OAKLANDS FARM SOLAR PARK

Applicant: Oaklands Farm Solar Ltd

Environmental Statement
Chapter 11 – Noise
October 2024
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Planning Act 2008
Infrastructure Planning (Application: Prescribed Forms and Procedure) Regulations 2009 - 5(2)(a)

Chapter 11
Noise and Vibration

Introduction

11.1 This chapter considers the potential effects of the Proposed Development on noise and vibration sensitive receptors. It details the assessment of noise and vibration effects at sensitive receivers and resources during the construction, operation and decommissioning stages.

11.2 Traffic data provided by the transport consultants ITP (see **Chapter 10: Transport and Access**) has been used in the assessment of off-site vehicle noise during construction.

11.3 Any potential effects on Ecology from noise or vibration are discussed within **Chapter 6: Ecology.**

11.4 The Noise and Vibration assessment was undertaken by Sustainable Acoustics Ltd.

11.5 This chapter is supported by the following figures available in **Volume 2** of the ES and several Plates referenced in the text below:

- **Figure 11.1: Survey measurement positions and noise receptors of interest**.
- **Figure 11.2: Predicted worst-case daytime noise levels (at 1.5m above ground)**
- **Figure 11.3: Predicted worst-case night-time noise levels (at 4.5m above ground)**

11.6 The following appendices support the assessment and are also referred to throughout this chapter and included in **Volume 3**:

- **Appendix 11.1: Baseline Noise Survey**.
- **Appendix 11.2: Construction Noise Source Data**.
- **Appendix 11.3: Operational Noise Source Data**.

Scope of the Assessment

Effects Assessed in Full

11.7 The following effects were identified at the scoping stage for consideration in this assessment:

- Direct noise effects during construction on noise sensitive receptors including:
  - works required for enabling works for the construction compounds, installation of the Proposed Development's substation and BESS units, construction of temporary construction access tracks, any excavation, or site preparation works such as soil stripping, site levelling, cable trenches, installation of the solar PV arrays using 'pile' driven foundations, and installation of the panels;
  - noise from on-site construction traffic using internal haul roads and access tracks; and
  - offsite construction traffic using local lanes to connect to the main roads.
- Direct noise effects from plant during operation on noise sensitive resources and receptors.

11.8 The assessment scenarios used for this topic will be:

- For construction noise - the current best understanding, from **Chapter 4: Project Description,** of likely construction equipment and duration of construction traffic volumes and haul routes and based on the approach for similar developments.
- For operational noise – the current best knowledge of sound data for potential equipment and likely placement of equipment within the Site from current layout plans shown in **Figure 4.1: Illustrative Concept Design**.

Effects Scoped Out

11.9 Based on the desk based and field survey work undertaken for the noise and vibration assessment; the professional judgement of the Environmental Impact Assessment (EIA) team; experience from other relevant projects; policy guidance and standards; and feedback received

from consultees, the following topic areas have been 'scoped out' of detailed assessment, as agreed in the Scoping Opinion:

- The assessment of vibration from construction and decommissioning activities. It is unlikely vibration will be a concern considering proposed activities relative to potential sensitive receptors. This will be reviewed if the assumptions that informed this decision become notably different.
- The assessment of noise arising from construction traffic on main roads. Construction traffic routes will be on dedicated routes, designed to join main roads (which currently carry significant traffic volume) as directly as possible so that the increase in traffic volume on main roads will be incidental (<1dBA - see paragraph **11.30** and **Table 11.7:**). The impact of noise from construction traffic on the minor roads is, however, presented.
- The assessment of operational noise and vibration from maintenance activities and traffic during the operational stage of the Proposed Development. There is a low level of activity required for maintenance with up to 3 members of staff on site to oversee daily operation. This is expected to be similar to current levels of agricultural activity.
- The assessment of operational vibration as there are no noteworthy sources of vibration during operational stages.
- The assessment of vibration from vehicle movements on public roads and access tracks on resources and receptors. Vibration from road vehicle movements is highly unlikely to be significant unless there are significant discontinuities or sudden changes in road height, such as potholes, immediately adjacent to a receptor. Where this occurs on any public roads it is an existing issue and is not an effect of the Proposed Development. All existing access tracks within the Site will be upgraded and maintained in accordance with **Appendix 4.3: Outline Construction Environmental Management Plan** and **Appendix 4.4: Outline Operational Management Plan**.
- Noise and vibration during decommissioning is assumed to be no greater than that during construction. Therefore, decommissioning has not been assessed as a separate stage within the ES.
- Noise from overground cables - there are no high voltage overground cables proposed for the Proposed Development.

Public Rights of Way

11.10 It is also considered appropriate to scope out a detailed assessment of the effects of noise and vibration on users of the Public Rights of Way (PRoW) crossing the Site as they are not likely to be considered significant. With reference to **Chapter 12: Socio-economics, Tourism and Recreation** it is understood that there is some use of the PRoW crossing the Site but it is not heavily used.

11.11 General footpaths are considered to have low sensitivity to noise and vibration. As noted by DCC in response to the PEIR consultation; *"The users of Public Rights of Way crossing the site, including the Cross Britain Way and proposed permissive route, will experience noise levels greater that at the closest residential receptors, although transitory in nature, due to progression along the route. The use of such routes is also unlikely to be frequent during the hours of night-time. It is therefore agreed that the operational impacts of noise are therefore unlikely to be significant."*

11.12 Construction activity will move around the Site as it is developed and is unlikely to result in high levels of noise or vibration for prolonged periods at the PRoW.

11.13 No operational vibration is expected at the PRoW as a result of the Proposed Development.

11.14 There are no specific guidance criteria for the assessment of noise on users of footpaths where it is not a defined amenity area and operational noise levels at the PRoW are not expected to be high. A commentary-level assessment of operational noise is provided at paragraph 11.140.

Assessment Methodology

Policy, Legislation and Guidance

Policy

11.15 This assessment is carried out in accordance with the principles contained within the following policy documents:

- National Policy Statements (NPS) for Energy Infrastructure, and in particular EN-1[1], and the November 2023 drafts NPS EN-1[2], EN-3[3] and EN-5[4] to be designated.
- The National Planning Policy Framework (NPPF)[5].
- The Noise Policy Statement for England (NPSE)[6].
- South Derbyshire District Council (SDDC) Local Plan[7].

11.16 Overarching NPS for Energy (EN-1) and the November 2023 draft NPS EN-1 to be designated sets out, at 4.5 (and draft to be designated at 4.7) '*Criteria for "good design" for Energy Infrastructure'*, how good design, in terms of siting and use of appropriate technologies, can help mitigate adverse impacts such as noise. At section 5.11 (and draft to be designated 5.12), the assessment of noise and vibration effects are discussed, with reference to the aims of the NPSE and Good Design principles for mitigation to human receptors and wildlife. The overall aims at paragraph 5.12.17 are:

- *"Avoid significant adverse impacts on health and quality of life from noise.*
- *Mitigate and minimise other adverse impacts on 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".*

11.17 EN-1 states that assessment should follow the principles of the relevant British Standards and other guidance, quoting examples of BS 4142 and BS 8233 for operational noise assessment and BS 5228 for construction noise and should include the following (similar text is

[1] Department of Energy and Climate Change (July 2011), Overarching National Policy Statement for Energy (EN-1)
[2] Department for Energy Security and Net Zero (November 2023), Overarching National Policy Statement for Energy (EN-1)
[3] Department for Energy Security and Net Zero (November 2023), National Policy Statement for Renewable Energy Infrastructure (EN-3)
[4] Department for Energy Security and Net Zero (November 2021) Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)
[5] Department for Levelling Up, Housing and Communities (December 2023), National Planning Policy Framework
[6] Department for Environment, Food and Rural Affairs (March 2010), Noise Policy Statement for England (NPSE)
[7] South Derbyshire District Council (June 2016), South Derbyshire Local Plan

presented at paragraph 5.12.6 of in the November 2023 draft NPS EN-1 to be designated, with additions shown in brackets below):

- 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 both the short term such as during the construction period and 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 the year*).
- An assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas (*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*).

11.18 The November 2023 draft NPS EN-3 to be designated section 2.10.120 relates to noise and vibration impacts from traffic generation during the construction phase of solar farms, requiring consideration of suitability of routes to the farms as many solar farms will be sited in areas served by a minor road network. Specific policy for Solar Farms is not provided in the extant EN-3.

11.19 NPS EN-5 sets out additional technology-specific considerations for noise and vibration at section 2.9 (paragraph 2.9.26 onwards in the draft to be designated) from high voltage transmission lines (defined as 400kV and 275kV lines) and also audible effects that arise from substation equipment such as transformers, which is relevant to the Proposed Development. It

states that assessment should follow the principles of the relevant British Standards, quoting examples of BS 4142.

11.20 The November 2023 draft NPS EN-5 to be designated (at paragraph 2.9.18 – 2.9.19) considers The Horlock Rules – guidelines for the design and siting of substations, which state that *"applicants should consider environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum and to keep the visual, noise and other environmental effects to a reasonably practicable minimum".*

11.21 The NPPF sets out Government planning policy on noise. This supports a presumption in favour of sustainable development, unless the adverse impacts of that development would outweigh the benefits when assessed against the policies in the NPPF, taken as a whole. The noise implications of development are recognised at paragraph 191 where it is stated that planning policies and decisions should:

- *"mitigate and reduce to a minimum potential adverse impact from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life".*
- *"Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".*

11.22 The NPSE sets out a policy vision to *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".* To achieve this vision the NPSE sets the following three aims: *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

11.23 In achieving these aims the document introduces significance criteria, which are referred to in this report:

- SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur. It is stated that "*significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development*".
- LOAEL – Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "*all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur*."
- NOEL – No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. This can be related to the third aim above, which seeks: "*where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim*."

