Great North Road Solar and Biodiversity Park

Environmental Statement

Volume 2 – Chapters

Chapter 12 – Noise And Vibration Impact Assessment

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Infrastructure Planning (Applications: Prescribed Forms and Procedure)

Contents

12.1 INTRODUCTION

1 This chapter of the Environmental Statement (ES) presents the findings of an assessment of the likely significant effects from noise and vibration as a result of the Development. Where required, this chapter identifies measures to address potential impacts and likely significant effects of the scheme in terms of noise and vibration during the construction, operation and decommissioning phases.

2 The Development would be located to the northwest of Newark, in the Newark and Sherwood district of Nottinghamshire, East Midlands. The Development would be within an area bound by the Order Limits. The Order Limits are to the west of the A1, north of the A617, east of Eakring, and south of Egmanton, to the north and northwest of Staythorpe.

3 The Development is described by ES Chapter 5, Development Description, [EN010162/APP/6.2.5], and briefly summarised here. The Development essentially consists of discrete land parcels proposed to be occupied by solar PV panels and associated infrastructure (Work no. 1), connected by cable route areas (Work no. 2). Up to 4 intermediate substations (Work no. 4) will be spaced around the solar areas, and a Battery Energy Storage System (BESS; Work no. 5a) and 400 kV Compound (Work no. 5b) will collate the electrical energy and step up the voltage before cabling it to the National Grid Staythorpe Substation (Work no. 6), likely via the Consented Staythorpe BESS (Work no. 7). Road works (Work no. 8; access) will be undertaken, principally to create passing places and create or upgrade access points. Other areas within the Order Limits are identified for mitigation/enhancement (Work no. 3). The Work Areas are shown on ES Figure 5.1 [EN010162/APP/6.3.5.1] and a summary of mitigation/enhancement measures is shown on ES Figure 5.2 [EN010162/APP/6.3.5.2].

4 This chapter is supported by the following Technical Appendices (TAs), in Volume 4 of this ES:

- TA A12.1 Baseline Noise Survey [EN010162/APP/6.4.12.1];
- TA A12.2 Noise and Vibration Modelling [EN010162/APP/6.4.12.2]; and
- TA A12.3 Noise Survey Record Sheets [EN010162/APP/6.4.12.3].

5 This chapter is also supported by the following TAs, in Volume 4 of this ES:

- TA A5.2 Outline Construction Traffic Management Plan (oCTMP) [EN010162/APP/6.4.5.2];
- TA A5.3 Outline Construction Environmental Management Plan (oCEMP) [EN010162/APP/6.4.5.3]; and
- TA A5.6 Outline Decommissioning and Restoration Plan (oDRP) [EN010162/APP/6.4.5.6].

6 The oCTMP and oCEMP are outline documents. Final versions of these will be produced at detailed design stage, post consent, and submitted to Newark and Sherwood District Council (NSDC) for approval, and then carried out as agreed. The oDRP is also an outline document, and a final version of this will be produced prior to decommissioning and submitted to NSDC for approval, and then carried out as agreed. The oDRP provides for a Decommissioning Environmental Management Plan (DEMP) to be

produced as part of the final DRP. These are secured by Requirements in the DCO [EN010162/APP/3.1].

7 This chapter is supported by the following Figures in Volume 3 of this ES:

- Figure 12.1: Noise Sensitive Receptors and Monitoring Locations [EN010162/APP/6.3.12.1];
- Figure 12.2: Assessment of Noise during Hardstanding Construction Activities [EN010162/APP/6.3.12.2];
- Figure 12.3: Assessment of Noise during PV Module Construction Activities [EN010162/APP/6.3.12.3];
- Figure 12.4 Assessment of Noise during Installation of Substations and BESS [EN010162/APP/6.3.12.4];
- Figure 12.5 Assessment of Noise during Installation of Cable Route [EN010162/APP/6.3.12.5]; and
- Figure 12.6 Assessment of Vibration Impacts [EN010162/APP/6.3.12.6].

8 This chapter includes the following elements:

- Consultation;
- Legislation, Planning Policy and Guidance;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Development Design Mitigation;
- Assessment of Likely Effects;
- Cumulative Effects Assessment;
- Mitigation Measures and Residual Effects;
- Summary of Likely Effects; and
- Statement of Significance.

9 A glossary of terms is provided in Chapter 20 [EN010162/APP/6.2.20].

10 The assessment reported in this Chapter assumes realistic worst-case scenarios from the range allowed by Chapter 5, Development Description, [EN010162/APP/6.2.5], the Work Areas and the illustrative layout, as shown in Figure 5.4 [EN010162/APP/6.3.5.4]. A detailed discussion regarding the assessment assumptions is presented in section 12.4.10.

12.2 CONSULTATION

11 Table 12.1 below provides a summary of the Scoping Opinion provided by PINS in December 2023 and consultation with key stakeholders following the issue of PEIR. Full responses are provided in the Consultation Report [EN010162/APP/5.1].

Table 12.1: Summary of Consultation

Consultee and Communication Type	Response	How Consultation Response has been Addressed
Planning Inspectorate Scoping Opinion[1] (received 20th December 2023)	The ES should include an assessment of vibration effects from all construction activities, or the information required to demonstrate the absence of a likely significant effect.	The assessment of vibration effects is provided in section 12.7.3
	The ES should include an assessment of this matter or provide further justification for the assumption that decommissioning traffic noise would be less than that during the construction phase, such as clarification of the likely duration of construction and decommissioning phases and the likely traffic movements associated with these phases.	Section 14.7.3 of Chapter 14, Traffic and Transport, [EN010162/APP/6.2.14] confirms that traffic movements during decommissioning are not anticipated to exceed the number set out for the construction phase. As such, decommissioning noise would be no more than the levels assessed in section 12.7.1.
	The Applicant proposes to scope out vibration from traffic for all phases on the basis that there is no realistic likelihood that vibration from traffic sources will result in an adverse effect. the Inspectorate does not agree to scope this matter out at this stage for construction and operation. Accordingly, the ES should provide an assessment of this matter, or the information required to demonstrate the absence of a likely significant effect such as information demonstrating that the number and type of traffic movements do not exceed thresholds required detailed assessment in line with guidance.	A consideration of vibration from traffic movements during construction is presented in section 12.4.6. This approach was discussed and agreed with the NSDC Environmental Health Officer.

[1] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010162/EN010162-000012-EN010162%20Great%20North%20Road%20Solar%20Park%20-%20Scoping%20Opinion.pdf

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	The Applicant proposes to scope out vibration for all other sources for the operation and decommissioning phases on the basis that significant effects are not likely to occur based on the plant to be used. Considering the nature of the Proposed Development during operation the Inspectorate is content to scope this matter out of further assessment for the operational phase. However, the detailed description of the Proposed Development within the ES should demonstrate that operational plant and equipment (e.g. substations, battery storage infrastructure, and tracker panel mechanisms) is of a type and to be used in locations unlikely to result in significant vibration effects on sensitive receptors. The ES should detail any measures to control vibration emissions during operation.	Operational equipment installed as part of the Development have minimal moving parts and emit no / negligible levels of vibration. Tracker panels will not be used on the Development.
	Although it is noted that no piling or track compaction is proposed during decommissioning, no further detail on the decommissioning phase activities are provided and it is unclear whether there is potential for sources of vibration, such as from the removal of piles. On this basis the inspectorate is not in a position to scope this matter out at this stage	A detailed justification for scoping out vibration impacts during the decommissioning phase is provided in section 12.4.11.2.
	The Scoping Report proposes to scope out an assessment of noise associated with operational traffic on the basis that the traffic movements would be limited to occasional maintenance visits only. Considering the characteristics of the Proposed Development, the Inspectorate is content that this matter can be scoped out of further assessment. However, the ES project description should confirm the anticipated trip generation (including number and type of vehicles) required for “occasional maintenance visits” during operation to justify	Section 14.7.2 of Chapter 14, Traffic and Transport, [EN010162/APP/6.2.14] confirms that traffic movements during normal operation would be 15 car / van movements per day. In addition, Section 14.7.2 states that components would not be replaced in bulk. As such any traffic due to maintenance or replacement of equipment would be

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	this, as the number and/or type of vehicle required, or frequency of maintenance visits, is not specified within the Scoping Report.	occasional, and substantially less than during the construction phase. Traffic movements at this level will not result in an adverse noise impact, as discussed in section 12.4.11.1.
	The Scoping Report states that all residential receptors within 300m of the Order Limits will be identified. There is no indication that other types of sensitive receptors would be assessed, although paragraph 411 states that residential receptors are the closest receptors. Table 11.1 and Figure 11.1 identify other types of sensitive receptors located within the vicinity of the proposed traffic routes. It is unclear whether noise and vibration effects on these receptors will be assessed. Whilst it is noted that consultation will be undertaken with NSDC and therefore the receptors are not yet finalised, the Applicant should consider the potential for the Proposed Development to impact on all noise sensitive receptors within the study area, including the traffic routeing. The Applicant's attention is drawn to the consultation responses from the parish councils (Appendix 2 of this Opinion) which list possible receptors including heritage assets, education, laboratories and workshops or other buildings sensitive to vibration, and nearby flood defences.	For clarity, all receptors within 500 m of the Order Limits have been identified. As discussed in section 12.4.2, all Noise Sensitive Receptors (NSRs) identified within the AddressBase dataset as residential, leisure (hotels, campsites etc.), community services (village halls, crematoria etc) and education (schools etc.) have been included as part of this assessment. Project team knowledge of the area has not identified any laboratories or workshops utilising equipment sensitive to vibration within the 100 m vibration study area. The assessment of noise and vibration on receptors along access routes is presented in sections 12.7.2 and 12.7.3 respectively.

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	It is noted that during operation, noise would be generated by the substations, inverters, and transformers and this is proposed to be assessed using modelling. Whilst it is unclear whether this list is exhaustive, there is no mention of noise associated with other components of the Proposed Development such as the BESS or tracker panels. The Applicant should ensure the noise assessment is fully comprehensive of all components of the Proposed Development which are likely to result in noise and vibration effects. Where uncertainty exists regarding the final infrastructure components to be used, such as tracker or fixed panels or the number of BESS units, the ES should assess a worst-case scenario or multiple worst-case scenarios.	The operational assessment includes noise from solar array inverters, inverters and transformers within substations, as well as noise from the BESS battery containers and inverters. The assessment assumes all plant is operational simultaneously at 100% capacity, as a worst case. Details of operational noise modelling, including confirmation of the worst-case modelling scenario, is provided in TA A12.2 Noise and Vibration Modelling [EN010162/APP/6.4.12.2]. The Development will utilise fixed panels, and as such no consideration of tracker panels has been undertaken.
	It is stated that for activities which would occur for less than one month, the magnitude of effect is considered to be negligible. It is stated (in paragraph 398) that this is based on British Standard Guidance BS 5228-1. However, this guidance states that this is subject to there being no works of a shorter duration which could lead to a significant effect. The ES should provide further justification that works of a duration of less than one month would not result in likely significant effects in line with the guidance referenced. Any assumptions adopted within the ES should be fully justified.	Both BS 5228-1 (section 12.3.11) and DMRB (section 12.3.14) state that the duration of construction noise or vibration impacts will affect the overall significance. Section 12.4.3 presents a justification for the construction assessment criteria.

