar,1hr}		
R16	38	44	+6	31	Low	Minor adverse
R17	38	37	-1	25	Low	Minor adverse
R18	38	36	-2	22	Very low	Negligible
R19	26	44	+18	31	Low	Minor adverse
R20	28	36	+8	23	Low	Minor adverse
R21	27	44	+17	30	Low	Minor adverse
R22	38	42	+4	28	Low	Minor adverse
R23	27	43	+16	30	Low	Minor adverse
R24	49	39	-10	25	Very low	Negligible
R25	39	37	-2	23	Very low	Negligible
R26	49	37	-12	22	Very low	Negligible
R27	26	43	+17	29	Low	Minor adverse

Table 11-14: Operational Noise Assessment – Weekday Evenings

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	L _{A90,1hr}	L _{Ar,1hr}		L _{Ar,1hr}		
R1	26	42	+16	28	Low	Minor adverse
R2	24	43	+19	30	Low	Minor adverse

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	L _{A90,1hr}	L _{Ar,1hr}		L _{Ar,1hr}		
R3	35	44	+9	31	Low	Minor adverse
R4	46	28	-18	13	Very low	Negligible
R5	26	43	+17	30	Low	Minor adverse
R6	40	43	+3	31	Low	Minor adverse
R7	24	40	+16	26	Low	Minor adverse
R8	24	44	+20	30	Low	Minor adverse
R9	26	42	+16	29	Low	Minor adverse
R10	24	43	+19	29	Low	Minor adverse
R11	46	30	-16	15	Very low	Negligible
R12	24	41	+17	27	Low	Minor adverse
R13	25	37	+12	22	Low	Minor adverse
R14	30	42	+12	28	Low	Minor adverse
R15	26	43	+17	29	Low	Minor adverse
R16	35	44	+9	31	Low	Minor adverse
R17	35	37	+2	25	Low	Minor adverse
R18	35	36	+1	22	Low	Minor adverse
R19	24	44	+20	31	Low	Minor adverse
R20	25	36	+11	23	Low	Minor adverse

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	L _{A90,1hr}	L _{Ar,1hr}		L _{Ar,1hr}		
R21	26	44	+18	30	Low	Minor adverse
R22	35	42	+7	28	Low	Minor adverse
R23	30	43	+13	30	Low	Minor adverse
R24	49	39	-10	25	Very low	Negligible
R25	40	37	-3	23	Very low	Negligible
R26	49	37	-12	22	Very low	Negligible
R27	24	43	+19	29	Low	Minor adverse

Table 11-15: Operational Noise Assessment – Night-time/Early Morning Periods

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	L _{A90,1hr}	L _{Ar,1hr}		L _{Ar,1hr}		
R1	27	42	+15	28	Low	Minor adverse
R2	31	43	+12	30	Low	Minor adverse
R3	38	44	+6	31	Low	Minor adverse
R4	52	28	-24	13	Very low	Negligible
R5	27	43	+16	30	Low	Minor adverse
R6	39	43	+4	31	Low	Minor adverse
R7	31	40	+9	26	Low	Minor adverse

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	L _{A90,1hr}	L _{Ar,1hr}		L _{Ar,1hr}		
R8	26	44	+18	30	Low	Minor adverse
R9	27	42	+15	29	Low	Minor adverse
R10	31	43	+12	29	Low	Minor adverse
R11	52	30	-22	15	Very low	Negligible
R12	31	41	+10	27	Low	Minor adverse
R13	28	37	+9	22	Low	Minor adverse
R14	27	42	+15	28	Low	Minor adverse
R15	27	43	+16	29	Low	Minor adverse
R16	38	44	+6	31	Low	Minor adverse
R17	38	37	-1	25	Low	Minor adverse
R18	38	36	-2	22	Very low	Negligible
R19	26	44	+18	31	Low	Minor adverse
R20	28	36	+8	23	Low	Minor adverse
R21	27	44	+17	30	Low	Minor adverse
R22	38	42	+4	28	Low	Minor adverse
R23	27	43	+16	30	Low	Minor adverse
R24	49	39	-10	25	Very low	Negligible
R25	39	37	-2	23	Very low	Negligible
R26	49	37	-12	22	Very low	Negligible

Receptor	Sound pressure level, dB				Magnitude of Impact	Potential Significance of Effect
	Measured background level	Predicted rating level	Difference between background and rating level	Estimated internal level		
	$L_{A90,1hr}$	$L_{Ar,1hr}$		$L_{Ar,1hr}$		
R27	26	43	+17	29	Low	Minor adverse

11.8.32 During the daytime, rating levels are predicted to be below background levels (and therefore do not exceed the LOAEL) at receptors R4, R11, R18, R24, R25 and R26, which is a very low adverse magnitude impact. For receptors of medium sensitivity this is equivalent to a **negligible** effect, which is **not significant**.