11.24 The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

11.25 The SDDC Local Plan follows the principles of NPPF and encourages quality sustainable development.

Legislation

11.26 This assessment is carried out in accordance with the following legislation:

- The Control of Pollution Act 1974[8].
- The Environmental Protection Act 1990[9].

Guidance

11.27 This assessment is carried out in accordance with the principles contained within the following documents:

- IEMA Guidelines for Environmental Noise Impact Assessment 2014[10], sets out key principles around the process of assessment of environmental noise impacts and reporting to the decision makers. These guidelines are not prescriptive but describe the process and good practice.
- British Standard BS5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites[11]. The BS 5228 includes a method for the prediction and assessment of noise levels resulting from demolition, site preparation and construction works, including construction traffic movement along internal haul roads[12]. The Standard outlines methods of setting noise limits from sites, taking account of existing noise levels. Attention is drawn to legislative controls, selection of the most suitable methods to provide an appropriate level of noise control and establishing community relations.
- National Planning Policy Guidance on Noise (NPPG: Noise) 2019[13], provides guidance on how planning can manage potential noise impacts in new development, and states that *"good acoustic design needs to be considered early in the planning process" (Paragraph: 001 Reference ID: 30-001-20190722)* . Examples of outcomes to a given noise exposure are provided; at the Lowest Observed Adverse Effect Level (LOAEL), *"Noise can be heard*

[8] Control of Pollution Act 1974, Part III, *Noise*

[9] HMSO (1990), Environmental Protection Act, Part III Part III, *Statutory Nuisances and Clean Air*

[10] Institute of Environmental Management & Assessment (2014), Guidelines for Environmental Noise Impact Assessment, Version 1.2 (November 2014)

[11] British Standards Institute (2009), BS 5228:2009+A1:2014, Code of Practice for Noise and Vibration Control on Construction and Open Sites

[12] For assessment of traffic noise generated by traffic on haul roads not part of the public highway but not internal to the site, the principles of Design Manual for Roads and Bridges LA 111 Noise and vibration is followed.

[13] National Planning Policy Guidance (22 July 2019), Noise, Available at https://www.gov.uk/guidance/noise--2 (Accessed 29 August 2023)

and causes small changes in behaviour, attitude or other physiological response". The noise exposure hierarchy table below is provided, based on the likely average response of those affected.

Table 11.1: Noise Exposure Hierarchy Table in NPPG: Noise

Response	Examples of outcomes	Increasing effect level	Action
Observed Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			

Response	Examples of outcomes	Increasing effect level	Action
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature waking and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

- WHO and British Standard 8233: 2014[14]. The World Health Organisation (WHO) has published criteria[15],[16] which establish desirable noise limits derived from studies of annoyance, sleep disturbance, and the impact of noise on human health and well-being, which have been widely adopted. The British Standard BS 8233: 2014, Guidance on Sound insulation and noise reduction for buildings, provides additional guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the WHO. The criteria set outs desirable levels of steady state, "anonymous" noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant.
- British Standard BS4142:2014+A1:2019[17]. The sound from the industrial/commercial source is rated by considering the sound level and its characteristics, such as tonal, impulsive or intermittency. The rating level is then compared to the existing background noise level to determine the likelihood of an adverse impact on people, depending upon the context.

Consultation

11.28 In undertaking the assessment, consideration has been given to the scoping responses and other consultation which has been undertaken as detailed in **Table 11.2**.

[14] British Standards Institute (2014), BS 8233:2014, Guidance on sound insulation and noise reduction for buildings

[15] The World Health Organisation (1999), Guidelines for Community Noise

[16] The World Health Organisation (2018), Environmental Noise Guideline for the European Region, 2018

[17] British Standards Institute (2014), BS4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound

Table 11.2: Consultation Responses

Consultee and Date	Comment or Issue Raised	Response/Action Taken
Scoping Consultation Responses		
Head of Environmental Services, SDDC, September 2021	*"We are not aware of any additional noise sensitive receptors not identified in the Scoping Report. Including ecological or amenity."*	Noted
	"I agree that off-site vehicle movements can be scoped out from the quantitative assessment in the Noise chapter."	Noted
	"I agree that vibration from vehicle movements on roads and tracks can be scoped out from the quantitative assessment in the Noise chapter."	Noted
	"I agree that construction vibration can be scoped out from the quantitative assessment in the Noise chapter provided that the piling activities do not significantly exceed those described in paragraph 8.3" (of scoping report).	Noted

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	"Agree" that an assessment of overhead cable noise for cables below 350kV can be excluded from the scope.	Noted
	Applicant queried local policy/ interpretation of BS4142. 9th June 2021 email response from Matthew Holford setting out LOAEL and SOAEL relationships and noise character penalties.	Noted
	Applicant requested confirmation of acceptance of residential survey positions. 4th November email response from SDDC confirmed that happy with proposals for noise survey positions.	Noted
Planning Inspectorate, September 2021	Applicant proposed to scope out the assessment of noise and vibration impacts to Ecology from the noise and vibration chapter to the Ecology Chapter (no specific noise or vibration sensitive Ecological sites were identified). *"The Inspectorate is content with this approach to the noise and vibration assessment but advises*	Noted

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	the Applicant to provide clear cross-referencing in the Noise and Vibration ES aspect chapter to where these assessments are located."	
	The Inspectorate is content to scope out: Assessment of operational vibration, Assessment of operational noise and vibration from maintenance and traffic, Vibration from piling, Assessment of construction vibration from vehicle movements on public roads and access tracks.	Noted
	Advised the ES should contain an assessment of construction vehicle noise unless otherwise justified with reference to relevant thresholds and guidance.	An assessment of construction vehicle noise has been undertaken for minor roads connecting the Site to main roads. The findings of this assessment justify that further assessment of construction traffic on main roads is not required and has been scoped out.
	Advised the ES should either include evidence to confirm that noise generated by overhead cables	No longer applicable as the Proposed Development does not include overhead cables.

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	below 350kV would not result in significant effects on sensitive receptors or provide an assessment of likely significant effects.	
	The ES should explain how the study area and sensitive receptors have been selected with reference to the extent of the likely impacts. Sensitive receptors should include community, leisure and ecological receptors as well as residential receptors.	This information is included in this assessment (Paragraphs 11.29 to 11.33 and 11.69 to 11.71).
	The ES should explain how the baseline noise monitoring locations were chosen with reference to relevant information including noise contour mapping.	This information is included in this assessment (Paragraphs 11.29 to 11.33 and 11.69 to 11.71).
	Noted the criteria for assessing the significance of noise and vibration effects should be clearly set out in the ES with reference to established guidance.	This information is included in this assessment (Paragraphs 11.38 to 11.63).

Consultee and Date	Comment or Issue Raised	Response/Action Taken
Drakelow Parish Council, 25/08/21	Effects of noise should not be scoped out of the ES since noise and vibration from construction can affect properties some distance from the Site, particularly if piling operations are being undertaken.	Assessment of significant noise and vibration sources has been undertaken.
Rosliston Parish Council and Walton-on-Trent Parish Council, September 2021	Advised *"the ES should adequately investigate the noise impact of covering 500 acres of ground with soil; or foliage which are generally noise "absorbers" with 500 of acres of what are hard reflective surfaces which will reflect noise and make the ambient background noise very different."*	Sound reflection from solar panels may be a consideration if located close to both a significant noise source and receptors. There are no significant existing noise sources (such as a busy main road) close to the Site. The maximum possible theoretical increase would be 3dB where the majority of the surface between a noise source and receiver changes from being entirely absorptive to entirely reflective. In practice the change is much lower. Existing ambient noise levels in the area are relatively low, and as such resulting effect is highly unlikely to be a significant issue.
	Question why local parks including Walton-on-Trent park and Rosliston Forestry Centre are not included as noise sensitive receptors. Question	Fairfield Farm is included as a receptor position in the assessment. The Rosliston Forestry Centre was included in the PEIR but following design changes and reduction in the

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	why is Fairfield Farm not a noise sensitive receptor given its proximity to both the panels and the overhead cables (over Rosliston Road).	Site's red line boundary, it is now outside of the assessment boundary. (See **Table 11.3** for list of operational and construction noise receptors.)
	"Given the poor state of the local rural roads, and the Applicants comment in relation to vibration from vehicle movements on public roads that this is "generally only noticeable where roads are poorly maintained" this needs to be retained in scope."	Vibration from vehicle movements is highly unlikely to be significant unless there are significant discontinuities or sudden changes in road height, such as potholes or speed bumps immediately adjacent to a receptor. There is a general obligation (BS 5288 Section 8.2.1: Control of noise at source) to keep "internal" haul roads well maintained- this would be applied to the haul road formed from the Park Farm access track. It is also assumed that where there is a plan to use an existing access track, such as Park Farm access tracks, the track will be upgraded to an appropriate state.
PEIR Consultation Responses		
SDDC 6th June 2022	*"No significant concerns in principle are raised at this stage, but officers would look to comment at full application stage, once the design of the scheme and proposed plant has been selected."*	Noted

Consultee and Date	Comment or Issue Raised	Response/Action Taken
DCC 6th June 2022	*"The noise and vibration assessment and methodology presented is welcomed and it is accepted that in the main, the construction methods employed are unlikely to generate significant noise or vibration at the most sensitive receptors.* *Operational noise generated by the proposal is effectively limited to that of sub-stations and transformers. DCC supports the review of the location and acoustic screening of the energy storage facility and transformer sub-stations to further reduce the possible impacts of noise while accepting that there is only very limited likelihood for adverse impact on specific receptors. The evidence provided in the form of acoustic contours relating to the predicted operational worst-case day-time noise levels (plate 11.1) and predicted worst case night-time noise levels (plate 1.2) suggests that the noise impacts at the*	Noted