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	The Scoping Report does not appear to make reference to considerations such as noise or other nuisances affecting tranquillity of socioeconomic (or associated heritage, landscape or visual) receptors. The ES should include a consideration of effects such as disturbance of tranquillity.	A consideration of noise and vibration on heritage assets is presented in Chapter 11, [EN010162/APP/6.2.11] section 11.8.1.3. Tranquillity has been considered as part of the assessment of the setting of heritage assets where this is considered to contribute to the heritage significance of an asset.
Averham, Kelham & Staythorpe Parish Council – scoping comment	The parish council requested that the A617 be included in the assessment.	The A617 (Kelham Road) is included in the assessment.
The Environment Agency – scoping comment	Vibration from Construction, Operation and Decommissioning Traffic should be scoped in. The justification does not consider the potential for nearby sensitive flood defences. Decommissioning Vibration should be scoped in because the extraction of piles can be just as onerous in regards to vibration as installation. Table 13.2 states that for Flood Defence Failure: “This will be covered in the Flood Risk Assessment and will also be reported in the ES. It will cover any risk to the Development and any increased risk caused by the Development.” Hence, vibration should be considered in more detail and scoped in.	The impact of vibration on flood defences is considered in section 9.6.1.6 in Chapter 9, Water Resources [EN010162/APP/6.2.9]. In summary, no construction work is proposed near any flood defences. The impact of vibration during decommissioning will be the same as or less than during construction. Noise and vibration during decommissioning will be dealt with in accordance with the Decommissioning and Restoration

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	Vibration from the installation of structures may adversely affect flood defences from vibration. By way of example, Section 4.2 discusses the installation of pylons and other above ground structures. Given there is no indication of where such structures will be installed in relation to main rivers or flood defences, we would like to see vibration monitoring scoped into the assessment to ensure that the associated vibrations will not adversely affect any flood defence structures. Vibration should be limited to a safe threshold using appropriate guidance. For example, the type of pylon foundation chosen (e.g., pad and column, mini pile or tube pile) and associated methodology should be assessed. Depending on proximity an assessment may also be required for vibration from HGV traffic/plant.	Plan (DRP), an outline of which is included as TA A5.6 [EN010162/APP/6.4.5.6]. No pylons will be installed as part of the Development.
Kneesall, Kersall & Compton Parish Council – scoping comment	The parish council requested that potential vibration from construction traffic be considered as part of the assessment.	Vibration from construction traffic is considered in section 12.4.6.
Laxton and Moorhouse Parish Council – scoping comment	The parish council requested noise from tracker panels be included in the assessment.	It is confirmed that tracker modules will not be installed as part of the Development and are therefore not assessed.
Newark & Sherwood District	It is considered Chapter 9 should be re-titled ‘Noise and Vibration’ as the EIA Scoping Report notes that vibration associated with piling of photovoltaic (PV) mounting structures and compaction of tracks/hardstanding areas have the potential to cause an effect at	This chapter is titled ‘Noise and Vibration’.

Consultee and Communication Type	Response	How Consultation Response has been Addressed
Council – scoping comment	nearby receptors and will therefore form part of the assessment (para. 389).	
	Also, given the type of panels proposed has not been set the ES should include an assessment of noise and vibration generated by tracking panels and its potential impact on residential and ecological receptors.	Tracker modules will not be installed as part of the Development and are therefore not assessed.
Environmental Health Officer (EHO) at Newark & Sherwood District Council – scoping comment	I would suggest that noise disturbance is taken into account when designing the scheme, and that an assessment of noise at the nearest receptors be submitted with any forthcoming application.	This chapter contains an assessment of noise at the nearest Noise Sensitive Receptors (NSRs). The assessment methodology and assessment criteria were discussed and agreed with the Environmental Health Officer (EHO).
	I would recommend a Construction Management Plan be submitted with the application taking into account hours of operation, vehicle routing, etc.	TA A5.3, oCEMP, [EN010162/APP/6.4.5.3] includes best practice noise mitigation measures.
Consultation with NSDC Environmental Health Department Operational Noise and Vibration	Consultation letter sent by the Applicant to the Environmental Health Department at NSDC on 26th February 2024 to agree the methodology and assessment criteria for operational noise and vibration impacts. The consultation letter contained the following: • Proposed study areas; • Identification of assessment locations i.e. where operational noise will be predicted; • Identification of background noise monitoring locations;	This is noted

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	• Identification of representative monitoring locations for each of the assessment locations • Proposed survey details; • Proposed data analysis methodology; • Proposed noise monitoring methodology; and • Proposed operational noise assessment criteria. A response from NSDC Environmental Health Department was received by the Applicant via email on 05/03/2024, which stated: "*Thank-you for sending the proposed noise assessment for the development.* *The proposed monitoring locations and receptors appear appropriate, and I have no objection to the assessment criteria proposed*."	
Consultation with NSDC Environmental Health Department Construction Noise and Vibration	Consultation letter was sent by the Applicant to the Environmental Health Department at NSDC on 16th July 2024 to agree the methodology and assessment criteria for construction noise and vibration impacts. The consultation letter contained the following • Proposed construction noise study area; • Assessment methodology and criteria for construction activity noise impacts; • Assessment methodology and criteria for construction traffic noise impacts; • Assessment methodology and criteria for construction activity vibration impacts; and	This is noted.

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	• Justification for scoping out operational road traffic impacts and operational vibration. A response from NSDC Environmental Health Department was received via email on 29/08/2024: "*I have reviewed your proposed methodology and have no objections to it*"	
NSDC response to PEIR (dated 20/02/2025)	In respect of working hours, under the heading of Construction Noise Assessment Methodology Paragraph 12.4.3 states that working hours of between 0700 and 1900, Monday to Friday, and 0700 to 1300 on a Saturday. In order to protect sensitive residential receptors in the area, NSDC would request that hours of construction for 'noisy' activity instead be limited to the hours of 07:30- 18:00 Monday to Friday and 08:00- 13:00 on Saturdays.	Construction working hours for 'noisy' activities have been updated to 0730 – 1800 Monday – Friday, and 0700 to 1300 on a Saturday, in line with NSDC request. This is set out in TA A5.3, oCEMP [EN010162/APP/6.4.5.3].
	Under the heading of Operational Noise, paragraph 12.6.2 confirms that modelling of noise from plant and equipment as detain the illustrative layout has been undertaken. Taking into account, that the design may evolve in this regard should the layout and plant details be changed, the assessment will need to be reviewed and updated as needed to ensure it remains representative.	This is controlled by a Requirement of the DCO [EN010162/APP/3.1].
	As part of the noise assessment undertaken noise levels at representative receptors have been assessed in accordance with BS4142. This is considered to be an appropriate standard for assessing noise from the development. Assumptions in relation to operation of the site have been made such that the assessment will be conservative in terms of generated noise levels.	Comment noted.

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	As detailed under the heading of Operational Noise Effects, paragraph 12.7.4 notes that at the majority of receptors, the rating level of noise from the development is below background noise levels, representing a negligible impact. A low impact has been predicted at other receptors, where the rating level is above background levels. However, in these locations, background levels are particularly low, and absolute noise levels at the building façade will be sufficiently low to prevent disturbance	Comment noted.
	Finally, Paragraph 12.6 sets out the development design mitigation and it is also noted that Requirement 15 within the DCO seeks to secure an operational noise assessment detailing how the design will incorporate this mitigation, which is supported.	Comment noted.
	Under the heading of Construction and Decommissioning Noise Effects Paragraph 12.7.1 refers to the potential noise effects, in constructing the different elements of the scheme. This assessment includes for a variety of phases of work of distances at which noise levels will fall below a medium magnitude impact. These distances have then been compared to the site plan to determine if any sensitive receptors fall within this distance. It has been identified that specific properties will lie within these areas for a number of activities, but that the likely duration of impact will be minimal as work progresses. As such, no significant impact at any receptor is predicted at the current stage of assessment. Linked into this point Paragraph 12.6.1 states that a detailed Construction Noise Management Plan (CNMP) will be developed by the Applicant, based on finalised location of construction activities and equipment to be used on site. Whilst it is noted that the CNMP will be submitted to approval to relevant stakeholders, the 'approving' bodies	It is confirmed that the Construction Noise Management Plan (CNMP) will form part of the final CEMP. The CEMP will be submitted to NSDC for approval prior to construction, which will be secured through a Requirement of the DCO [EN010162/APP/3.1]. Decommissioning noise will be the same or less than during the construction phase and will be managed in accordance with a Decommissioning Environmental Management Plan (DEMP); which forms part of TA A5.6 Outline Decommissioning and Restoration

Consultee and Communication Type	Response	How Consultation Response has been Addressed
	are not defined, and neither is the process. It is unclear whether the CNMP would form part of the approved Construction Environmental Management Plan (CEMP) which itself is currently listed as draft Requirement 12. The Applicant should explain how the measures in the CNMP will be secured, including a role for NSDC to consider and approve this.	Plan (oDRP) [EN010162/APP/6.4.5.6] to be agreed prior to decommissioning
Natural England response to PEIR (dated 20/02/2025)	Section 8.8.4.1 para 164 identifies that the frequency of traffic movements will increase during construction, however noise arising from this will not be significant. NE concur with this assessment.	Comment noted.
Various local Parish Councils Response to PEIR	Parish Councils raised various comments in response to the PEIR Noise and Vibration report. Key comments raised included assessment of noise and vibration on non-human receptors, queries regarding construction working hours, noise during installation of fencing and vibration from HGV movements.	Detailed responses to all Parish Council comments are provided in the Consultation Report [EN010162/APP/5.1]

12.3 LEGISLATION, PLANNING POLICY AND GUIDANCE

12 This section provides a summary of the relevant legislation, planning policy and guidance related to the assessment of noise and vibration. The relevant legislation and policy documents are as follows, as discussed in the following sections:

- Control of Pollution Act 1974[2] (CoPA 1974);
- Overarching National Policy Statement for England[3] (EN-1);
- National Policy Statement on Renewable Energy Infrastructure[4] (EN-3);
- National Planning Policy Statement for Electrical Networks[5] (EN-5);
- National Planning Policy Framework[6] (NPPF);
- The Noise Policy Statement for England[7] (NPSE);
- Planning Practice Guidance for Noise[8] (PPGN);
- Newark and Sherwood Local Development Framework[9];
- British Standards (BS) 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142:2014)[10];
- The Association of Noise Consultants Technical Note on BS 4142[11];
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 (Noise)[12];
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 (Vibration)[13];
- Calculation of Road Traffic Noise (CRTN)[14]; and
- Design Manual for Roads and Bridges (DMRB) Volume 11[15].