11.8.33 At all other receptors during the daytime, rating levels are predicted to be above background levels but do not exceed 50 dB $L_{Ar,1hr}$ (exceeding the LOAEL but not the SOAEL) which is a low adverse magnitude impact. For receptors of medium sensitivity this is equivalent to a **minor adverse** effect, which is **not significant**.

11.8.34 During the weekday evening period, rating levels at receptor R4, R11, R24, R25 and R26 are predicted to be below background levels (and therefore do not exceed the LOAEL), which is a very low adverse magnitude impact. For receptors of medium sensitivity this is equivalent to a **negligible** effect, which is **not significant**.

11.8.35 At all other receptors during the weekday evening period, rating levels are predicted to be above background levels but do not exceed 45 dB $L_{Ar,1hr}$ (exceeding the LOAEL but not the SOAEL) which is a low adverse magnitude impact. For receptors of medium sensitivity this is equivalent to a **minor adverse** effect, which is **not significant**.

11.8.36 During the night-time/early morning period, rating levels at receptor R4, R11 and R26 are predicted to be below background levels (and therefore do not exceed the LOAEL), which is a very low adverse magnitude impact. For receptors of medium sensitivity this is equivalent to a **negligible** effect, which is **not significant**.

11.8.37 At all other receptors during the night-time/early morning period, rating levels are predicted to be above background levels but do not exceed 45 dB $L_{Ar,1hr}$ (exceeding the LOAEL but not the SOAEL) which is a low adverse magnitude impact. For receptors of medium sensitivity this is equivalent to a **minor adverse** effect, which is **not significant**.

11.8.38 User of the PRow will be affected by operational noise. Noise predictions indicate that that the highest level of operational noise at the section of the PRow that passes the west boundary of the BESS is approximately 52 dB $L_{Ar,1hr}$. As PRow users are considered to be low sensitivity to noise due to their limited exposure time, this is equivalent to a **minor adverse** effect and **not significant**.

11.8.39 No exceedances of the SOAEL are predicted during the daytime, evening and night periods. This demonstrates compliance with paragraph 5.11.9 of NPS EN-1 to avoid significant adverse impacts on health and quality of life.

11.8.40 As the operational phase of the Scheme is proposed to commence no earlier than 2026, with decommissioning to commence in approximately 2066 (note that **Chapter 2: The Scheme** of the ES advises that the Scheme may operate beyond its 40 year design life), any operational noise effects are considered to be long-term in duration.

11.8.41 The proposed extension to the Bulls Lodge Substation will be on the opposite side to the nearest sensitive receptor (R3). New plant that will be installed are of a similar nature to plant currently operating and will generate low levels of noise. As the new plant will not change the nature of plant noise emissions and will be located further from the nearest sensitive receptor than existing plant, noise impacts from the proposed Bulls Lodge Substation extension are not considered result in any additional noise impacts than currently experienced at R3. Consequently, noise from the proposed Bulls Lodge Substation is considered to be **negligible** and **not significant**.

Summary of Impacts and Effects

11.8.42 **Table 11-16** presents a summary of the impacts and effects during the construction (and decommissioning) and operational phases of the Scheme.

Table 11-16: Summary of Magnitude of Impact and Significance of Effect

Receptor	Sensitivity (Value)	Description of Impact	Magnitude of Impact	Effect Category	Significant effect (Yes / No)
Construction (and Decommissioning) Phase					
All (R1-R27)	Medium	Construction/ decommissioning works noise	Long-term, Temporary, Low	Minor Adverse	No
All (R1-R27)	Medium	Construction/ decommissioning works vibration	Short-term, Temporary, Very low	Negligible	No
All (R1-R27)	Medium	Construction/ decommissioning traffic noise	Short-term, Temporary, Very low	Negligible	No
Operational Phase					
R4, R11 and R26	Medium	Operational plant noise	Long-term, Permanent, Very low	Negligible	No
R18, R24 and R25	Medium	Operational plant noise	Long-term, Permanent, Very low to Low	Negligible to Minor Adverse	No

Receptor	Sensitivity (Value)	Description of Impact	Magnitude of Impact	Effect Category	Significant effect (Yes / No)
R1-R3, R5-R10, R12-R17, R19-R23, R27	Medium	Operational plant noise	Long-term, Permanent, Low	Minor Adverse	No
All (R1-R27)	Medium	Operational traffic noise	Long-term, Permanent, Very Low	Negligible	No