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	nearest receptor are expected not to be above the threshold of hearing. *The users of Public Rights of Way crossing the site, including the Cross Britain Way and proposed permissive route, will experience noise levels greater that at the closest residential receptors, although transitory in nature, due to progression along the route. The use of such routes is also unlikely to be frequent during the hours of night-time. It is therefore agreed that the operational impacts of noise are therefore unlikely to be significant."*	
Owners/occupier of The Old Byre 6th June 2022	Concern over potential cumulative effect of noise from overhead lines.	All cables are now underground and will not result in any perceptible operational noise.
	Concern about noise levels generated during construction and post commissioning.	Noise levels during construction and operation have been assessed. (Paragraphs 11.91 to 11.120)

Consultee and Date	Comment or Issue Raised	Response/Action Taken
(and meeting 6th September 2022)	Would like assurance noise survey was thorough and wonder why not informed when carried out. Request a plan showing the position of the instruments which measured the sound in our vicinity, the time of the monitoring and weather conditions encountered.	Full details of the survey are in **Appendix 11.1: Baseline Noise Survey Report**. Noise levels were measured over an extended period in appropriate weather conditions, at a position adjacent to the rear garden of Corner Farm, which is also off Rosliston Road. This is considered to be representative of The Old Byre. An attempt to make contact was made prior to the survey, however we unfortunately had the wrong correspondence address. This meeting was subsequently held with the occupiers.
	Concern that construction noise may become excessive at times and if assessment of noise occurring over fairly short periods near particular properties is correct.	The construction noise assessment is summarised in **Table 11.14**. A Negligible effect is assessed at The Old Byre. Assumptions are based on standard practice that has been undertaken at previous Solar Farm projects (Paragraphs 11.93 to 11.95).
	Concern that mechanical noise may be heard after commissioning on quiet summer evenings and nights when windows in our house would normally be left open.	It is possible that sound may be audible during quiet periods as background sound levels can be very low at this location, but the level will be very low and no adverse effect on sleep or behaviour would be expected.

Consultee and Date	Comment or Issue Raised	Response/Action Taken
		Note that the noise model (**Plate 11.1** and **11.2**) is also for worst-case light down-wind conditions in all directions and assumes that all cooling fans are fully operating when ambient temperatures are higher (**Paragraphs 11.123 and 11.133**). This has been assessed taking account of the typical low background noise level for this location (**Paragraph 11.68**), the character of sound and the absolute levels. In practice noise levels from the operation of the solar farm are expected to be lower much of the time.
	Would expect further surveys to be undertaken during construction and post scheme completion particularly if persistent noise problems experienced. Noise levels could be monitored adjacent to house this summer.	Further baseline surveys are not likely to yield more information that would change the findings of the assessment (it is already known that background noise levels are very low at times). Noise impacts are not expected, however, the CEMP includes an obligation to investigate justifiable complaints during construction and act upon them as appropriate.

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	Would like the substation sited so that there is room to retrofit sufficient acoustic panels in the event it creates a noise nuisance	The Proposed Development's substation has been moved further away from Rosliston Road and The Old Byre, and is now proposed to be sited adjacent to the Battery Energy Storage System (BESS) (**Paragraph 11.129**). The assessment indicates a noise nuisance is highly unlikely.
Owner/Occupier, Pennyworth Cottage 6th June 2022	*"Being situated close to the site, our property will be subject to noise and air pollution effects for the duration of the construction phase – and also for the decommissioning of the site in whatever form that takes."*	Noise effects presented for Twin Oaks House also represent the effects on Boroughfields Cottage and Pennyworth Cottage. Effects are assessed to be Negligible (see **Table 11.14**).
Various residents in The Chase, Rosliston 6th June 2022	*"The onsite machinery for converting the power for feeding into the grid is noisy and is currently shown very close to villages"*	The Proposed Development's substation and battery storage are to be located approximately 1km from properties in Rosliston (Paragraph 11.129). Noise effects on properties in Rosliston have been assessed and found to be Negligible (**Table 11.18** and **Table 11.19**).
Netherseal Parish Council 25th May 2022	No reference to impact of noise from piling required for the permanent buildings and many hundreds of photovoltaic panels.	The only building-like structures on the Site will be in the form of containers to house equipment and welfare facilities. These will be situated on concrete pads or a permeable crushed

Consultee and Date	Comment or Issue Raised	Response/Action Taken
& Councillor Amy Wheelton, SDDC Seales Ward 6th May 2022		aggregate hard standing base. No piling is required for these structures. Noise from piling for the solar PV panels is included in the assessment (see from paragraph 11.93, **Table 11.12** and **Appendix 11.2**).
Chair of Lullington Parish Meeting 30th May 2022 & Councillor Amy Wheelton, SDDC Seales Ward 6th May 2022 & County Councillor Stuart Swann, Derbyshire County Council 6th June 2022	Concern for the degree of impact of low amplitude noise from the constant running of the plant in a rural/tranquil setting.	The effects of operational noise have been considered and assessed in detail and the impact has been found to be Negligible. The operational noise levels will vary depending on load; not all equipment will be constantly running. The worst-case operational noise levels have been assessed, taking account of the typical low background sound levels in this area, the character of sound, and absolute levels. In practice noise levels from the operation of the Proposed Development are expected to be lower than assessed much of the time. (Paragraphs 11.122 to 11.139)
SDDC 21st June 2022	The Environmental Officer is satisfied that the environmental impacts of the scheme can be	Noted.

Consultee and Date	Comment or Issue Raised	Response/Action Taken
	satisfactorily mitigated to ensure that they are not of a magnitude to be considered significant and adverse. The officer identified piling during construction to be the most significant effect, and they expect the applicant to explore provision of localised screening to minimise the impacts this will have. At full application stage the officer will recommend conditions including; • SDDC standard construction hours • A site noise limit at the boundary with NSR's (to be validated upon completion, and maintained thereafter) • A Construction Environmental Management Plan, including a risk-based assessment of potential dust impacts arising from construction.	Significant impacts during construction are only predicted at isolated properties for short periods. The CEMP includes provision for localised screening of fixed sources of noise where any significant impacts are anticipated to occur for short periods for these specific works near to noise sensitive receptors.
Targeted Consultation 2023		

Consultee and Date	Comment or Issue Raised	Response/Action Taken
DDC, Noise 20 April 2023	*"The reduced size of the scheme and relocation of the substation are likely to result in lower than previously predicted noise levels. Both the battery storage area and substation are to be located toward the centre of the site with the nearest residential receptor being in the region of 600 metres distant. Although sections of the existing rights of way network are significantly closer than 500 m, users of this network will be transitory and the impacts of noise from the transformers and battery storage are unlikely to be significant.* *Any further issues of noise may be considered by the Environmental Health Officer at South Derbyshire District Council."*	Noted

Consultee and Date	Comment or Issue Raised	Response/Action Taken
Consultation for Environmental Statement		
Environmental Services, SDDC 09 May 2023	Assessment author consulted SDDC to confirm agreement with operational noise assessment criteria used in PEIR. Reply from John Mills, Principal Environmental Health Officer on 02 June 2023 provided confirmation that the documentation has been reviewed and he is in agreement with the operational noise criteria proposed.	Noted

Study Area

11.29 For assessment purposes, potential noise and vibration sensitive receptors within an approximate 300m radius of the Site were identified. These are shown in **Figure 11.1**. This is deemed an appropriate distance to assess noise from the construction of the Proposed Development. Given the generic construction activities, construction noise levels will be within these limits at these distances. The effects are assessed from a calculated absolute level relative to set absolute criteria limits.

11.30 The routes for construction traffic can sometimes lead to the study area being extended beyond the 300m site radius along the routes' corridors, as noted within Design Manual for Roads and Bridges (DMRB)[18] "*construction traffic study area shall be defined to include a 50m width from the kerb line of public roads with the potential for an increase in baseline noise level (BNL) of 1 dB(A) or more as a result of the addition of construction traffic to existing traffic levels*." This restricts the study to minor roads with low traffic volumes, allowing main roads where the additional of construction traffic is incidental, to be scoped out.

11.31 The currently proposed scenarios for construction traffic routes, as described in paragraph **11.107** (and **Chapter 10: Transport and Access**), avoid passing through the settlements of Rosliston and Walton-on-Trent. The proposed transport corridors have been assessed. Two Abnormal Indivisible Load (AIL) movements will travel through main settlements, however these are deemed exceptional to the rest of the construction traffic assessment discussed.

11.32 During operation, noise levels will be associated with proposed inverters, the Proposed Development's substation and BESS. To establish the study area for the purpose of baseline noise surveys, the preliminary layout was used and indicative noise predictions undertaken to gauge operational noise propagation from the Site in the various directions to determine where it was feasible that there may be a noise impact. These initial predictions were then used with the surveyed background noise data to establish the locations of potentially affected noise sensitive receptors. Each receptor was taken to represent all receptors at a similar distance and

[18] Design Manual for Roads and Bridges, LA111 Noise and vibration

in a similar location. The closest receptor for each area was chosen as being representative of the worst case for all receptors close by.

11.33 The locations of key residential properties and other noise sensitive receptors have been refined as the design of the Proposed Development evolved. The noise survey locations were defined through consultation with Environmental Health at SDDC, and in consultation with the project team, for example, to confirm the presence of specific ecological or historic resources to include as noise sensitive receptors. The team confirmed no noise sensitive ecological or historic resources were present.