13 Consultation drafts of the NPSs have been issued (April 2025) in response to changing climate change policy, however, the content of these with respect to the topic covered in this Chapter is materially unchanged from the

[2] Her Majesty's Stationery Office (1974); Control of Pollution Act
[3] Department of Energy and Climate Change (2023) Overarching National Policy Statement for Energy (EN-1)
[4] Department of Energy and Climate Change (2023) National Policy Statement for Renewable Energy Infrastructure (EN-3)
[5] Department of Energy and Climate Change (2023) National Policy Statement for Electricity Networks Infrastructure (EN-5)
[6] Ministry of Housing, Communities and Local Government (2024) National Planning Policy Framework
[7] Department for Environment Food and Rural Affairs (2010) Noise Policy Statement for England
[8] Ministry of Housing Communities and Local Government (2019); Planning Practice Guidance for Noise
[9] Newark & Sherwood District Council, Allocations & Development Management Plan (DPD) (2013).
[10] British Standards Institute (2014 with 2019 amendments); BS 4142 – Methods for rating and assessing industrial and commercial sound, BSi, London
[11] Association of Noise Consultants (2020) BS 4142:2014+A1:2019 Technical Note. Available at: https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2020/07/ANC-BS-4142-Guide-March-2020.pdf[accessed 02/05/2025]
[12] 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
[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, Vibration, BSi, London
[14] HMSO Department of Transport (1988), Calculation of Road Traffic Noise
[15] Highways England (2020): Design Manual for Roads and Bridges (DMRB) - LA111 – Noise and vibration

adopted versions, and hence the adopted versions are referred to elsewhere in this Chapter.

12.3.1 Control of Pollution Act 1974

14 CoPA 1974 provides Local Authorities with powers to control noise and vibration from construction sites.

15 Section 60 of CoPA enables a Local Authority to serve notice to persons carrying out construction work of its requirements for the control of site noise. This may specify plant or machinery that is or not to be used; the hours during which construction work may be carried out; the level of noise or vibration that may be emitted; and provide for changes in circumstances.

12.3.2 Overarching National Policy Statement for England (EN-1)

16 The Overarching NPS for Energy (EN-1) sets out the overall national energy policy for delivering major energy infrastructure.

17 Section 5.12.6 of EN-1 states that:

18 *"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 a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive, low frequency or temporal characteristics of the noise*
- *identification of noise sensitive receptors 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 (and weekends) as appropriate, and at different times of year*
- *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*
- *if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise*
- *measures to be employed in mitigating the effects of noise using best available techniques to reduce noise impacts*".

19 With regards to operational noise, EN-1 states that the assessment should be undertaken using the relevant British Standards (for example BS4142).

20 Paragraph 5.12.15 of EN-1 states that the project should:

21 *"demonstrate good acoustic design through selection of the quietest or more acceptable cost-effective plant available; containment of noise within buildings wherever possible".*

22 To aid the decision-making process, EN-1 (paragraph 5.12.17) states that the project should meet the following aims through effective management and control of noise:

- "avoid significant adverse impacts on health and quality of life from noise
- mitigate and minimise other adverse impacts of health and quality of life from noise
- where possible, contribute to improvements to health and quality of life through the effective management and control of noise".

12.3.3 National Policy Statement for Renewable Energy Infrastructure (EN-3)

23 The NPS for Renewable Energy (EN-3) sets out the overall energy policy for delivering renewable energy infrastructure. Section 2.10 states that applicants should assess the various potential routes to site for delivery of material and components.

24 Section 2.10.162 of EN-3 states that:

25 *"The Secretary of State is unlikely to give any more than limited weight to traffic and transport noise and vibration impacts from the operational phase of a project."*

12.3.4 National Policy Statement for Electricity Networks Infrastructure (EN-5)

26 The NPS for Electricity Networks Infrastructure (EN-5) sets out the policy for electricity networks.

27 Section 2.9.39 states:

28 *"For the assessment of noise from substations, standard methods of assessment and interpretation using the principals of the relevant British Standards (For example, BS 4142) are satisfactory."*

12.3.5 National Planning Policy Framework (NPPF)

29 Regarding noise, paragraph 187 of the NPPF states:

30 *"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."*

31 In addition, paragraph 198 states:

32 *"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".*

12.3.6 Noise Policy Statement for England (NPSE)

33 The NPSE sets out the underlying principals and aims of existing policy documents, legislation and guidance that relates to noise. The aims of the NPSE require that:

- Significant adverse effects on health and quality of life are avoided, while taking into account the guiding principles of sustainable development;
- Adverse impacts on health and quality of life are avoided; and
- Where possible, contribute to the improvement of health and quality of life.

12.3.7 Planning Practice Guidance: Noise

34 The Planning Practice Guidance concerned with noise (PPGN) advises that:

35 *"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)".*

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

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

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

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

12.3.8 Newark and Sherwood Local Development Framework

39 With regards to renewable and low carbon energy generation, Policy DM4 of Newark and Sherwood Council's Local Development Framework states:

40 *"In order to achieve the commitment to carbon reduction set out in Core Policy 10, planning permission will be granted for renewable and low carbon energy generation development, as both stand alone projects and part of other development, its associated infrastructure and the retro-fitting of existing development, where its benefits are not outweighed by detrimental impact from the operation and maintenance of the development and through the installation process upon: …4. Amenity, including noise pollution, shadow flicker and electro-magnetic interference".*

12.3.9 BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

41 BS 4142:2014+A1:2019 ('BS 4142') provides a method for rating and assessing noise in order to provide an indication of it's likely impact on nearby NSRs.

42 The standard provides advice for monitoring background noise and the subsequent derivation of an appropriate representative background level (dB L_{A90}).

43 The 'Specific' noise level at NSRs due to noise from a given development is rated by applying corrections to account for the acoustic characteristics of the sound. Acoustic characteristics considered are tonality, impulsivity and intermittency. Where noise from a development does not contain acoustic characteristics, but is considered distinctive against the existing acoustic environment, a distinctiveness correction can be included. Each characteristic has its own penalty based on how noticeable the characteristic is at the NSR. The resultant 'Rating' level is then assessed against the representative background sound level at the NSR to determine a likely level of impact.

44 An assessment is undertaken based on the level by which the Rating level exceeds the representative background sound level, as follows:

- A difference of 10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around 5 dB is likely to be an indication of an adverse impact, depending on the context; and
- Where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on context.

45 BS 4142 states that where the Rating level and background levels at a receptor are low, changes in the absolute level should be taken into account. It states:

46 *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

47 BS 4142:2014+A1:2019 does not define low in terms of background sound or rating levels.

12.3.10 The Association of Noise Consultants Technical Note on BS 4142

48 The Association of Noise Consultants (ANC) Technical Note on BS 4142 provides guidance on the interpretation and application of BS 4142.

49 With regards to low background noise levels, the ANC document states:

50 *"BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the levels. For*

example, a situation might be considered acceptable where a rating level of 30 dB is 10 dB above a background sound level of 20 dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels.

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

52 *The WG [Working Group] suggest that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate".*

12.3.11 BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 (Noise)

53 BS 5228:2009:A1:2014 Part 1 Noise (referred to as BS 5228-1) provides example criteria for the assessment of the significance of noise effects.

54 With regards to the assessment of construction noise, BS 5228 presents several assessment methodologies, of which Example Method 2: 5 dB(A) change, states:

55 *"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime[16], evening[17] and night-time[18] periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect".*

56 The standard provides methods for calculating the levels of noise resulting from construction activities, as well as source levels for various types of plant, equipment and activities. In addition, the standard provides a method for calculating an equivalent continuous sound level from construction traffic that pass at intervals (the 'Haul Road' method in section F2.5).

12.3.12 BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 (Vibration)

57 Section B2 of BS 5228:2009:A1:2014 Part 2 Vibration (referred to as BS 5228-2) sets out guidance on the effects of vibration, including vibration levels at which effects are perceptible to human receptors. Table 12.2 summarises this guidance.

[16] Defined in BS 5228 as 0700 – 1900 Monday – Friday, 0700 – 1300 Saturday
[17] Defined in BS 5228 as 1900 – 2300 Monday – Friday, 1300 – 2300 Saturdays and 0700 – 2300 Sundays
[18] Defined in BS 5228 as 2300 – 0700 all days

Table 12.2: BS 5228 Guidance on effects of vibration levels

Vibration Level (Peak Particle Velocity (PPV) mm/s)	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequences associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

58 With regards to the structural response to vibration, section B.3.1 of BS 5228-2 states:

59 *"Extensive studies carried out in the UK and overseas have shown that documented proof of actual damage to structures or their finishes resulting solely from well-controlled construction and demolition vibrations is rare. There are many other mechanisms which cause damage, especially in decorative finishes, and it is often incorrectly concluded that vibrations from construction and demolition sites are to blame".*

60 The standard states that the response of a building to vibration is affected by the type of foundation, underlying ground conditions, building construction and the state of repair of the building. With regard to residential or light commercial buildings, BS 5228-2 states that cosmetic damage could be incurred where Peak Particle Velocity (PPV) values exceed 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz, and 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

61 The standard also provides methods for calculating the levels of vibration resulting from construction activities, as well as source levels for various types of plant, equipment and activities.

12.3.13 Calculation of Road Traffic Noise (CRTN)

62 The 'Control of Road Traffic Noise' was published by the Department of Transport in 1988, and provides a procedure for calculating noise from road traffic based on traffic flows and road speed. The CRTN procedure can be used where existing traffic flows exceed 1000 vehicles per day. Where traffic flows are below 1000 vehicles per day, the 'Haul Road' method described in BS 5228 (section 12.3.11) can be used.

12.3.14 Design Manual for Roads and Bridges (DMRB) Volume 11

63 DMRB sets out the requirements for assessing and reporting the effects of highways noise from the construction and operation of highway projects.

64 With regards to construction noise, DMRB states that a study area of 300 m from the closest construction activity is normally sufficient to encompass noise sensitive receptors. For noise associated with construction traffic, DMRB states that a 50 m width from the kerb line is suitable.

65 With regards to construction activity noise assessment methodology and criteria, DMRB references the methodology and criteria in BS 5228-1.

66 Table 3.17 of DMRB (reproduced in Table 12.3 below) provides the magnitude of impact at receptors due to construction traffic, based on the increase in Basic Noise Level (BNL). The BNL is calculated at a reference distance of 10 m to define to the change in noise level.

Table 12.3: Magnitude of impact due to construction traffic noise

Magnitude of Impact[19]	Increase in BNL of closest public road used for construction traffic (dB)
High	Greater than or equal to 5.0
Medium	Greater than or equal to 3.0 and less than 5.0
Low	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

67 DMRB states that with regard to construction vibration a “study area of 100 m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors”.