11.9 Additional Mitigation and Enhancement Measures

- 11.9.1 At this stage no specific details for additional mitigation, enhancement or monitoring measures for the construction/decommissioning phases are proposed given that no significant adverse effects have been predicted.
- 11.9.2 The Concept Design drawings show an acoustic barrier at the west-end of the BESS, which was not accounted for in noise predictions. The purpose of this fence is to screen plant noise for users of the P_{RoW}. The effect of screening provided by this barrier, set at a maximum height of 4 m, is illustrated in **Figure 11-4** of the ES [EN010118/APP/6.3] and demonstrates how the barrier, in combination with screening provided at the nearby solar station (see paragraph 11.7.9), can reduce noise at the P_{RoW} to below 50 dB L_{A_r,Tr}. This is considered to be the best practicable acoustic environment that can be provided in the context of sustainable development. Although, an acoustic barrier is necessary to achieve the target level of noise in the Concept Design, other future designs may use alternative mitigation or potentially no mitigation if quieter equipment is procured than has been modelled in this chapter.
- 11.9.3 It is acknowledged that the DCO allows flexibility for the location of solar stations in accordance with the Works Plans, such that the finalised locations may be closer to receptors. Any changes to the Scheme that result in solar station being located closer to receptors will be assessed during the detailed design. Where necessary, all practicable mitigation measures will be provided to ensure noise at receptor locations is within Design Principle limits.

11.10 Residual Effects and Conclusions

- 11.10.1 This section summarises the residual significant effects of the Scheme due to noise and vibration following the implementation of mitigation.
- 11.10.2 No significant residual adverse effects due to construction/decommissioning or operational phase noise and vibration have been identified. Residual effects are listed in **Table 11-17** (Scheme construction and decommissioning) and
- 11.10.3 **Table 11-18** (Scheme operation). As concluded in **Chapter 15: Health** of the ES [EN010118/APP/6.1] there will be no significant health impacts due to the interaction of noise, land quality, transport, and landscape and visual amenity.

Table 11-17: Summary of Residual Effects (Construction and Decommissioning)

Receptor	Description of impact	Significance of effect without mitigation	Mitigation/Enhancement measure	Residual effect after mitigation
All (R1-R27)	Disturbance from construction / decommissioning works noise	Below SOAEL Not Significant	N/A	Below SOAEL Not Significant
All (R1-R27)	Disturbance from construction / decommissioning works vibration	Below SOAEL Not Significant	N/A	Below SOAEL Not Significant
All (R1-R27)	Disturbance from construction / decommissioning traffic noise	Negligible Not Significant	N/A	Negligible Not Significant

Table 11-18: Summary of Residual Effects (Operation)

Receptor	Description of impact	Significance of effect without mitigation	Mitigation/Enhancement measure	Residual effect after mitigation
R4, R11, R26 and R27	Disturbance from operational plant noise	Negligible Not Significant	N/A	Negligible Not Significant
R18, R24 and R25	Disturbance from operational plant noise	Negligible to Minor Adverse Not Significant	N/A	Negligible to Minor Adverse Not Significant
R1-R3, R5-R10, R12-R17, R19-R23, R27	Disturbance from operational plant noise	Minor Adverse Not Significant	N/A	Minor Adverse Not Significant
All (R1-R27)	Disturbance from operational traffic noise	Negligible Not Significant	N/A	Negligible Not Significant

11.11 Cumulative Effects

11.11.1 Cumulative noise effects during construction and operation phases may occur when developments are located nearby to a common receptor. At distances of greater than 500m any interaction of noise emissions from multiple developments would be attenuated such that there would normally be no combined effect.

11.11.2 A list of relevant developments is presented in **Appendix 5A** of the ES [EN010118/APP/6.2], and cumulative assessment methodology discussed within **Chapter 5: EIA Methodology** of the ES [EN010118/APP/6.1]. The following developments in **Table 11-19** have been identified to be within 500m of the Scheme.

Table 11-19: Cumulative Developments within 500m of the Scheme

#	Name	Location description	Development Summary	LPA	Ref permission / application
1	Beaulieu Station Hub	West of Bulls Lodge	Up to 3600 dwellings and 62,300sqm employment floorspace.	CCC	19/01722/SCOPE
3	Flour Mill	Adjacent to site to west	Flour and Feed Mill	CCC	16/01394/OUT
16	Radial Distributor Road (RDR) Phase 3	West of Bulls Lodge	Radial distributor road (Phase 3)	CCC	27/04/2018
17	Radial Distributor Road (RDR) Phases 2a and 2b	West of Bulls Lodge	Radial distributor road (Phase 2a and 2b)	CCC	27/04/2018

11.11.3 Development #3 (Flour Mill) is located directly adjacent to the Order limits along Cranham Road, although is approximately 500m to the west of areas where PV panels and BoSS plant would be installed. Common receptors to this development and the Scheme are R17 and R18, which are approximately 500m away from this development.