11.34 The list of receptors considered in this assessment are set out in **Table 11.3** and **Table 11.4**.

Table 11.3: Noise sensitive receptors considered for operational and construction noise

Receptor (see Figure 11.1)	Assessed for:	
	Construction noise (on-site)	Operational Noise
Drakelow Park (Housing)	✓	
Grove Lodge	✓	
Park Farm Cottages	✓	
Park Farm House	✓	
Spring Farm Cottage	✓	
Fairfield Farm		✓
Old Barn Farm		✓
Corner Farm	✓	✓
The Old Byre (Walton Lane Farm)	✓	✓
Walton Hill Farm	✓	✓
Houses on north west edge of Rosliston	✓	✓
Twin Oaks House	✓	✓
Boroughfields Cottage	✓	✓
Pennyworth Cottage	✓	✓
Ladsgrave	✓	✓

Table 11.4: Noise sensitive receptors considered for off-site construction traffic noise

Receptor (representative of all properties along the route)	**Traffic route of interest and associated ATC** (with reference to Figure 10.1: ATC locations and Figures 10.7 to 10.8 in Chapter 10)
Properties on Main Street/Walton Road	Route 3 (ATC 11) (see Figure 10.8)
Properties on the edge of Stapenhill, for example, Fallow Drive/ Drakelow House	Route 6 (ATC 2) (see Figure 10.8)
Donkhill Cottages and Catton Farm Cottages on Unnamed Rd, West of Catton Lane	Routes 1 & 9 (ATC 6) (see Figure 10.7)
The Wilderness (near Catton Hall) and New Lodge properties on Catton Hall Road, North of A513	Routes 1 & 9 (ATC 7) (see Figure 10.7)
Ladsgrave Cottage & any properties facing onto Church Street within Coton in the Elms and toward junction with A444	Route 8 (ATC 13) (see Figure 10.7)

11.35 The proposed construction traffic route scenarios and traffic survey sites are as shown in **Chapter 10 Transport**, and also reproduced in **Appendix 11.2: Construction Source Noise Data**.

Desk Based Research and Data Sources

11.36 The following data sources have informed the assessment:

- EirGrid Evidence Based Environmental Studies Study 8: Noise[19].

[19] EirGrid (2016), Evidence Based Environmental Studies Study 8: Noise, *Literature review and evidence-based field study on the noise effects of high voltage transmission development*

- Planning guidance for the development of large-scale ground mounted solar PV systems[20].
- SDDC Local Plan[7] and Supplementary Planning Documents[21].
- Natural England Open Data Geoportal[22].
- Derbyshire Mapping Portal[23].
- Source noise data used for other Solar Farm developments as detailed in **Appendix 11.2: Construction Noise Source Data** and **Appendix 11.3: Operational Noise Source Data**.

Field Survey

11.37 The following field surveys were carried out to inform the assessment:

- Daytime noise survey undertaken in May 2021 to measure and observe the existing noise climate and determine existing noise and vibration sources near to the Site. Monitoring locations were chosen which were likely to represent the noise climate experienced at noise sensitive receptors around the perimeter of the Site; a desk study was undertaken to identify nearby dwellings and noise sensitive dwellings and to establish the influencing existing noise sources, for example, a nearby main road, industrial units etc. **Appendix 11.1: Baseline Noise Survey** summarises the results and site conditions.
- From the field study above, the soundscape for the surrounding area of the Site was established. A scoping study of noise source propagation has also been completed, and potential impacts identified. This allowed a more honed and targeted survey exercise to be devised at 'key' receptors. Some of these key receptors represent a number of different

[20] BRE (October 2013), KN5524, Planning guidance for the development of large-scale ground mounted solar PV systems

[21] South Derbyshire District Council (2017), Supplementary Planning Documents, Available at https://www.southderbyshire.gov.uk/our-services/planning-and-building-control/planning/planning-policy/supplementary-planning-documents

[22] Natural England, Open Data Geoportal, Available at https://naturalengland-defra.opendata.arcgis.com/ (Accessed 29 August 2023)

[23] Derbyshire County Council, Derbyshire Mapping Portal, Available at https://www.derbyshire.gov.uk/council/partnerships/derbyshire-mapping-portal/derbyshire-mapping-portal.aspx (Accessed 29 August 2023)

receptors (e.g. one house has been selected to represent each house in a group). All of these receptors are dwellings, except the Forestry Centre[24].

- Daytime and night-time noise surveys were undertaken from 12 to 19 November 2021, over a week period to obtain noise data at the key receptors. **Appendix 11.1: Baseline Noise Survey** summarises the results and site conditions, including the implications of the survey conditions regarding the weather and limitations of access arrangements.

Assessing Significance

11.38 The significance of an effect is determined by the sensitivity of the receptor and the magnitude of the effect. The significance of an effect is also related to the duration of the effect and thus the significance of noise of relatively short duration caused during construction, may be less than a semi-permanent noise of a similar level caused by the operation of the Proposed Development.

Sensitivity

11.39 Sensitivity has been determined on the basis of the following in **Table 11.5**.

[24] The originally Proposed Development included operational areas closer to this receptor when it was included. It is no longer a noise sensitive receptor within the assessment area of potential effects.

Table 11.5: Sensitivity Table

Sensitivity	Description	Examples
Very High	Site of international importance	World Heritage Site
High	Receptors where people or operations are particularly susceptible to noise.	Dwellings, schools, hospitals, quiet amenity areas noted for their tranquillity.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance.	Offices, external recreational spaces where teaching or communication is an element of its use.
Low	Receptors where distraction or disturbance from noise is minimal.	Other external recreational spaces, farming activities, restaurants and commercial premises, footpaths.
Non sensitive receptors	Receptors not sensitive to noise.	Factories and working environments with existing high noise levels.

11.40 The Scoping Report (**Appendix 2.1**) and cross discipline consultation has identified approximately 16 dwellings, plus groups of dwellings on the western-most edge of Rosliston as noise sensitive receptors close to the Site. As per **Table 11.5** these are classed as having high sensitivity to noise. The assessment has only identified receptors deemed as having high sensitivity. There are no medium sensitivity receptors within the Study Area. It is not considered necessary to undertake a detailed assessment of Low (or Non-sensitive) receptors at this Site. No very high sensitivity receptors have been identified close to the Site.

Magnitude

11.41 The magnitude of change has been assessed with reference to predicted noise levels at a receptor and compared to measured background noise levels in the area, but also to absolute

noise levels in relation to baseline criteria presented in British Standards and best practice / good design guidelines.

11.42 Magnitude criteria for noise and vibration varies for different types of receptors. The criteria described below focuses on residential properties.

Magnitude – Construction Noise at Dwellings

11.43 For construction noise, advice on the control of construction noise and vibration is given in British Standard BS 5228: 2009[11]. A method for calculating the noise from construction sites is provided and this has been used to evaluate the effect of noise from construction activities at the nearest residential properties. The standard places an emphasis on the use of best practical means to minimise noise.

11.44 Example criteria for evaluating the magnitude of construction noise and setting limits are provided in the informative guidance at Annex E:

- At section E2 an absolute daytime noise limit of 70 dB $L_{Aeq,\ 12\ hour}$ is suggested for rural areas.
- At section E3 a lower limit of 65 dB $L_{Aeq\ 12\ hour}$ is indicated based on the relatively low existing ambient noise in the vicinity.

11.45 For daytime construction noise and construction traffic noise on minor roads (where applicable), the magnitude of impact is assessed adjacent to the Site boundary; where levels occur for ten or more days in any fifteen consecutive days, or for more than 40 days in any six months. These reflect the temporary nature of the activities.

11.46 The construction magnitude is based on an assumption of daytime activities only.

Table 11.6: Magnitude Criteria for Daytime Construction Noise

Magnitude of Effect	Absolute Noise levels from construction activities
High	>75 dB $L_{Aeq, 12hrs}$
Medium	70-75 dB $L_{Aeq, 12 hrs}$
Low	65-70 dB $L_{Aeq, 12 hrs}$
Minimal	<65 dB $L_{Aeq, 12 hrs}$

11.47 Where applicable, noise from construction traffic using minor roads and lanes, from the main roads to the Site, is assessed as a change in noise level from the road due to the addition of construction traffic to existing traffic levels. The magnitude of the change, considered as short-term, is addressed in the following table, which is derived from DMRB[18].

Table 11.7: Magnitude Criteria for Daytime Construction Traffic Noise

Magnitude of Effect	Change in Traffic Noise level, $L_{A10,1hr}$, or $L_{Aeq, 1hr, dB}$	Subjective Response
High	>5.0dB- 9.9dB	Clearly noticeable approach. Approaching being perceived as twice as loud
Medium	3 – 4.9dB	Noticeable
Low	1 – 2.9dB	Barely perceptible
Minimal	< 1dB	Limit of perceptibility in lab conditions for steady state noise

Magnitude – Operational Noise at Dwellings

11.48 For Operational Noise the magnitude criteria have been derived from consideration of the level and character of operational sound and the existing background sound level, following the

approach in BS 4142[17], which is noted as appropriate within NPS EN-1[1 2] and EN-5[4]. This Standard provides a method for rating outdoor sound levels of an industrial and/or commercial nature, to determine the likelihood of adverse impact on people at residential properties. The initial estimate of the magnitude of impact used in the method (see **Table 11.8** below) is based on the difference between the rating sound level of the industrial source and the background sound level without the industrial source and at the receiver location. The sound level from the industrial source (known as the specific sound level) can be weighted by 1-9 dB if it displays an identifiable character (such as tonality, impulsiveness, or intermittency) to determine the rating sound level. When making assessments it is then essential to place the sound in context and the magnitude of impact may be modified by other factors, such as the absolute level of sound.