68 Tables 3.31 and 3.33 of DMRB provide magnitude criteria for the assessment of vibration due to construction activities. These are summarised in Table 12.4 below.

Table 12.4: Magnitude of impact due to construction activity vibration

Magnitude of Impact	Vibration Level
High	Above or equal to 10 mm/s Peak Particle Velocity (PPV)
Medium	Above or equal to 1.0 mm/s PPV and below 10 mm/s PPV
Low	Above or equal to 0.3 mm/s PPV and below 1.0 mm/s PPV
Negligible	Below 0.3 mm/s

69 DMRB states that construction noise, construction traffic noise (section 3.19) and construction vibration (section 3.34) shall:

70 *“constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:*

[19] Equivalent to Major, Moderate and Minor in DMRB

- *10 or more days in any 15 consecutive days or nights, or*
- *a total number of days exceeding 40 in any 6 consecutive months*."

71 With regards to vibration caused by vehicle movements, DMRB states:

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

12.4 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

12.4.1 Study Areas

73 With regards to construction noise, a study area of 300 m from the Order Limits has been utilised, in line with DMRB (section 12.3.14) and BS 5228-1 (section 12.3.11).

74 With regards to construction vibration, a study area of 100 m from the Order Limits has been utilised, in line with DMRB (section 12.3.14).

75 The construction traffic study area is 50 m from the kerb line of public roads, in line with DMRB (section12.3.14).

76 As operational noise guidance does not define study areas, a conservative study area of 500 m from the Order Limits has been used. This is based on professional judgement and substantial experience on similar Solar and BESS projects. The extent of the study area was agreed with the EHO through the consultation process.

12.4.2 Receptor Identification and Assessment Locations

77 All Noise Sensitive Receptors (NSRs) within the 500 m operational study area (i.e. the largest study area) specified in section 12.4.1 have been identified using Ordnance Survey AddressBase data, aerial imagery and confirmed through site visits. The AddressBase dataset has been filtered to identify all residential, leisure (including hotels and campsites), community services (including village halls and crematoria) and education (schools etc.) uses.

78 Public rights of way are not considered to be NSRs as their use by the public is transitory, and as such these receptors will not be subject to long-term noise exposure that would result in health impacts.

79 The disturbance of animals due to noise and vibration is considered in Chapter 8, Ecology and Biodiversity, [EN010162/APP/6.2.8] section 8.8. A consideration of noise and vibration on heritage assets is presented in Chapter 11 [EN010162/APP/6.2.11], section 11.8.1.3.

80 Receptors with the potential to experience significant construction effects in terms of the EIA Regulations have been identified by calculating the distance at which significant impacts will occur from different activities. This is discussed further in section 12.4.3.

81 For the assessment of operational impacts, following the identification of the NSRs within the study area, a total of 61 representative Assessment Locations have been identified. These Assessment Locations were selected as those closest to areas where noise emitting equipment will be installed

(Work Area 1 (Solar PV), Work Area 4 (Immediate Substations), Work Area 5a (BESS), Work Area 5b (400 kV Compound), Work Area 6 (National Grid Staythorpe Substation) and Work Area 7 (Staythorpe BESS Connection). No noise emitting equipment is proposed within Work Area 3 (Mitigation) and as such, receptors within 500 m of Work Area 3 are not considered further as part of the operational assessment. Where multiple NSRs are located in close proximity to each other, the NSR closest to the nearest Work Area has been selected as the Assessment Location, on the basis that should noise effects be acceptable at the closest NSRs, they will also be acceptable at NSRs located further from the Development. The Assessment Locations were agreed with the EHO through the consultation process.

82 Since the PIER stage, a large area of Solar PV has been removed around Cromwell, North Muskham, Bathley, South Muskham, Little Carlton and Kelham, reducing the number of Assessment Locations required. For consistency with the PEIR assessment, Assessment Locations remain labelled between H1 and H89, however it should be noted that H22 and H24 – H50 have been omitted from the due to the increased separation distance between operational plant and receptors, as there is now only Work no. 3, Mitigation/Enhancement, proposed in these areas.

83 Figure 12.1 Noise Sensitive Receptors and Monitoring Locations [EN010162/APP/6.3.12.1] presents:

- Order Limits;
- NSRs within 500 m of the Order Limits;
- Work Areas where operational noise emitting plant may be located;
- Work Area 1: Solar PV;
- Work Area 4: Intermediate Substations; and
- Work Area 5a: BESS
- Work Area 5b: 400 kV Compound.
- Assessment Locations (H1 – H21, H23 and H51 to H89); and
- Monitoring Locations (ML 1 – ML 35, as identified in TA A12.1 Baseline Noise Survey) [EN010162/APP/6.4.12.1].

12.4.3 Construction Noise Assessment Methodology

84 An assessment of the potential effects of noise during construction activities has been carried out.

85 Decommissioning noise will be the same or less than during the construction phase and will be managed in accordance with a Decommissioning Environmental Management Plan (DEMP); which forms part of TA A5.6 Outline Decommissioning and Restoration Plan (DRP) [EN010162/APP/6.4.5.6] to be agreed prior to decommissioning. As such the assessment presented is conservatively representative of both construction and decommissioning activities.

86 The construction noise assessment considers the impact of noise on nearby receptors from the following construction activities:

- Construction of hardstanding;
- Installation of PV modules and fencing;
- Installation of substations and BESS; and

- Installation of cable route.

87 Noise levels at the NSRs due to construction activities are dependent on a number of variables, including:

- The sound power level of the plant or equipment used on site;
- The plant or equipment on-time;
- The distance between the source and receiver; and
- The attenuation due to ground absorption, air absorption and barrier effects.

88 TA A12.2 [EN010162/APP/6.4.12.2] contains details of the modelling inputs (i.e. equipment type, sound power levels, on-time etc) for each construction activity.

89 As noted in TA A5.3, Outline CEMP, [EN010162/APP/6.4.5.3] construction working hours will be between 0730 and 1800, Monday to Friday, and 0830 to 1300 on a Saturday. It is notable that these construction hours are within the daytime period identified in BS 5228, and as such, no assessment of construction activity during evening or night-time periods is required.

90 During daytime periods, BS 5228 states that noise is potentially significant where the total noise level (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise level by 5 dB or more, subject to the lower cutoff value of 65 dB L_{Aeq} from site noise alone. However, across most of the Site it is likely that the pre-existing ambient noise level would be lower than the lower cutoff threshold. It is therefore assumed that construction noise levels in excess of the lower threshold would also result in total noise level of more than 5 dB above the pre-existing ambient noise level, as a conservative measure.

91 BS 5228 states that effects are considered to be potentially significant where the lower cutoff values are exceeded for a duration of one month or more, unless works of a shorter duration are likely to result in significant effect. In addition, DMRB states that construction activities constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding 10 or more days in any 15 consecutive days or nights; or a total number of days exceeding 40 in any 6 consecutive months. As such, the duration of any construction impact should be taken into account when determining Significance.

92 Table 12.5 below presents the subsequent construction noise magnitude of effect, based on the lower cutoff values of 65 dB, as agreed with the Council.

Table 12.5: Construction Noise Magnitude of Effect

Construction Noise Level	Magnitude of Effect
> 75 dB L_{Aeq}	High
> 65 dB L_{Aeq} ≤ 75 dB L_{Aeq}	Medium
> 55 dB L_{Aeq} ≤ 65 dB L_{Aeq}	Low
≤ 55 dB L_{Aeq}	Negligible

93 The criteria in Table 12.5 apply where the construction noise level threshold is exceeded for a period of 10 days or more. This is the shortest duration of impact, as presented in DMRB, and as such is a conservative approach.

94 The distance at which noise from each activity would fall below 65 dB $L_{Aeq,t}$ (Medium magnitude) has been calculated, as discussed in TA A12.2. [EN010162/APP/6.4.12.2]. This distance has then been used to identify receptors which are likely to experience a Medium magnitude of effect.

12.4.4 Construction Traffic Noise Assessment Methodology

95 Road traffic noise levels will be calculated using the CRTN method which contains a method for calculating the Basic Noise Level (BNL) from road usage in terms of the 18-hour average Annual Average Weekday Traffic (AAWT) flow. The temporary changes in road traffic noise along the primary routes to the Development are then assessed by comparing the calculated Baseline BNL (i.e., existing vehicle movements) with the Baseline with Construction Traffic (i.e., existing vehicle movements plus construction movements). Both the Baseline BNL and Baseline with Construction Traffic BNL are calculated at a reference distance of 10 m to define the change in noise level.

96 The change in BNL on each road due to construction traffic will then be compared to the magnitude of impacts presented in DMRB as summarised in Table 12.3 of this chapter. The magnitude of effect criteria were agreed with the EHO through the consultation process.

97 Traffic counting was undertaken along the main construction traffic routes, as discussed in section 14.5.9 of Chapter 14, Traffic and Transport [EN010162/APP/6.2.14]. These locations are shown in Figure 14.4 [EN010162/APP/6.3.14.3]. Baseline traffic data and anticipated daily construction movements have been sourced from section 14.6.4 of chapter 14.

98 As noted in section 12.3.13, the CRTN method is suitable only for roads where the existing AAWT flows are above 1000. The construction traffic route roads where the existing baseline AAWT flows are above 1000 are as follows:

- A - A46;
- B – A616 Great North Road;
- C – A617 Kelham Road;
- D - Caunton Road N;
- F – Newark Road;
- G - A616 Newark Road;
- L – B1164 Great North Road; and
- 1 – Caunton Road S.

99 The predicted change in BNL for each of the above roads will be assessed according to the criteria in DMRB, as presented in Table 12.3 of this chapter.

100 For roads with existing AAWT flows below 1000, the assessment is based on the absolute level of noise produced, rather than the change in traffic noise levels. As such, noise from HGVs using construction routes along the public highway have been calculated using the ‘Haul Road’ method

described in BS 5228 (section F2.5.2). Using this method, noise levels are expressed as an equivalent continuous noise level (L_{Aeq}) during the working day. The HGV noise level is evaluated at a worst-case distance of 4 m, representative of NSRs located roadside, as detailed in TA A12.2 [EN010162/APP/6.4.12.2]. The calculated noise level due to construction traffic on local rural roads is then assessed against the criteria in Table 12.5.

101 In order to account for HGVs utilising internal temporary roads, internal tarmac roads and internal stone roads during construction (i.e. once HGVs have left the public highway), the calculated 'Haul Road' noise level has been added to the construction activity noise levels discussed in 12.4.3, and are therefore inherently assessed against the criteria in Table 12.5.

12.4.5 Construction Activity Vibration Assessment Methodology

102 Some construction activities can generate vibration in close proximity to the activity in question. Activities which could result in vibration include:

- Vibratory piling of PV mounting structures, fencing and Horizontal Directional Drilling (HDD); and
- Vibratory compaction of hardstanding areas.