11.11.4 Developments #1 (Beaulieu Station Hub), #16 (RDR Phase 3) and #17 (RDR Phases 2a and 2b) are located directly adjacent to the Order limits along Generals Lane, although are approximately 1km to the west of the Bulls Lodge Substation Extension Site and 2.5km to the southwest of areas where PV panels, BoSS and BESS plant would be installed. Common receptors to these developments and the Scheme are R4 and R11, which are approximately 1.5km away from this development.

11.11.5 The precise scale of additional noise effects will be dependent on the exact works taking place at each location at any one time; however, compliance with the mitigation measures detailed within the OCEMP and Decommissioning Strategy will reduce these effects as far as possible. It has been assumed that

the other developments will also be required to adopt BPM as standard working practices during their construction phases and that noise and vibration levels will comply with set limits in accordance with guidance in BS 5228-1 and BS 5228-2.

11.11.6 Based on the distances from key project components to cumulative developments and requirements to implement BPM, it is considered that any overlapping of construction phases between the Scheme and the other nearby development schemes would not result in any in-combination cumulative effects at common noise-sensitive receptors. Predicted construction and decommissioning noise effects from the Scheme are below the LOAEL, and it is considered that cumulative effects of construction noise will remain unchanged from the residual effects and, therefore, remain not significant.

11.11.7 It is expected that any operational noise emissions from nearby developments will be designed to achieve appropriate operational noise limits so as not to contribute additional noise to the area (i.e. 'background creep', which could avoid any adverse effects to noise-sensitive receptors in the area). The control and mitigation of noise effects from surrounding development will be the responsibility of the developer. Given the requirement for new developments to achieve operational noise standards and the relative distance between cumulative developments and the Scheme (discussed in paragraphs 11.11.3 and 11.11.4), operational noise effects from the Scheme will remain unchanged from the residual effects and therefore remain negligible to minor adverse and not significant.

11.12 References

- Ref 11-1 Her Majesty's Stationery Office (1974); Control of Pollution Act.
- Ref 11-2 Her Majesty's Stationery Office (1995); Environmental Protection Act.
- Ref 11-3 Ministry of Housing, Communities & Local Government (MHCLG) (2021) National Planning Policy Framework.
- Ref 11-4 Department of Energy and Climate Change. (2011) Overarching National Policy Statement for Energy (EN-1).
- Ref 11-5 Department of Energy and Climate Change (2011) National Policy Statement for Renewable Energy Infrastructure (EN-3).
- Ref 11-6 Department for Business, Energy & Industrial Strategy (2021) Draft overarching National Policy Statement for energy (EN-1).
- Ref 11-7 Department for Business, Energy & Industrial Strategy (2021) Draft National Policy Statement for renewable energy infrastructure (EN-3).
- Ref 11-8 Department for Environment Food and Rural Affairs (Defra) (2010); Noise Policy Statement for England.
- Ref 11-9 Ministry of Housing, Communities & Local Government (2019); Planning Practice Guidance - Noise.
- Ref 11-10 Braintree District Council (2021); Local Development Framework: Core Strategy.
- Ref 11-11 Braintree District Council (2021); Local Plan Section 1.
- Ref 11-12 Chelmsford City Council (2020); Local Plan.
- Ref 11-13 British Standards Institute (2009 with 2014 amendments) BS 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Noise, BSi, London.

- Ref 11-14 Highways England (2020); Design Manual for Road and Bridges LA111: Noise and Vibration, Revision 2.
- Ref 11-15 British Standards Institute (2003); BS 7445 – Description and environment of environmental noise – Part 1: Guide to quantities and procedures, BSi, London.
- Ref 11-16 British Standards Institute (2014 with 2019 amendments); BS 4142 – Methods for rating and assessing industrial and commercial sound, BSi, London.
- Ref 11-17 Institute of Environmental Management and Assessment (2014); Guidelines for Environmental Noise Impact Assessment.
- Ref 11-18 CadnaA®, registered trademark of Datakustik GmbH (Munich, Germany).
- Ref 11-19 International Standards Organization (Part 1: 1993, Part 2: 1996) ISO 9613 – Acoustics – Attenuation of sound during propagation outdoors, ISO.
- Ref 11-20 British Standards Institute (2014); BS 8233 – Guidance on sound insulation and noise reduction for buildings, BSi, London.
- Ref 11-21 World Health Organization (1999); Guidelines for Community noise
- Ref 11-22 Hiller, D. M., and G. I. Crabb, (2000); Groundborne Vibration Caused by Mechanised Construction Works. TRL Report 429.