Table 11.8: BS 4142 Table – initial estimate of magnitude

Difference	BS4142 Initial Assessment	Initial estimate of Magnitude of Effect
Around 10dB or more	Indication of significant adverse impact, depending on context	High
Around 5dB	Indication of likely adverse impact, depending on context	Low to Medium
0dB or less	An indication of a low impact, depending on the context	Minimal

11.49 It should be noted, however, that the BS 4142 assessment methodology does not provide specific guidance on setting criteria and the principle is generally interpreted by the determining authority to provide recommended limits that are suited to the locality and development plans. South Derbyshire Environmental Services has confirmed its standard approach and this is set out in **Table 11.9.**

Table 11.9: South Derbyshire Environmental Services approach

Metric	Action Required	Effect
Development Noise 10dBA below background	No specific measures required	No Observed Effect
Development Noise at or below background	No specific measures required	No Observed Adverse Effect
Lowest Observed Adverse Effect Level (LOAEL)		
Development Noise ≤5dBA above background	Mitigate and reduce to a minimum	Observed Adverse Effect
Significant Observed Adverse Effect Level (SOAEL)		
Development Noise 5 – 10dBA above background	Avoid	Significant Observed Adverse Effect
Development Noise ≥10dBA above background	Prevent	Unacceptable Adverse Effect

11.50 Within the BS 4142 methodology, it is acknowledged that where existing background sound levels are very low, as has been established through the surveys for this site, the absolute sound level may be more appropriate to assess significant effects. Absolute levels are such as those provided in BS 8233[14] (and WHO guidelines[15]), which is again referenced in NPS EN-1.

11.51 BS 8233 (and WHO) recommend absolute internal noise level limits appropriate for resting and sleeping. These can be translated to an appropriate free-field external level (not façade corrected), using a typical level difference of 10-15dB for a partially open window[25].

11.52 The criteria in BS 8233 do not make any allowance for the specific character of the sound source. The criteria can therefore be considered equivalent to the 'Rating level' within BS 4142, with adjustment for character added to the 'Specific sound' being assessed.

11.53 The criteria in BS 8233 are defined as 16 hour daytime and eight hour night-time equivalent continuous levels (L_{eq}) based on typical diurnal fluctuation in external noise. The guidance recognises that this may not be appropriate for other patterns and therefore it is suggested that a one-hour period is more appropriate for the proposed use.

11.54 Taking account of the above and using a conservative 10dB translation factor for a partially open window, the BS 8233 criteria has therefore been adjusted as per **Table 11.10**.

Table 11.10: Adjusted BS8233 criteria for external noise levels

Activity	Location	BS8233 internal noise level criterion	Minimum attenuation through partially open window	Adjusted external noise level criterion
Daytime resting (07:00 – 23:00)	Bedroom	35 dB $L_{Aeq, 16hour}$	+10 dB	45 dB $L_{Aeq, 1hour}$
Sleeping (23:00-0700)	Bedroom	30 dB $L_{Aeq, 8hour}$	+10 dB	40 dB $L_{Aeq, 1hour}$

[25] The insulation of an open window has been generally accepted as being in the range 10-15 dBA. WHO (1999 and 2009) uses a reduction of 15 dBA from the facade level is assumed for a partially open window. BS 8233 (2014) also uses 15 dBA in the typical example at Annex G. AVO (2020) uses a typical value of 13 dBA based on research.

11.55 WHO Night-noise Guidelines for Europe[26] also recommends a level of 40 dB $L_{night, outside}$ based on evidence of the onset of detectable effects on health and well-being, which is comparable with the above.

11.56 A conservative approach is therefore considered to be to take a Rating level value of 40 dB L_{Aeq} for both daytime and night-time absolute lower noise criteria. This criterion is considered to represent the LOAEL and Low Magnitude threshold. Below this can be classed as NOAEL and minimal magnitude.

11.57 An increase of 5 dB from the LOAEL to the SOAEL (Avoid) threshold is considered appropriate here in defining the Medium Magnitude threshold with reference to South Derbyshire's typical assessment policy at **Table 11.9**.

11.58 In determining the criteria to establish a High Magnitude, WHO Night-noise Guidelines for Europe state that $L_{night,outside}$ above 55 dB represents a situation that is considered increasingly dangerous for public health. This is also used to define the upper threshold in the AVO guide[27], which with reference to NPPG: Noise [13], is defined as relating to a material change in behaviour; "*Avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."*

11.59 However, it is also noted that the WHO guidelines assume 15 dB attenuation through a partially open window, whereas the AVO guidelines take a more conservative typical value of 13 dB[28]. Applying the lower value of 10dB would result in a lower external noise level of 50 dB. Further, the above represent the night-time periods where people are expected to be indoors and people may be more affected outside during the day. The external noise criterion of 50 dB L_{Aeq} is therefore proposed for the High Magnitude threshold for both daytime and night-time.

[26] World Health Organisation (2009) Night Noise Guidelines for Europe

[27] AVO ACOUSTICS VENTILATION AND OVERHEATING (January 2020) Residential Design Guide Vs 1.1 Table 3-3

[28] As discussed in Appendix C of the AVO Guide

11.60 It is appropriate to combine the lower absolute noise level determined above with the initial estimate of impact criteria relative to background according to BS4142. The resulting combined Magnitude criteria for operational noise are presented in **Table 11.11** below:

Table 11.11: Magnitude Criteria for Operational noise (Dwellings)

Magnitude of Effect	Magnitude threshold for external noise levels	
	Rating level (dB $L_{Aeq, 1\ hour}$) relative to existing background L_{A90}	Absolute lower rating level ($L_{Aeq, 1\ hour}$)
High	≥10dBA above background	>50 dB
Medium	>5 to ≤10dBA above background	>45 to ≤50 dB
Low	>0 to ≤5dBA above background	>40 to ≤45 dB
Minimal	less than or equal to background	≤40 dB

11.61 It is considered that Magnitude of effects are based purely on noise levels and/or noise level changes and are immaterial to the number of noise sensitive properties affected.

11.62 The operational activities are considered to be long term, for the purpose of the assessment, as continuous activity for the lifespan of the Proposed Development.

Significance

11.63 The predicted significance of the effect was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of change as detailed in **Table 11.12** below. Major and moderate effects are considered significant in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Table 11.12: Significance Criteria

Magnitude	Sensitivity of receptor	
	High	Medium
High	**Major**	**Moderate**
Medium	**Moderate**	**Moderate**
Low	Minor	Minor
Minimal	Negligible	Negligible

Assessment Limitations

11.64 Whilst some flexibility has been incorporated into the design (within the parameters of the Work Plans) to enable advances in technology to be considered prior to construction of the Proposed Development, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on receptors from construction and operational noise.

11.65 Limited data on the frequency spectrum content of specific noise sources is available, and therefore typical representative frequency data is assumed.

11.66 There is a wide range of potential noise levels from the BESS, the Proposed Development's substation and inverter units, with limited supporting information on some manufacturers data, however, the data used in the assessment is considered to represent the likely worst case.

Baseline Conditions

11.67 The assessment of Construction traffic noise on minor roads relies on the baseline data for existing traffic on the road network which is contained within **Chapter 10: Transport and Access.**

11.68 The initial baseline noise survey results are presented in **Appendix 11.1: Baseline Noise Survey Report**. The key details from the survey are:

- The Site and surrounding area are predominantly rural land in farming use. Ambient and background noise levels are generally controlled by road traffic noise on local roads, farm animals and birdsong. Local roads are relatively lightly trafficked and consequently noise levels around the Site are low. The busiest road is Walton Road to the north of Park Farm.
- Daytime background noise levels at the nearest residential properties around the Site typically range between approximately 30-45 dB L_{A90}, with average ambient noise levels of approximately 40-55 dB L_{Aeq}. These levels are representative of the soundscape in a rural area.
- There is large variation in existing background noise levels, however, sometimes they are relatively low during both the daytime and night-time periods. Measured background noise levels at positions representative of the nearest residential properties around the Site range between 18 dB L_{A90} at night and 50 dB L_{A90} during the day. The statistical analysis indicates that the 20th percentile of all measured values for each of the time periods is a reasonably conservative value for the representative 'typical' background noise level. The analysis includes both weekday and weekend periods and the typical low represents the lowest of either.
- The A38, approximately 2km to the north-west of the Site, was not observed to be audible during the initial attended site visit, (but may contribute to background noise levels under north-westerly wind direction).
- The Litchfield/ Tamworth to Burton-upon-Trent railway line which runs parallel to the A38 was not audible during the initial daytime noise survey under calm/southerly wind conditions. The line carries freight traffic and there are sidings at Barton-under-Needwood approximately 2km to the east, both of which may contribute to the ambient conditions especially at night.
- The National Grid Drakelow substation is in the north of the Site and north of Walton Road and several existing high voltage (400kV) overhead lines cross the Site and connect into the National Grid Drakelow substation. During the initial survey, one of these lines was observed to generate noticeable 'corona discharge', a crackle noise during dry conditions, which was measurable above the background noise level at around 50m away and in one location was faintly audible beyond 200m.

- Short term noise sources include farming activities, and it is noted that some of the farm buildings in the area contain industrial units. Ventilation fans on barns at Oaklands Farm run continuously which control background noise levels at this location.
- No significant sources of vibration were observed during the initial survey.

11.69 Environmental Services at SDDC was consulted on the baseline survey methodology and locations and the Head of Environmental Services confirmed they were *"happy with [the] proposals"* in email correspondence dated 4 November 2021 prior to the surveys being undertaken. The survey methodology is as set out in **Appendix 11.1: Baseline Noise Survey Report**. The measurement procedures and analysis of background noise levels follow guidance in BS4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' and BS7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedure'.

11.70 Note that at the time the survey positions were decided, solar panels were also proposed across areas on Park Farm (see **Figure 3.4a and b: PEIR Layout April 2022**).

11.71 The 'key locations' surveyed identify the noise receptors of interest for Operational noise and Construction noise as set out in **Table 11.3** and shown on **Figure 11.1: Survey measurement positions and noise receptors of interest**.

11.72 It is considered that similar noise levels will occur at The Old Byre (Walton Lane Farm) and Old Barn Farm as at the Corner Farm monitoring position. All are located off Rosliston Road. Although there are some industrial units adjacent to Old Barn Farm, which could potentially increase ambient noise levels at this position, it is considered that these are less likely to influence the background noise levels as no continuous sources of noise at this location have been observed.