103 BS 5228 provides formulae for the prediction of PPV vibration levels due to vibratory piling and vibratory compaction activities. The formulae have been used to predict the distance at which a Moderate magnitude of effect (i.e., 1.0 mm/s) would be experienced, as per Table 12.4.

104 These distances have then been used to identify receptors which may experience Moderate magnitude of effects.

105 As noted in section 12.3.12, BS 5228-2 states that cosmetic damage could occur in residential or light buildings where PPV levels exceed 15 mm/s, depending on frequency. This threshold would only be exceeded where piling or compaction works are undertaken within approximately 3 m of any receptor. There is no reasonable prospect of works being undertaken at this distance, and as such cosmetic damage from vibration is **not significant** and is not considered further.

12.4.6 Construction Traffic Vibration

106 Vibration from traffic can be transmitted through the ground by the interaction of the vehicle tyres and the road surface. The passage of vehicles over irregularities in the road can create locally increased levels of vibration. As noted in section 12.3.134, the DMRB scopes out operational vibration from a new road on the basis that a maintained road surface will be free of irregularities.

107 Section A5.2.7.11 of TA A5.2, CTMP [EN010162/APP/6.4.5.2] provides measures that ensure the delivery route is maintained and improved before, during and after the construction period, ensuring vibration from traffic will be minimised as far as practicable. On this basis no traffic induced vibration is anticipated, and as such, effects have not been considered further.

108 It is also notable that existing routes will already experience HGV movements, so the maximum vibration levels at any designated heritage assets, educational premises, laboratories, workshops or other premises

where high precision tasks are performed (as requested by Kneesall, Kersall & Ompton Parish Council in response to the Scoping Report) will be no greater than they are now, although would be more frequent.

12.4.7 Operational Noise Assessment Methodology

109 Operational noise effects have been assessed according to the methodology set out in BS 4142, whereby the Rating level of noise from the Development is compared to the representative background level.

110 The predicted Specific level of operational noise at the Assessment Locations is calculated using SoundPlan 9.1 which implements the noise prediction calculations of ISO 9613-2:2024 '*Acoustics – Attenuation of Sound During Propagation Outdoors*'. Details of the source data and modelling parameters is presented in TA A12.2 [EN010162/APP/6.4.12.2]. TA A12.2 also considers acoustic feature corrections to the Specific sound to account for any acoustic characteristics (i.e., the Rating level).

111 As noted in section 12.3.9, BS 4142 states that where the Rating level and background levels at a receptor are low, changes in the absolute level should be taken into account. It states:

112 *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

113 BS 4142:2014+A1:2019 does not define 'low' in terms of background sound or rating levels, however the ANC Technical Note on BS 4142 provides guidance on the interpretation and application of BS 4142, as discussed in section 12.3.10. The Technical Note states that:

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

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

116 As such, where background levels are found to be low (i.e. below 30 dB L_{A90}), a lower threshold Rating level (L_{Ar}) of 35 dB has been adopted. The operational noise limits are therefore a combination of a margin of 5 dB above the representative background level, subject to a fixed lower threshold of 35 dB, L_{Ar}. This approach was agreed with the EHO at NSDC.

117 Table 12.6 below presents the resulting operational noise magnitude of effect.

Table 12.6: Operational Noise Magnitude of Effect

Magnitude of Effect	Effect
High	Rating level above 35 dB and 10 dB or more above background, depending on context.
Medium	Rating level above 35 dB and between 6 dB and 10 dB above background, depending on context.
Low	Rating level is between 25 dB L_{Ar} and 35 dB L_{Ar}; or Rating level is above 35 dB L_{Ar}, but less than 5 dB above background.
Negligible	Rating level is less than 25 dB L_{Ar}; or Rating level is more than 10 dB below background.

12.4.8 Sensitivity

118 The sensitivity of potentially affected receptors will be assessed in line with Table 12.7 below.

Table 12.7: Receptor Sensitivity

Sensitivity of Receptor	Definition
High	Residential dwellings, schools and hospitals
Medium	Offices, internal teaching / training spaces
Low	Commercial premises

119 The closest (and therefore worst case) receptors are residential and are therefore of High sensitivity. As such, providing noise and vibration impacts are acceptable at the closest receptors, effects at any other receptors will also be acceptable, regardless of sensitivity.

12.4.9 Assessment of Significance

120 The sensitivity of the receptor and magnitude of the predicted effects will be used to determine the significance of likely effects. Table 12.8 summarises the guideline criteria for assessing noise and vibration effects.

Table 12.8: Criteria for Assessing Significance of Noise and Vibration Effects

Magnitude of Effect	Sensitivity		
	High	Medium	Low
High	Major	Moderate	Minor
Medium	Moderate	Minor	Minor
Low	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible

121 Effects predicted to be of Moderate or Major significance (shaded in Table 12.8) are considered to be ‘Significant’ in the context of the EIA Regulations.

12.4.10 Assumptions and Limitations

122 As discussed in Chapter 2, Environmental Impact Assessment, [EN010162/APP/6.2.2] the 'Rochdale envelope' approach is used where project details may not always be confirmed or finalised. For the assessment of noise and vibration, at this stage of the design there is an almost infinite combination of plant locations which could occur. In addition, it is not necessary to assume an extreme worst-case scenario for either construction or operational impacts, as it involves all plant being located directly adjacent to a receptor, which is unrealistic. This would clearly not occur in practice, as plant will be located such that noise limits identified in this report are not exceeded. As such, both the construction and operational noise and vibration assessments are based on a combination of work areas (shown in Figure 5.1 [EN010162/APP/6.3.5.1]) and the illustrative layout (shown in Figures 5.4 [EN010162/APP/6.3.5.4] and 5.5 [EN010162/APP/6.3.5.5]).

123 With regards to construction noise and vibration, this limitation is mitigated by the requirement for a Construction Environmental Management Plan (CEMP) for each phase of construction to be submitted to and approved by the planning authority prior to construction, as secured by a DCO Requirement [EN010162/APP/3.1]. Section A5.3.5 of TA A5.3, oCEMP, [EN010162/APP/6.4.5.3] states that a Construction Noise Management Plan (CNMP) will be developed by the Applicant and submitted to Newark and Sherwood District Council (NSDC) for approval, prior to commencement of construction. The CNMP will identify mitigation measures or monitoring which may be required to ensure noise and vibration thresholds are not exceeded, based on the finalised location of construction activities.

124 In terms of operational noise, this limitation is mitigated by the DCO Requirements [EN010162/APP/3.1], which require an operational assessment based on the final equipment selection and location to be submitted to and approved by the planning authority prior to commencement of the Development.

125 It is notable however that both the construction and operational modelling undertaken as part of this assessment include a number of worst-case assumptions. With regards to construction noise and vibration impacts, the following conservative assumptions have been applied:

- All plant is operational simultaneously;
- All plant operational for 100 % of the time;
- No reduction in noise due to barrier effects, either through existing buildings or created by the progressive installation of PV panels;
- No reduction in noise as a result of topographical screening;
- HGV movements on local roads occur at a distance of 4 m NSRs; and
- Noise from HGV movements based on maximum anticipated daily movements plus a 20 % uplift to allow for uncertainty in the number of HGVs required.

126 With regards to operational noise impacts, the following conservative assumptions have been applied:

- Predictions assume that all noise-emitting plant is operational continuously during daytime and night-time periods. In practice, noise from inverter stations and transformers will be dependent on the air

temperature and the level of sunlight incident on the panels, and as such noise is likely to be negligible from these sources during the majority of the night-time period;

- Operation of the battery units is modelled as continuous, however in practice batteries will not charge / discharge continuously;
- Predictions assume all plant is operational at 100% capacity, however cooling fans associated with plant items are unlikely to operate at 100% in the temperatures typical of the UK. For most of the time (and particularly during night-time periods), cooling fans will typically operate at 60 - 80% capacity, resulting in lower noise emission levels;
- Once installed, the PV panels will provide additional screening to NSRs, thereby reducing noise levels. The actual level of reduction would depend on precise positioning of panels relative to the noise sources and NSRs; as a conservative measure, no allowance for any such reduction has been included; and
- All inverter stations modelled at a height of 3.5 m. Based on our experience of such plant, noise-emitting vents/louvres are typically at a height of approximately 2 m.

127 Given the above, the assumptions made as part of this assessment will result in an overprediction of noise levels in practice and as such can be considered a reasonable worst case.

12.4.11 Matters Scoped Out

12.4.11.1 Operational Road Traffic Impacts

128 Operational Development traffic will be limited to occasional maintenance visits in a car / van. As noted in section 14.7.2 of chapter 14, Traffic and Transport, [EN010162/APP/6.2.14] it is anticipated that 15 vehicle movements per day spread across the development may be required as part of the ongoing operation of the Development. These movements are negligible, and therefore no further assessment of operational road traffic impacts is included in this ES.

12.4.11.2 Decommissioning Noise and Vibration

129 As noted in section 12.4.3, decommissioning noise will be the same or less than during construction phase and will be managed in accordance with a Decommissioning Environmental Management Plan to be agreed prior to decommissioning. As such, the assessment presented is representative of both construction and decommissioning activities, and no specific assessment of decommissioning activities is required.

12.4.11.3 Operational Vibration

130 Operational equipment installed as part of the Development has no moving parts, will emit negligible levels of vibration and will be imperceptible at all NSRs. No further assessment of operational vibration is included in this ES.

12.5 BASELINE CONDITIONS

131 Baseline noise monitoring has been carried out to establish the existing noise climate around the Development, at the locations agreed with the EHO. Details of the monitoring survey, including the methodology and results are contained in TA A12.1: Baseline Noise Survey [EN010162/APP/6.4.12.1].

132 As discussed in Section 12.4.2, since PEIR a large area of panels have been removed around Cromwell, North Muskham, Bathley, South Muskham, Little Carlton and Kelham. For consistency, details of noise monitoring undertaken in these areas (ML9 to ML17) are presented in TA A12.1: Baseline Noise Survey [EN010162/APP/6.4.12.1], however the results are no longer used as part of this assessment.

133 Figure 12.1 [EN010162/APP/6.3.12.1] presents the baseline noise monitoring locations (ML1 – ML35). These locations were agreed with the EHO prior to being undertaken.

134 The dominant noise source at the majority of the assessment locations was found to be road traffic from the A1, which runs along the easternmost boundary of the Order Limits. This is particularly true for receptors H1 – H50, which are generally located between approximately 50 m and 2,000 m from the A1. In addition, Assessment Locations 15 – 47 are located between approximately 30 m and 2,000 m from the East Coast Mainline railway, which was clearly audible on multiple occasions at a number of monitoring locations throughout the survey.

135 Additional sources of road traffic noise include the A616 running through the Order Limits and the A617 running close to the southernmost boundary of the Order Limits. Both roads were noted to be relatively busy and subject to the national speed limit, and as such were clearly audible at a number of measurement locations. In addition, passing vehicles on the local road network were noted at most monitoring locations.