11.73 For Fairfield Farm the lower background noise level of either Corner Farm or Walton Hill Farm have been used. Pennyworth Cottage is adjacent to Boroughfields Cottage and both Boroughfields Cottage and Twin Oaks House are considered to be representative of other dwellings in the Oaklands Farm area.

11.74 For Grove Lodge and Park Farm Cottages (which will not be affected by operational noise) a series of short attended daytime measurements were taken during the initial survey only.

11.75 Table 11.13 provides a synopsis of the measurements undertaken which are presented in detail at **Appendix 11.1: Baseline Noise Survey Report**.

Table 11.13: Summary table of existing ambient and background noise levels

Receptor	Daytime		Night-time	
	Ambient (dB $L_{Aeq, 12\ hour}$)	Background (dB $L_{A90, 15\ min}$)	Ambient (dB $L_{Aeq, 12\ hour}$)	Background (dB $L_{A90, 15\ min}$)
Park Farm House	46	35	41	29
Park Farm Cottages	≥46	35	n/a*	n/a*
Grove Lodge	≥53	40	n/a*	n/a*
Spring Farm Cottage	45	33	38	23
Fairfield Farm	46	33	41	26
Old Barn Farm	46	33	41	29
Corner Farm	46	33	41	29
The Old Byre	46	33	41	29
Walton Hill Farm	50	34	41	26
Rosliston	52	34	41	30
Twin Oaks House	52	41	n/a**	36
Boroughfields Cottage	n/a	41	n/a	35
Ladsgrave Cottage	60	33	53	25

*short term attended daytime measurements were taken in these positions.

**short term evening/night-time measurements were taken in these positions.

11.76 Some elements of the Proposed Development will only operate during daylight hours, which is from approximately 04:45 to 22:15 at the summer solstice (maximum). It is not,

however, considered appropriate to determine representative background noise levels for the separate early morning period of 04:45 to 07:00 from the survey results in November, well before sunrise, as the background noise levels will vary depending on the time of year. For assessment purposes it is considered reasonable to assume the early morning and night-time background noise levels will be similar as a worst case.

Future Baseline in the Absence of the Proposed Development

11.77 There are no expected significant changes to the noise and vibration baseline if the Proposed Development does not take place, and the land is left in its current state. Historically there has been a gradual increase in road traffic noise, and climate change may result in higher background noise levels during more frequent wet and windy periods as discussed at paragraph 11.80 below.

11.78 An area of the former Drakelow Power Station land is being redeveloped as a mixed use development which includes areas of housing. Traffic noise generated by additional traffic on the housing development supply roads and additional traffic on the existing road network could impact the baseline noise environment. However, it is anticipated that this would only be of any potential significance to Walton Road to the north of the Site, which has limited influence on the receptors identified other than those at Park Farm.

Implications of Climate Change

11.79 UK Climate Change Projections 2018 (UKCP18) indicate that:

- Temperatures are projected to increase, particularly in summer.
- Winter rainfall is projected to increase and summer rainfall is most likely to decrease.
- Heavy rain days (rainfall greater than 25mm) are projected to increase, particularly in winter.
- Near surface wind speeds are expected to increase in the second half of the 21st century with winter months experiencing more significant effects from wind; however, the increase in wind speeds is projected to be modest.
- An increase in frequency of winter storms over the UK.

11.80 Climate change may have an indirect effect on the baseline noise environment as more frequent rainfall will result in wet road surfaces which result in an increase in road traffic noise. Similarly, where there are stronger more frequent winds, the influence of distant traffic noise on the soundscape may change. These effects would not change this assessment of noise from the Proposed Development, which focuses on the worst-case scenario during calm and dry conditions.

Design Considerations and Embedded Mitigation

11.81 The BESS has been identified as a potentially significant noise source. Following initial noise modelling, the location of the BESS was moved to a more suitable location in the centre of the Oaklands Farm area to maximise the distance from residential properties. The effect of this change is discussed at paragraph 11.142.

11.82 Noise was considered during the Site design process in the placement of solar plant (inverters and Medium Voltage (MV) transformers). A stand-off distance of at least 100m is currently proposed between solar plant and residential properties.

11.83 For the Operational phase there will be string inverters at the end of each row of panels. Insofar as reasonably possible, and as an acknowledgement of potential noise from the inverters, the Applicant will aim to place these items on row ends away from the Site boundaries in proximity to residential receptors. The location of equipment and specification of equipment chosen for the operational phase will be determined when finalising the design specification.

11.84 For both construction and operational phases, the Site access points and traffic routes are located away from the nearest villages of Rosliston and Walton-on-Trent, reducing the perceived noise from traffic associated with the Site.

11.85 For construction, there is an aim to “do minimum” to the Site. This means soil stripping, trench building and drainage ditches are minimised. Concreting operations are restricted to the transformer / the Proposed Development’s substation / BESS compounds, and if required pad foundations for solar panels over the water main through the south of the Site.

11.86 During construction, the principles presented with BS 5228[11] section 7.3 Execution of works will be followed: *“All available techniques should be used to minimize, as far as is appropriate, the level of noise to which operators and others in the neighbourhood of site*

operations will be exposed". These include consideration to the hours of working, quiet working methods where reasonably practicable, control of the construction noise at source, and control of the spread of noise (section 8 of BS 5228).

11.87 In addition, Best Practical Means as described in the Control of Pollution Act 1974 will be adopted including:

- Selection of low noise plant and construction techniques where possible.
- Application of noise silencers.
- Application of rubber linings in dumpers to reduce noise impact.
- Minimise drop height of materials.
- All plant to be properly maintained and operated in accordance with manufacturer's instructions.
- Any fixed construction plant items to be located as far from noise sensitive properties as possible and screened if required and practical with temporary hoardings.

11.88 Furthermore, the construction will occur during daytime hours only, which is detailed in the Outline Construction Environmental Management Plan (CEMP). The proposed working hours are 07:00-19:00 hours on weekdays during the summer (with reduced hours in winter months), 08:00–14:00 hours on Saturdays, and no working on Sundays, Bank or Public Holidays without the written approval of the local planning authority.

11.89 The proposed location of equipment is set out within the Work Plans (See **Appendix 1.3: Work Plans**) however the exact location and specification of operational equipment will be determined when finalising the design specification. The design specification of any operational plant will consider noise emissions in their selection; the quietest plant will be selected where other non-acoustic design considerations allow (subject to available acoustic data). Note that the Applicant will be required to undertake and submit a noise assessment to the local planning authority prior to the commencement of works on Site (DCO requirement 15) to confirm it will not adversely affect noise sensitive receptors. A noise complaint procedure is also included in the Operational Environmental Management Plan (see **Appendix 4.4**).

11.90 Where reasonably possible, plant will be selected to provide oversizing and redundancy to ensure equipment is operating below maximum capacity (highest noise levels typically occur when plant is operating at maximum capacity).

Assessment of Construction Effects

11.91 The assessment of effects is based on the project description as outlined in **Chapter 4: Project Description**. Unless otherwise stated, identified potential effects are considered to be negative.

Predicted Construction Effects On Site

11.92 The construction noise predictions have been undertaken, using a spreadsheet-based program, following the methodology for prediction of construction noise in British Standard BS 5228:2009+A1:2014, Code of Practice for noise and vibration control on construction and open sites – Part 1:Noise[11].

11.93 The plant equipment involved in the Proposed Development and construction programme has been developed from similar construction schemes and from an indicative construction programme and works packages presented in **Chapter 4: Project Description** and therefore presents a 'best estimate' of build for the purposes of assessing potential effects. The following plant are assumed for the different construction phases:

- Excavators to lay cables – main cable from the Proposed Development's substation to the National Grid Drakelow substation, and for cabling to connect between the solar PV modules, smaller transformers across the site and BESS.
- Piling – Installation of PV mounting frames and Site fencing.
- Concreting works associated with the Proposed Development's substation, BESS and Site compounds.
- Construction of access roads to the site segments; gravel road construction or laying of temporary metal mats. This includes access improvements and creation of new junctions.
- Earthworks and civil works such as cut and fill, installation of culverts.
- Directional drilling of cabling.

- Construction traffic (deliveries and dispatch of plant, equipment and material, personnel movements).

11.94 –Information on the plant used to estimate noise from construction activities is presented in **Appendix 11.2: Construction Source Noise Data**, grouped by main noise producing activities on the Site.

11.95 A prediction of noise levels has been made from each construction noise source to the nearest noise sensitive property, as detailed in the summary construction table presented below, together with the significance of the effect at each receptor, or at a receptor which represents the worst-case effects for an area.

11.96 The construction activities identified in Column 2 of **Table 11.14** represent the likely worst-case noise impacts for that particular property. Note that through the full construction period other construction lesser activities may continue in parallel to these 'worst case' activities. Although these may be visible and just audible to a receptor, because of their distance or nature they will not generate enough noise at the receptor to acoustically contribute to the cumulative construction noise level. Hence these lesser activities are not reported.

11.97 Prediction of construction traffic noise changes has been calculated using the calculation methodology set out in BS 5228: F.2.5 Method for mobile plant using a regular well-defined route (i.e. haul roads). This prediction method takes into account the sound power level of the vehicle, which has been simply classified as either a car/ light vehicle or an HGV, the number of vehicles expected per hour, the average vehicle speed along the haul road, the distance to the middle of the haul road to the nearest noise sensitive property and if there is a restricted angle of view from the noise sensitive property to the haul road.

11.98 The maximum likely number of construction vehicles using the internal access track per day varies between off-site traffic route scenarios (a full description is set out in paragraph 11.107 assessing the effects of off-site traffic):

- Scenario S1 – 67 light vehicles with 14 HGVs.
- Scenario S2a – 17 light vehicles with 14 HGVs.
- Scenario S2b – Not used.