136 Other noise sources noted were typical of rural areas, and included rustling vegetation, agricultural activities, livestock and birdsong. The survey record sheets at each monitoring location include a description of the local acoustic environment at each location, as well as the audible noise sources noted by the surveyor.

137 Table A12.1.2 in TA A12.1, Noise Survey, [EN010162/APP/6.4.12.1] presents the representative background noise levels at each monitoring location.

12.6 DEVELOPMENT DESIGN MITIGATION

138 Development design mitigation is outlined below. The mitigation identified below forms an integral part of the design scheme and construction management, and will be taken into account as part of the assessment of potential effects.

12.6.1 Construction and Decommissioning Phases

139 Annex B of BS 5228-1 and section 8 of BS 5228-2 contain a number of measures to control noise and vibration during construction and decommissioning activities. The following measures have been adopted within TA A5.3, Outline CEMP [EN010162/APP/6.4.5.3]:

- Construction activities will be between 0730 and 1800 Mondays to Fridays, and 0830 to 1300 on Saturdays (unless in exceptional circumstances where need arises to protect plant, personnel or the environment);
- Deliveries of plant and materials by HGV to site shall only take place via designated routes and within times agreed with the Council as secured in the oCTMP [EN010162/APP/6.4.5.2];
- The site contractors shall be required to employ the best practicable means of reducing noise emissions from plant, machinery and construction activities, as advocated in BS 5228;
- Non-tonal and / or directional reversing alarms will be used;
- Where necessary and practicable, noise from fixed plant and equipment will be contained within suitable acoustic enclosures or behind acoustic screens;
- All sub-contractors appointed by the principal contractor will be contractually obliged to comply with environmental noise and vibration DCO Requirements [EN010162/APP/3.1]; and
- All plant and equipment should be properly maintained and operated to prevent excessive noise and vibration and should be switched off when not in use.

140 As noted in Chapter 5, Development Description, [EN010162/APP/6.2.5] construction compounds will be located at least 300 m from nearby receptors.

141 As stated in section A5.3.5 of TA A5.3, Outline CEMP, [EN010162/APP/6.4.5.3] a detailed Construction Noise Management Plan (CNMP) will be developed by the Applicant, based on finalised location of construction activities and equipment to be used on site. The CNMP will identify any additional mitigation measures required to ensure the noise and vibration thresholds specified in section 12.4 are not exceeded. The CNMP will be submitted to NSDC for approval as part of the CEMP.

142 As discussed in Section A5.3.5 [EN010162/APP/6.4.5.3] of the oCEMP (TA A5.3), properties at which the 65 dB $L_{Aeq,t}$ threshold is predicted to be exceeded will be notified in advance.

12.6.2 Operational Noise

143 As part of the design process, indicative buffer distances were provided to the design team to ensure that the distance between substations and array inverters and receptors was maximised, demonstrating that good acoustic design principles were implemented at the outset. Where possible, the illustrative design has been optimised to maximise the distance from the nearest NSRs to noise emitting plant wherever possible, subject to other design constraints.

144 As part of the Development design, a 4 m high acoustic fence is included around Work Area 4 (Intermediate Substations), Work Area 5a (BESS) and Work Area 5b (400 kV Compound).

145 Plant that will be installed as part of the Development has not yet been finalised. In addition, there is a need to maintain flexibility on the number of units to be installed, as well as its location and orientation. The assessment presented in this chapter has therefore been based on a number of realistic worst case design parameters, as discussed in section 12.4.10.

146 Should the design change such that noise emitting equipment is moved closer to receptors, or equipment is selected with higher sound power levels than those presented in this report, design changes or mitigation will be implemented such that the as-built Development will comply with the consented noise limits. This will be secured in the DCO [EN010162/APP/3.1], which requires an operational noise assessment to be submitted to the Council prior to each phase of the Development being commenced based on the final layout and equipment selection for that phase.

12.7 ASSESSMENT OF LIKELY EFFECTS

12.7.1 Construction and Decommissioning Noise Effects

147 Section A12.2.1 of TA A12.2, Noise and Vibration Modelling, [EN010162/APP/6.4.12.2] sets out construction equipment and associated noise levels for each construction activity. The overall noise levels from each activity have been used to calculate the distance at which noise levels would fall below 65 dB $L_{Aeq,t}$, which is the level at which a Moderate level of effect would occur, as per section 12.4.3.

148 The calculated distances are set out in Table A12.2.5 of TA A12.2 Noise and Vibration Modelling, and are based on the following conservative assumptions:

- All plant operational simultaneously;
- All plant operational for 100 % of the time;
- No reduction in noise due to barrier effects, either through existing buildings or created by the progressive installation of PV panels; and
- No reduction in noise as a result of topographical screening.

12.7.1.1 Construction of Hardstanding Activities

149 Areas of hardstanding have been identified using the Work Areas and Illustrative Design, as per the following:

- Construction compounds;
- Internal stone roads;
- Internal tarmac roads;
- Internal temporary roads;
- Work Area 4 (Intermediate Substations);
- Work Area 5a (BESS); and
- Work Area 5b (400 kV Compound).

150 As calculated in Table A12.5 of TA A12.2 [EN010162/APP/6.4.12.2], it is anticipated that hardstanding construction activities would result in the 65 dB $L_{Aeq,t}$ threshold being exceeded at distances of less than 65 m.

151 Construction compounds will contain enabling plant and vehicles for construction of the nearby elements of the Development, and their predominant use will be as storage areas. As such the worst-case noise levels from these areas will be during their construction. It should be noted that no construction compounds will be located within 300 m of any residential receptor.

152 In order to assess construction of hardstanding activities, Figure 12.2 *Assessment of Noise during Hardstanding Construction Activities* [EN010162/APP/6.3.12.2] presents:

- Order Limits;
- Construction compounds;
- Internal stone roads;
- Internal tarmac roads;
- Internal temporary roads;
- Work Area 4 (Intermediate Substations);
- Work Area 5a (BESS);
- Work Area 5b (400 kV Compound);
- 65 dB $L_{Aeq,t}$ contour during hardstanding construction; and
- All NSRs within 300 m of the Order Limits.

153 As can be seen from Figure 12.2 [EN010162/APP/6.3.12.2], Brecks Farm (470113 361176) is located within the 65 dB $L_{Aeq,t}$ contour.

154 At all other NSRs, noise from hardstanding activities is not predicted to exceed the 65 dB $L_{Aeq,t}$, threshold.

155 The NSR identified as potentially exceeding the 65 dB $L_{Aeq,t}$ threshold is located close to a new access track. The receptor is located close to the outer edge of the 65 m area, and as such noise would quickly fall below the 65 dB $L_{Aeq,t}$ threshold as construction of the track progresses. It is anticipated that tracks will be constructed at a rate of 20 m per day, and as such the 65 dB $L_{Aeq,t}$ threshold would likely only be exceeded for a few days at the receptor. Given exceedances in the 65 dB $L_{Aeq,t}$ threshold would be minimal, and less than ten days in duration, the magnitude of effect at this receptor is Low.

156 As such the effect of noise from hardstanding activities is of low magnitude, and therefore **not significant** in terms of the EIA regulations.

12.7.1.2 PV Module Construction

157 As calculated in TA A12.2 [EN010162/APP/6.4.12.2], based on a number of worst case assumptions the distance at which PV module construction activities would exceed 65 dB $L_{Aeq,t}$ is 75 m.

158 Figure 12.3 Assessment of Noise during PV Module Construction Activities [EN010162/APP/6.3.12.3] presents:

- Order Limits;
- Work Area 1 (Solar PV);
- Work Area 4 (Intermediate Substations);
- Work Area 5a (BESS);
- Work Area 5b (400 kV Compound);
- 65 dB $L_{Aeq,t}$ contour during PV module installation; and
- All NSRs within 300 m of the Order Limits.

159 As can be seen from Figures 12.3 [EN010162/APP/6.3.12.3], there are seven NSRs within the 65 dB $L_{Aeq,t}$ contour, as follows:

- Castle Hill House (478951 364267);
- Castle Hill (478951 364260);
- The Conifers (478964 364265);
- Chestnut Cottage (478964 364274);
- The Shires (478945 364266);
- Carlton Manor Mobile Home Park (479300 364164); and
- Brecks Farm (470113 361176).

160 At all other NSRs, noise from PV module construction activities is not predicted to exceed 65 dB $L_{Aeq,t}$.

161 While some receptors may briefly exceed the 65 dB $L_{Aeq,t}$ threshold, the identified receptors are located close to the outer edge of the 75 m area, and as such noise would quickly fall below the 65 dB $L_{Aeq,t}$ threshold as piling works progress. Piling for PV panel installation will typically take up to one month per field. Given that the threshold would only be exceeded when piling activities are undertaken at the closest point to the nearest receptors, any exceedance would be substantially less than ten days in duration, and therefore of Low magnitude.

162 As such the effect of noise from PV installation activities is low magnitude, and therefore **not significant** in terms of the EIA regulations.

12.7.1.3 Installation of Substations and BESS

163 Construction activities associated with the installation of Substations and BESS will be limited to Work Area 4 (Intermediate Substations), Work Area 5a (BESS), Work Area 5b (400 kV Compound), Work Area 6 (National Grid Staythorpe Substation) and Work Area 7 (Staythorpe BESS Connection).

164 As calculated in TA A12.2 [EN010162/APP/6.4.12.2], based on a number of worst-case assumptions the distance at which Installation of Substations and BESS would exceed 65 dB $L_{Aeq,t}$ is 80 m.

165 Figure 12.4 Assessment of Noise during Installation of Substations and BESS [EN010162/APP/6.3.12.4] presents:

- Order Limits;
- Work Area 4 (Substations);
- Work Area 5a (BESS);
- Work Area 5b (400 kV Compound);
- Work Area 6 (National Grid Staythorpe Substation);
- Work Area 7 (Staythorpe BESS Connection);
- 65 dB $L_{Aeq,t}$ contour during substation installation; and
- All NSRs within 300 m of the Order Limits.

166 As can be seen from Figure 12.4 [EN010162/APP/6.3.12.4], there are twelve receptors located within the 65 dB $L_{Aeq,t}$ contour, all of which are located around the existing Staythorpe Substation i.e. Work Area 6 and Work Area 7. While some installation work will be required in these Work Areas to connect the Development to the existing infrastructure, construction activities are likely to be modest, and of short duration. It is also notable that while Work Area 7 extends close to residential receptors, it is highly likely that construction activities associated with connecting in this area to the Development will not occur within 80 m of the nearest receptors.

167 It is therefore considered unlikely that the 65 dB $L_{Aeq,t}$ threshold will be exceeded in practice during the installation of substations and BESS, and as such the effect of noise during installation of Substation and BESS areas is considered low magnitude, and therefore **not significant** in terms of the EIA regulations.