11.99 As construction traffic movements, particularly cars and vans, are likely to be higher at certain times of the day, the hourly noise level is also presented as well as the daily noise level.

For the purposes of this assessment the highest predicted hourly noise level is presented for the predicted peak time hour in scenario S1 of 27 light vehicles, and the predicted peak time hour in Scenario S2b of 7 light vehicles. Note HGVs are to be dispersed through the daytime period out of peak hours as discussed further at paragraph 11.111.

Table 11.14: Summary of Construction Effects

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
Drakelow Park (housing development)	Access Road building for works 5 , 5A and 5B around Drakelow	58 dB $L_{Aeq,\ daytime}$	Minimal	Negligible
Drakelow Park	Excavation of trench and road crossing for cable connections to Drakelow	47 dB $L_{Aeq,\ daytime}$	Minimal	Negligible
Drakelow Park	Potential directional drilling crossing Walton Road with possible night-time workings	54 dB $L_{Aeq,\ daytime}$ (and night-time)	Minimal	Negligible
Drakelow Park	Establishing site compound (Ground levelling, permanent hard-standing and temp accommodation)	52 dB $L_{Aeq,\ daytime}$	Minimal	Negligible
Grove Lodge	Construction Traffic on access track: distance ≥ 30m	Day(S1): 48 dB $L_{Aeq,\ daytime}$ Day(S2a): 45 dB $L_{Aeq,\ daytime}$ Hour(S1): 52 dB $L_{Aeq,\ 1\ hour}$ Hour(S2a): 46 dB $L_{Aeq,\ 1\ hour}$	Minimal	Negligible

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
Park Farm Cottages	Construction Traffic on access track: distance ≥ 25m	Day(S1): 47 dB $L_{Aeq, daytime}$ Day(S2a): 44 dB $L_{Aeq, daytime}$ Hour(S1): 51 dB $L_{Aeq, 1 hour}$ Hour(S2a): 46 dB $L_{Aeq, 1 hour}$	Minimal	Negligible
Park Farm	Construction Traffic on access track: distance ≥ 120m	Day(S1): 39 dB $L_{Aeq, daytime}$ Day(S2a): 36 dB $L_{Aeq, daytime}$ Hour(S1): 42 dB $L_{Aeq, 1 hour}$ Hour(S2a): 37 dB $L_{Aeq, 1 hour}$	Minimal	Negligible
Park Farm	Road building activities to establish access tracks to Site compounds and onwards to the Site	55-68 dB $L_{Aeq, daytime}$. Highest noise levels with stablishing access into Site compound	Minimal-Low	Negligible for much of build, but with minor adverse effect (not significant) at nearest build points very

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
				short durations expected
Park Farm	Excavation of trench for cable connections to Drakelow over a three month period	55 dB $L_{Aeq,\ daytime}$	Minimal	Negligible
Park Farm	Establishing 1 Acre Site compound (Ground levelling, installing permeable hard-standing installing fencing, gates, checkpoint kiosks and welfare facilities, installing drainage features, lighting, and removal of waste)	61 dB $L_{Aeq,\ daytime}$ for northerly section	Minimal	Negligible
Spring Cottage	Excavation of trench for cable connections to Drakelow over a three month period	46 dB $L_{Aeq,\ daytime}$	Minimal	Negligible
Spring Cottage	Establishing 1 Acre site compound (Ground levelling, installing permeable hard-standing installing fencing, gates, checkpoint kiosks and welfare facilities, installing drainage features, lighting, and removal of waste)	46 dB $L_{Aeq,\ daytime}$ for southerly section	Minimal	Negligible

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
Corner Farm	Construction Traffic on access track: distance ≥ 100m	Day(S1): 42 dB $L_{Aeq, daytime}$ Day(S2a): 40 dB $L_{Aeq, daytime}$ Hour(S1): 46 dB $L_{Aeq, 1 hour}$ Hour(S2a): 40 dB $L_{Aeq, 1 hour}$	Minimal	Negligible
Corner Farm	Road Building works to establish access track over Rosliston Road to site access point- 3 weeks per 300m	58-68 dB $L_{Aeq, daytime}$	Minimal	Negligible – Minor
Corner Farm	Excavation of trench for cable between north and south of the Site over a three month period	55-62 dB $L_{Aeq, daytime}$	Minimal	Negligible
Corner Farm	Cut and fill installation of culverts	60 dB $L_{Aeq, daytime}$	Minimal	Negligible
Corner Farm	Piling to establish solar panels, including trucks – locally over a ten day period and installation of screens and inverters	< 53 dB $L_{Aeq, daytime}$ at closest location	Minimal	Negligible
Corner Farm	Directional digging over potentially a 48 to 60 hr period possible night-time workings – specialist	67 dB $L_{Aeq, daytime}$	Low during daytime.	Minor during daytime.

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
	digging equipment/ mud pumps, support excavator and lighting rig		High if required overnight.	Moderate (significant) for short duration at night if required
The Old Byre	Construction Traffic on access track: distance ≥ 245m	Day(S1): 39 dB $L_{Aeq, daytime}$ Day(S2a): 36 dB $L_{Aeq, daytime}$ Hour(S1): 42 dB $L_{Aeq, 1 hour}$ Hour(S2a): 37 dB $L_{Aeq, 1 hour}$	Minimal	Negligible
The Old Byre	Road Building works to establish access track over Rosliston Road to site access point – 3 weeks per 300m	48-57 dB $L_{Aeq, daytime}$	Minimal	Negligible
The Old Byre	Excavation of trench for main line to Drakelow over a three month period – moving sources along Drakelow connection trench	50-54 dB $L_{Aeq, daytime}$	Minimal	Negligible

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
The Old Byre	Piling to establish solar panels – locally over a ten day period with truck movements and installation of screens and inverters	54-56 dB $L_{Aeq, daytime}$ dependant on number of teams	Minimal	Negligible
The Old Byre	Directional digging over potentially a 48 to 60 hr period. Possible night-time workings – specialist digging equipment/ mud pumps, support excavator and lighting rig	51 dB $L_{Aeq, daytime}$	Minimal	Negligible during daytime and night-time (as short duration)
Walton Hill Farm	Piling and frameworks to establish solar panels- nearest block of panels- locally over a 20 day period	55-63 dB $L_{Aeq, daytime}$ depending on location and no. of teams operating together	Minimal	Negligible
Walton Hill Farm	Nearest gravel road construction, string inverters and transformers installation – nearest block over a ten day period	48-50 $L_{Aeq, daytime}$	Minimal	Negligible

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
Edge of Rosliston	Piling to establish solar panels, including trucks – locally over a ten day period	54-57 dB $L_{Aeq, daytime}$	Minimal	Negligible
Edge of Rosliston	Installation of screens and inverters	48-51 dB $L_{Aeq, daytime}$	Minimal	Negligible
Twin Oaks House (also representing Boroughfields Cottage and Pennyworth Cottage)	Piling and frameworks to establish solar panels – blocks of panels to the north, east and south of the farm over a month period	54-62 dB $L_{Aeq, daytime}$	Minimal	Negligible
Twin Oaks House (also representing Boroughfields Cottage and Pennyworth Cottage)	Nearest gravel road construction, string inverters and transformers installation – nearest block over a ten day period	54-57 dB $L_{Aeq, daytime}$	Minimal	Negligible
Ladsgrave Cottage	Piling and frameworks to establish solar panels – blocks of panels to the north, east and south of the farm over a month period with truck movements	62-67 dB $L_{Aeq, daytime}$	Minimal-Low	Minor with nearest operations, to Negligible for

Property of interest	Summary of construction activity identified as potentially noisy enough to cause adverse effects	Predicted noise level at the property (free field)	Magnitude of effect based on **Table 11.6**	Significance based on **Table 11.5** and **Table 11.12**
				more distant installations
Ladsgrave Cottage	Nearest gravel road construction, string inverters and transformers installation- nearest block over a ten day period	56-66 dB $L_{Aeq, daytime}$	Minimal-Low	Minor with nearest operations, to Negligible for more distant installations

11.100 Prediction of construction noise from site activity to identified receptors indicates noise levels are likely to be less than 65 dB $L_{Aeq, 12hours\ daytime}$ for most construction works activities.

11.101 To install the solar PV modules, piling is currently the preferred method of construction, which results in the highest noise levels at most properties. At Ladsgrave Cottage when piling and installation of panels is at around 150m away to establish the first few rows of solar panels near to these properties, construction noise levels may be at or just above the first threshold of effect resulting in a short term **minor adverse effect (not significant)**. All other construction effects would be **negligible (not significant)**.

11.102 Around Park Farm, the construction/ upgrade of access roads and establishing one of the main Site construction compounds (approximately 1 acre), may lead to some **minor effects (not significant)** which are expected to be of short duration.

11.103 Around Corner Farm, the construction of the access track may lead to **minor effects (not significant)**. Specialist directional drilling may be required at the Rosliston Road crossing which could require continuous construction work over a 48 hr period requiring overnight work. If overnight work is required for a short period during directional drilling, the magnitude of the noise level over a short period is identified as a **moderate temporary effect** (**significant**) at Corner Farm.

Predicted Construction Traffic Effects on Minor Roads

11.104 Prediction of construction traffic noise changes has been calculated using a spreadsheet based program which follows the calculative methodology set out in Department of Transport's memorandum Calculation of Road Traffic Noise (CRTN)[29]. The CRTN methodology is used to calculate daytime road traffic noise in terms of either a 1 hour or an 18-hour (0600 to 2400 hours) L_{A10} noise level. The initial calculation provides a noise level at 10m from the edge of the carriageway, known as the basic noise level, which is based on the total volume of traffic, the percentage of heavy goods vehicles, the road surface and gradient, and the average speed of the traffic.