12.7.1.4 Cable Route Construction

168 As calculated in TA A12.2 [EN010162/APP/6.4.12.2], based on a number of worst case assumptions the distance at which construction activities associated with the installation of the cable would exceed 65 dB $L_{Aeq,t}$ is 55 m.

169 Figure 12.5 Assessment of Noise during Installation of Cable Route [EN010162/APP/6.3.12.5] presents:

- Order Limits;
- Work Area 1 (Solar PV);
- Work Area 2 (Cable);
- Work Area 4 (Intermediate Substations);
- Work Area 5a (BESS);
- Work Area 5b (400 kV Compound);
- Work Area 6 (National Grid Staythorpe Substation);
- Work Area 7 (Staythorpe BESS Connection);
- 65 dB $L_{Aeq,t}$ contour during installation of cable route; and
- All NSRs within 300 m of the Order Limits.

170 As can be seen from Figure 12.5 [EN010162/APP/6.3.12.5], there are thirteen NSRs within the 65 dB $L_{Aeq,t}$ contour, as follows:

- Twelve properties in Staythorpe (around 475578 353935); and
- North Park Farm (475599 366076).

171 It is notable that most of the receptors within the 65 dB $L_{Aeq,t}$ contour are located around Work Areas 6 and 7. While some cable route installation will be required in these Work Areas, it is highly unlikely that these works would be undertaken at the closest edge of the Work Areas to the nearby receptors. In addition, installation of the cable route will progress quickly, likely at a rate of 20 m or more per day. It is therefore considered that while the 65 dB $L_{Aeq,t}$ threshold may be briefly exceeded at some properties, in practice any exceedance would last for a maximum of 1 – 2 days, and therefore substantially less than ten days in duration, and is therefore of low magnitude.

172 As such the effect of noise from cable route installation activities is therefore **not significant** in terms of the EIA regulations.

12.7.2 Construction Traffic Noise Effects

173 The potential changes in road traffic noise along the construction traffic routes as a result of construction traffic have been assessed by calculating the baseline and construction year CRTN BNL and comparing the change.

174 Baseline traffic flows (Construction Year Baseline) and construction traffic flows have been sourced from Chapter 14, Traffic and Transport [EN010162/APP/6.2.14].

175 Table 12.9 below presents the results of the assessment.

Table 12.9: Construction Traffic Noise Assessment

Road Name (ID)	Baseline BNL dB	Baseline with Construction Traffic BNL dB	Change in BNL dB	Magnitude of Impact
A46 (A)	74.9	75.0	0.1	Negligible
A616 Great North Road (B)	70.0	70.6	0.6	Negligible
A617 Kelham Road (C)	71.9	72.0	0.1	Negligible
Caunton Road N (D)	60.9	63.0	2.1	Minor
Newark Road (F)	56.9	58.1	1.2	Minor
A616 Newark Road (G)	67.3	67.9	0.6	Negligible
B1164 Great North Road (L)	61.9	63.3	1.4	Minor
Caunton Road S (1)	60.9	61.6	0.7	Negligible

176 As can be seen in Table 12.9, the predicted noise levels from construction traffic along main access routes are **Minor** / **Negligible** in magnitude, and therefore **Not Significant**.

177 In order to assess noise from HGVs using rural / access roads on nearby receptors, the HGV noise level at a distance of 4 m, representative of residential receptors located directly adjacent to any access route, has been calculated in TA A12.2 [EN010162/APP/6.4.12.2]. A predicted haulage level of 60 dB $L_{Aeq,t}$ has been calculated, and is based on a number of worst case assumptions, including:

- 20 % uplift in anticipated HGV movements to allow for uncertainty; and
- Predictions based on the highest predicted number of daily HGV movements.

178 As such, the noise level at receptors located along any access route is likely to be substantially lower than that assessed as part of this assessment.

179 The 60 dB $L_{Aeq,t}$ predicted noise level from haulage at receptors directly along the access route is Low in terms of magnitude, and therefore **not significant.**

12.7.3 Construction Vibration Effects

180 Construction activities with the potential to result in vibration impacts are as follows:

- Vibratory piling of PV mounting structure framework, fencing installation and HDD works;
- Vibratory compaction of hardstanding areas.

181 As calculated in section A12.2 2 of TA A12.2 [EN010162/APP/6.4.12.2], receptors located within 25 m of vibratory piling could potentially exceed 1 mm/s (i.e. a medium magnitude of effect). Vibration compaction works could exceed 1 mm/s at a distance of 20 m. For the purpose of this assessment, a distance of 25 m is considered for all vibratory construction activities, as a worst case.

182 Figure 12.6 Assessment of Vibration Impacts [EN010162/APP/6.3.12.6] presents:

- Order Limits;
- Work Area 1: Solar PV;
- Work Area 2: Cable corridor;
- Work Area 4: Substations;
- Work Area 5a: BESS
- Work Area 5b: 400 kV Substation;
- Work Area 6 (National Grid Staythorpe Substation);
- Work Area 7 (Staythorpe BESS Connection);
- Internal stone roads;
- Internal tarmac roads;
- Internal temporary road;
- Construction compounds;
- Area exceeding 1 mm/s PPV during construction activities; and
- All NSRs within 100 m of the Order Limits.

183 As can be seen from Figure 12.6 [EN010162/APP/6.3.12.6], there are four receptors in Staythorpe (around 475600 353947) within the area where a vibration level of 1 mm/s could be exceeded.

184 All receptors identified are close to the cable corridor. Cable route installation would progress at approximately 20 m per day, meaning that receptors would experience vibration levels exceeding the thresholds for approximately 1 – 2 days, and substantially less than ten days in duration, and therefore is of low magnitude.

185 As such the effect of vibration during construction activities is of a low / negligible magnitude, and therefore **not significant** in terms of the EIA regulations.

12.7.4 Operational Noise Effects

186 The assessment of the impact of operational noise on NSRs has been undertaken in line with the methodology in section 12.4.7.

187 Details of the modelling parameters, assumptions and noise emission data for the operational modelling are summarised in TA A12.2 [EN010162/APP/6.4.12.2]. A number of worst-case assumptions have been applied, as detailed in section 12.4.10. It is therefore considered that the assumptions made as part of this assessment are likely to result in an overprediction of noise in practice. Given the conservative approach, any uncertainties inherent in the assessment will have no material effect on the findings of the assessment.

188 Tables A12.2.8 and A12.2.9 in TA A12.2 [EN010162/APP/6.4.12.2] present the predicted noise level, as well as the background noise level, margin between background level and Rating level, and the subsequent magnitude of effect at each assessed NSR, during daytime and night-time periods respectively.

189 As shown in Table A12.2.8, during daytime periods, operational noise levels are either below 35 dB L_{Ar}, or less than 5 dB above background. Operational noise is therefore Low / Negligible at all receptors during daytime periods. It is notable that at all receptors daytime predicted noise levels do not exceed the representative background noise levels.

190 During night-time periods, operational noise levels are either below 35 dB L_{Ar}, or less than 5 dB above background. All such operational noise levels at all NSRs during night-time periods are of Low / Negligible magnitude.

12.7.4.1 Context

191 As noted in section 12.4.7, the context of the Development should be considered as part of the assessment. The eastern side of the Order Limits is located close to several major transport links; including the A1 road and East Coast Main Line railway. In addition, the A616 and A617 roads run through the Order Limits and are subject to the national speed limit. These sources were audible during the site visit at a number of the monitoring locations. Sounds from farming activities and vehicle use on smaller roads also contribute to the acoustic environment. Given that at most receptors, the Development does not exceed the existing background noise level, as well as the worst-case nature of the assessment (particularly regarding night-time noise), it is considered that the Development will not change the character of the existing acoustic environment. As such, the context of the Development does not impact the overall assessment.

192 As per the criteria in section 12.4.7, during both daytime and night-time periods the magnitude of effect is Low / Negligible, and therefore **not significant**.

12.8 CUMULATIVE EFFECTS ASSESSMENT

193 Stages 1 and 2 of the cumulative effects assessment have been carried out for the ES and are described and reported in chapter 2, EIA, [EN010162/APP/6.2.2] and TA A2.1, Cumulative Effects Assessment Stages 1 and 2, [EN010162/APP/6.4.2.1] including the projects identified as requiring cumulative assessment in terms of noise and vibration. Information gathering (stage 3) has been undertaken on relevant cumulative projects, and an assessment (stage 4) on identified projects is undertaken in Table 12.10 below.

194 Cumulative construction noise and vibration impacts would only occur where noise and vibration from activities associated with the Development overlap temporally with noise and vibration activities associated with cumulative Developments. As noted in Section 12.4.1, the study area for construction noise impacts is 300 m, meaning that for cumulative noise impacts to occur, construction activities associated with the Development and any cumulative development would both need to occur at the same time within 300 m of the same receptor. For vibration impact, activities would have to both occur within 100 m of the same receptor to cause cumulative impacts. In practice, while overall construction periods may overlap, it is unlikely that noise and vibration emitting activities associated with the Development and any cumulative development will take place at exactly the same time within 300 m (or 100 m for vibration) of the same receptor.

195 However, in order to mitigate this limitation, a detailed cumulative noise and vibration assessment, based on exact construction activity timings for both the Development and any cumulative development will be undertaken as part of the Construction Noise Management Plan (CNMP) and submitted to NSDC for approval, as discussed in Section A5.3.5 of the oCEMP [EN010162/APP/6.4.5.3]. Where it is found that cumulative noise or vibration impacts could occur, mitigation will be implemented to ensure any cumulative effects are not significant. Mitigation measures could include use of quieter equipment, acoustic barriers or timing construction activities and deliveries such that they do not occur at the same time, and at the same receptors, as cumulative construction activities and deliveries.

196 Table 12.10 therefore focusses on operational cumulative noise and vibration impacts.

Table 12.10: Cumulative Assessment

ID	Name	Application Ref.	Status	LPA	Noise and Vibration Assessment
1	Staythorpe CCS Power Station, RWE	24/00086/DCO	~~N/A~~S36C Application Submitted, Pre-application	NSDC	~~Installation of a CCS plant and underground pipeline. At this stage no information is available for any~~The nearest noise emitting plant associated with the CCS plant~~, however it is anticipated that~~ is more than 1500 m from noise emitting plant associated with the ~~underground pipeline will not emit noise, and as such no operational~~ Development. At this distance, there is no reasonable prospect of cumulative noise ~~and vibration~~ effects ~~will occur.~~ occurring at nearby noise sensitive receptors, and therefore the magnitude of effect is **not significant**.
7	Staythorpe BESS	22/01840/FULM	~~Refused - 07/07/2023~~ ~~Appeal allowed~~Under construction	NSDC	Construction of Battery Energy Storage System and associated infrastructure. The background noise level at the receptor closest to both Staythorpe BESS and the Development (H54) is 42 dB $L_{Aeq,t}$ during daytime periods and 30 dB $L_{Aeq,t}$ during the night-time period. Noise from Staythorpe BESS is predicted to be 30 dB $L_{Aeq,t}$[20] at H54, while noise from the Development is 27 dB $L_{Aeq,t}$ at H54, resulting in a cumulative noise level of 32 dB $L_{Aeq,t}$. The cumulative noise level is therefore 10 dB below background during the day and 2 dB above background at night, resulting in a Negligible / Low magnitude of impact and a **not significant** effect.

[20] Noise Assessment Addendum, Staythorpe BESS, Metrica Environmental Consulting, June 2023

ID	Name	Application Ref.	Status	LPA	Noise and Vibration Assessment
~~1~~8	Staythorpe BESS connection	24/01261/FULM	Approved – Dec 2024	NSDC	Development consists of installation of cabling to connect Staythorpe BESS to adjacent National Grid Staythorpe substation. Cabling and associated infrastructure associated with Staythorpe BESS connection will emit negligible levels of noise and vibration, and as such no operational cumulative noise and vibration effects are anticipated.
9	SSE BESS	23/00317/FULM	~~Awaiting determination (as of 30/10/2024)~~Approved	NSDC	Construction and operation of a BESS. The predicted noise level at the nearest receptor to both SSE BESS and the Development (NSR B in the SSE BESS noise assessment[21]) from the SSE BESS is 42 dB $L_{Aeq,t}$. At the same receptor, the predicted noise level from the Development is 30 dB $L_{Aeq,t}$. Given predictions from the Development are more than 10 dB below those from the SSE BESS at the worst-case receptor, there is no possibility of cumulative noise effects.
10	SSE BESS cable route	23/00810/FULM	Approved - 20/06/2024	NSDC	Development consists of installation of cabling to connect SSE BESS to the adjacent National Grid Staythorpe substation. Cabling and associated infrastructure associated with SSE BESS cable route will emit negligible levels of noise and vibration, and as such the magnitude of effect is **not significant.**
11	Winkburn Solar Farm	20/02501/FULM	Approved - 20/05/2021	NSDC	Winkburn Solar Farm is located 1.3 km from nearest noise emitting plant associated with the Development. No noise assessment was submitted as part of the Winkburn Solar development, and there are no planning

[21] Battery Storage System and SGT, Land at the corner of the A617 and Staythorpe Road, Newark, Noise Impact Assessment, ENS, Feb 2024

ID	Name	Application Ref.	Status	LPA	Noise and Vibration Assessment
					conditions related to noise. At this distance there is no possibility of cumulative noise or vibration and therefore the magnitude of effect is **not significant**.
~~14~~15	Knapthorpe Solar	22/00976/FULM	Consented at appeal, April 2025	NSDC	Construction and operation of a solar development. Condition 13 of the Knapthorpe Solar Decision Notice[22] states that noise from Knapthorpe Solar should not exceed the predicted rating levels of 34 dBA during the day and 31 dBA during the night-time periods at the nearest receptors. At the same receptors (H60, H61, H63 and H64), the maximum predicted noise level from the Development is 30 dB $L_{Aeq,t}$, resulting in a maximum potential cumulative noise level of 35 dB $L_{Aeq,t}$ during the day, and 34 dB $L_{Aeq,t}$ during the night-time periods at the nearest receptors. Background levels at these receptors are 40 dB L_{A90} during the day and 33 dB L_{A90} during night-time periods. As such cumulative noise level are 5 dB below background during the day and 1 dB above background at night, resulting in a Negligible / Low magnitude of impact and a **not significant** effect.
15	Knapthorpe Solar	22/00975/FULM	Consented at appeal, April 2025	NSDC	As above
16	Kelham Solar	23/01837/FULM	~~Refused, as of 05/05/2025, but with a possibility of~~	NSDC	Construction of solar and BESS with associated equipment. The noise impact assessment[23] submitted with the application predicted noise levels of 37 dB $L_{Aeq,t}$ during the day and 34 dB $L_{Aeq,t}$ at night at the closest

[22] Appeal Decision APP/B3030/W/24/3344500
[23] Noise Impact Assessment for Solar Array and BESS Development at Land to the West of Main Road Kelham, NVC, Oct 2023

ID	Name	Application Ref.	Status	LPA	Noise and Vibration Assessment
			~~appeal~~Consented at appeal		receptor to both Kelham Solar and the Development (H65). The maximum predicted noise level from the Development at H65 is 34 dB $L_{Aeq,t}$, resulting in a maximum potential cumulative noise level of 39 dB $L_{Aeq,t}$ during the day and 37 dB $L_{Aeq,t}$ during the night-time periods. Background noise level at H65 is 42 dB during the day and 33 dB during the night-time periods. Cumulative noise levels are therefore 3 dB below background during the day and 4 dB above background at night, resulting in a Negligible / Low magnitude of impact and a **not significant** effect.
17	Foxholes Solar	22/01983/FULM	Awaiting determination (as of 30/10/2024)	NSDC	The nearest noise emitting plant associated with Foxholes Solar is approximately 1,400 m from noise emitting plant associated with the Development. At this distance, there is no prospect of cumulative noise effects occurring at nearby noise sensitive receptors, and therefore the magnitude of effect is **not significant**.
18	Tuxford Road Solar Farm	21/01577/FULM	Approved - 16/12/2021	NSDC	The nearest noise emitting plant associated with Tuxford Road Solar Farm is approximately 1200 m from noise emitting plant associated with the Development. At this distance, there is no reasonable prospect of cumulative noise effects occurring at nearby noise sensitive receptors, and therefore the magnitude of effect is **not significant**.
284, 285, 286	Ness Farm 1, 2 and 3	ES/4441 ES/4690,	Approved - 07/06/2023,	NCC – falls	Extension to existing quarry for the extraction of sand and gravel. The nearest noise emitting plant associated with the Development is located approximately 2 km from the NESS Farm quarry, across the A1. At this

ID	Name	Application Ref.	Status	LPA	Noise and Vibration Assessment
		V/4462	~~Awaiting determination as of 11/02/2025,~~ Approved – 12/03/26, Approved - 07/06/2023	within NSDC	distance there is no prospect of cumulative noise effects occurring during operation, and therefore the magnitude of effect is **not significant**.
292		F/4395	Approved - 30/09/2022	NCC – falls within NSDC	Relocation of existing mineral processing plant. The nearest noise emitting plant associated with the Development is located approximately 1.5 km from the Cemex operations, across the A1. At this distance there is no prospect of cumulative noise effects occurring during operation, and therefore the magnitude of effect is **not significant**.

12.9 MITIGATION MEASURES AND RESIDUAL EFFECTS

197 The effects of noise and vibration during the construction / decommissioning phases are predicted to be Negligible to Minor Adverse and are therefore **not significant**. As discussed in section 12.4.10, the assessment of construction noise and vibration is based on a combination of the Work Areas and the illustrative layout; an updated assessment of the construction activities will be undertaken as the design progresses to identify any NSRs where the construction noise and vibration thresholds may be exceeded, based on the final layout, and any required design changes or mitigation proposed in order to ensure that the thresholds are not exceeded. The assessment will be included in a Construction Noise Management Plan (CNMP) and submitted to the Council for approval as part of the CEMP prior to construction. This is secured by a requirement of the DCO [EN010162/APP/3.1].

198 Section 12.7.4 demonstrates that based on the illustrative design, operational significant adverse effects have been avoided. As such, no additional mitigation measures are required, and Residual effects are therefore **not significant**.

199 A 4 m high acoustic screen has been included in the noise model around the Work no. 4, Intermediate Substations, Work no. 5a, BESS, and Work no. 5b, 400 kV Compound. It is notable however that other future designs may implement alternative / additional mitigation, as required in order to ensure there are no exceedances of the thresholds, including:

- Reducing the number of noise emitting sources;
- Relocation of equipment to maximise distance from plant to nearest receivers;
- Orientation of equipment such that noise emitting sources face away from the nearest noise sensitive receptors;
- Selection of equipment with lower noise emission levels;
- Operating equipment in reduced noise modes; and
- Installing proprietary silencers or enclosures.

200 Implementation of the above mitigation measures may result in the reduction or removal of the acoustic screen.

201 The DCO process allows flexibility in the location of equipment, and as such noise sources may be located closer to NSRs than assessed. Any such changes will be assessed through the detailed design, and where necessary mitigation implemented to ensure noise at the nearest NSRs is below the Noise Limits. This is secured by a Requirement of the DCO [EN010162/APP/3.1] which requires an operational noise assessment to be submitted to the Council prior to each phase of the Development being commenced based on the final layout and equipment selection for that phase.

12.10 SUMMARY OF LIKELY EFFECTS

202 An assessment of potential noise and vibration effects has been carried out for the construction, operation and decommissioning phases of the Development. Table 12.11 outlines the likely effects.

Table 12.11: Summary of Effects

Predicted Effect	Mitigation	Residual Effect
Construction and decommissioning Noise and vibration	None (other than measures embedded in the design of the Development) The assessment of construction noise and vibration is based on the illustrative layout. An updated assessment of the construction activities will be undertaken as the design progresses to identify any receptors expected to exceed the construction noise and vibration thresholds, based on the final layout, and where required additional mitigation measures specified. The assessment will be included in a Construction Noise Management Plan (CNMP) and submitted to the Council for approval as part of the CEMP prior to construction. This is secured by a requirement of the DCO [EN010162/APP/3.1].	No significant effects
Operational Noise	None (other than measures embedded in the design of the Development). The DCO process allows flexibility in the location of equipment, and as such noise sources may be located closer to receptors than currently identified in the illustrative design. Any such changes will be assessed through the detailed design, and where necessary mitigation implemented to ensure noise at the nearest NSRs is below the Noise Limits. Mitigation measures could include: • Reducing the number of noise emitting sources; • Relocation of equipment to maximise distance from	No significant effects

Predicted Effect	Mitigation	Residual Effect
	plant to the nearest receivers; • Orientation of equipment such that noise emitting sources face away from the nearest noise sensitive receptors; • Selection of equipment with lower noise emission levels; • Operating equipment in reduced noise modes; and • Installing manufacturer silencers or enclosures. This is secured by a requirement of the DCO [EN010162/APP/3.1].	

12.11 STATEMENT OF SIGNIFICANCE

203 This chapter has assessed the significance of potential noise and vibration effects during the construction, operational and decommissioning phases, and concludes that noise or vibration effects are **not significant** in terms of the EIA Regulations.

204 This assessment is based on the illustrative design. In order to ensure that the final design will not result in significant effects, prior to the start of construction, the predictions of noise and vibration levels at receptors during both construction and operation will be repeated based on the actual detailed design, specific models of plant and specific mitigation measures. This will be required to show that predicted noise levels are below the relevant noise and vibration limits. These reports will be submitted to Newark and Sherwood District Council, prior to the commencement of construction and is secured through the DCO [EN010162/APP/3.1].