11.105 During the construction phase, the change assessment is the difference in the basic noise level, as a result of the additional traffic volume and change in % HGV vehicles on the

[29] Department of Transport and Welsh Office (1988), CRTN 'Calculation of Road Traffic Noise '

public highway. The basic noise level is calculated on an hourly basis from the sourced traffic data, and the assessment looks at the likely worse hour in a day where there is most change in traffic volume.

11.106 The assessment references the assumed construction traffic distribution.

11.107 There are 3 scenarios for construction traffic access to Oaklands:

- Preferred Construction Vehicle Routing (Scenario 1 as shown in **Figure 10.2**) – all HGVs cars and vans use the proposed Walton bypass into Park Farm and onto the Site via the internal access track through the Park Farm area, across Rosliston Road and into the Oaklands Farm area. As set out in **Chapter 10: Transport and Access** it is however unlikely that Walton bypass will be delivered in time for the Proposed Development therefore alternatives are set out below.
- Likely Construction Vehicle Routing (Scenario 2a as shown in **Figure 10.3**) – all HGVs through Stapenhill, then use the internal access track at Park Farm as described above. Cars and vans are dispersed; approximately quarter from the north, half from the south-west and quarter from the south-east.
- Back-up Construction Vehicle Routing (Scenario 2b as shown in **Figure 10.4**) – all HGVs through Coton-in-the-Elms, cars and vans are dispersed; approximately two-thirds from the south-west and one-third from the south-east. This is a backup to Scenario 2a and intended that traffic would revert to Scenario 2a at the earliest opportunity.

11.108 The transport assessment provided in **Chapter 10: Transport and Access** provides detail of likely number of vehicles on site during any month in the Construction programme.

11.109 The working assumption for this assessment is that there will be on average 67 light vehicles and 14 HGVs accessing the Site on a daily basis, and up to 75 light vehicles and 27 HGVs on the highest day.

11.110 Reference to the outline Construction Traffic Management Plan (CTMP) has been made in undertaking the assessment (available at **Appendix 10.1**, developed to guide the delivery of materials and staff onto the Site during the construction phase and sets out the routing and management of construction vehicles).

11.111 It is likely that the number of car and van movements will increase in the morning and evening as workers arrive and leave the Site. For the purposes of this assessment, it is

assumed that the majority of the cars and vans (27) arrive in the same hour in the morning (06:00 to 07:00) and leave in the same hour in the evening (19:00 to 20:00) as a worst case. HGV movements and the remaining light vehicles would be more evenly spread through the day, for the purposes of this assessment between 09:00 and 15:00, two HGV movements is the maximum assumed in any one hour on any given route.

11.112 The construction routes will be used throughout the construction period. As such, construction traffic noise minimum timeframe of ten days in 40 is met (see paragraph 11.45).

11.113 The construction traffic route information and surveyed traffic data used in this assessment is primarily presented in **Appendix 10.4: Traffic Survey Analysis** and repeated in **Appendix 11.2: Construction Noise Source Data** of this chapter for ease of reading. The receptors referred to in **Table 11.15** are shown in **Figure 11.2.**

Table 11.15: Summary of Construction Traffic Effects

Receptors	Road and traffic count site (with reference to **Figure 10.1**)	Scenario and route of interest (see **Figures 10.2** to **10.4**)	Change in predicted traffic noise level for worst hour in day		Magnitude of effect based on **Table 11.7**	Significance based on **Table 11.12**
			Average Day	Highest Day		
Properties on Main Street/ Watton Road	Walton Road (ATC site 11)	Scenario 1 (Route 3)	<0.5 dB	<0.6 dB	Minimal	Negligible
Properties on the edge of Stapenhill, for example, Fallow Drive/ Drakelow House	Walton Road (ATC site 2)	Scenario 2a (Route 6)	<0.3 dB	<0.5 dB	Minimal	Negligible
Donkhill Cottages and Catton Farm Cottages	Unnamed Rd, West of Catton Lane (ATC site 6)	Scenario 2a (Routes 1&9)	<1.5 dB (19:00-20:00)	<1.5 dB (19:00-20:00)	Low	Minor
		Scenario 2b (Routes 1&9)	<1.7 dB (19:00-20:00)	<1.7 dB (19:00-20:00)	Low	Minor

Receptors	Road and traffic count site (with reference to **Figure 10.1**)	Scenario and route of interest (see **Figures 10.2** to **10.4**)	Change in predicted traffic noise level for worst hour in day		Magnitude of effect based on **Table 11.7**	Significance based on **Table 11.12**
			Average Day	Highest Day		
The Wilderness (near Catton Hall) and New Lodge properties	Catton Hall Road, North of A513 (ATC site 7)	Scenario 2a (Routes 1&9)	<0.3 dB	<0.3 dB	Minimal	Negligible
		Scenario 2b (Routes 1&9)	<0.4 dB	<0.4 dB	Minimal	Negligible
Ladsgrave Cottage and any properties facing onto Church Street within Coton in the Elms and towards the junction with the A444	Church Street (ATC site 13)	Scenario 2a (Route 8)	<0.2 dB	<0.2 dB	Minimal	Negligible
		Scenario 2b (Route 8)	<0.8 dB	<1.5 dB	Minimal - Low on Highest Day	Negligible - Minor on Highest Day

11.114 The construction traffic assessment has identified that for an average day, there is one road with four properties (Donkhill Cottages and Catton Farm Cottages on Unnamed Road, West of Catton Lane/Cotton Road junction) in Scenarios 2A & 2B, where the change in traffic volume with the introduction of construction workers in cars and light vehicles leaving the site after 19:00 is likely to result in noise level changes of low magnitude, which is a **minor negative effect (not significant)**. On the highest construction traffic volume day, there is also predicted to be a minor negative effect (not significant) at Ladsgrave Cottage and any properties facing onto Church Street withing Coton in the Elms and towards the junction with the A444. At all other positions assessed there is a **negligible effect (not significant)**.

Proposed Mitigation

11.115 Appropriate construction noise mitigation would be incorporated into the CEMP/CTMP.

11.116 The CEMP will include: control of working hours and a requirement to liaise with the local planning authority and nearby affected stakeholders where planned works outside of these hours is considered necessary; appropriate control of access routes to the Site; management of arrival of HGVs; and appropriate noise and vibration action levels.

11.117 The contractor will have a duty to follow the best practice recommendations set out in BS 5228[11]. In particular training of site personnel to raise awareness of noise, the location of noise sensitive receptors nearby, and delivery/access routes. The contractor would also be required to make appropriate checks, keep records that the procedures within the CEMP are being followed, and have a clear complaints procedure.

Residual Construction Effects

11.118 The best practice measures defined in the Outline CEMP are included within the assessment and no specific measures beyond this have been proposed, therefore there is no change to the construction noise and construction traffic noise effects presented above.

11.119 Residual construction noise effects would remain **Negligible to Minor (not significant)**.

11.120 Residual construction traffic noise effects would remain **Minor (not significant)**.

Assessment of Operational Effects

11.121 The assessment of effects is based on the project description as outlined in **Chapter 4: Project Description**. Unless otherwise stated, identified potential effects are considered to be negative.

Predicted Operational Effects

11.122 Wölfel IMMI noise prediction software has been used to calculate noise from the operational plant items within the Site, relative to the noise sensitive receptors. The prediction model considers intervening topography, intervening buildings and ground conditions and allows mitigative elements such as noise barrier fences and landscape bunding to be introduced to investigate their effectiveness in controlling noise from the plant items or noise sources.

11.123 It should be noted that the model assumes a light breeze, down-wind from source to receiver in all directions to represent a worst case at each receptor. In practice noise levels can be marginally lower under calm conditions and will be significantly lower under upwind conditions with longer propagation distances.

11.124 The assessment is considered to be representative of worst-case seasonal variation (i.e. longest daylight hours in the summer) and for both weekday and weekend periods.

11.125 Predictions of noise are based on hemispherical spreading from point sources with defined sound power levels. Predictions are based on 'Porous' ground (G=1) as defined in ISO 1996[30], except for the areas of solar panels, where mixed 'hard' and 'porous' ground is used (G=0.5) to take account of potential reflection from solar panels.

11.126 It is not possible to accurately model the screening effect of the solar panels themselves, however they will provide a degree of screening of some sources; particularly for example, where there would be no direct line to a receptor from some string inverters due to the orientation of panels. To provide a more realistic model and to aid optimisation during the initial design process, the effect of screening of panels has therefore been simulated by including a barrier, with a height set at the lowest likely panel height, for every third or fourth row of panels.

[30] Porous ground in ISO 1996 is defined as ground covered by grass, trees or other vegetation, and all other ground surfaces suitable for the growth of vegetation, such as farming land. For porous ground G=1.

For most receptors this only results in a change of less than 2 dB, however for Ladsgrave Cottage, this results in a reduction of approximately 4 dB.

11.127 Appendix 11.3: Operational Source Noise Data details the indicative acoustic specification information used for each of the operational plant items considered.

11.128 The sources of noise during the operational phase considered are:

- Solar panel Inverters (to convert from DC to AC); Inverters are 'string' inverter type fitted to the rear of PV panels (482 are included in the model[31] as one point source for every two inverters).
- Distributed MV Transformer Stations (62 are included in the model).
- 2x132kV 90MVA transformers in the Proposed Development's substation area.
- Harmonic filters and reactive compensation in the Proposed Development's substation area.
- BESS Inverters - presently assumed to be up to 13 outdoor or containerised inverters (typically one unit for each of six energy storage units).
- Battery Units - worst case of 78 containerised units currently assumed (to provide oversizing/flexibility to accommodate operational or electrical redundancy).
- The solar PV panels and connecting cables do not emit noise.

11.129 The Proposed Development's substation has been moved from the northern part of the Oaklands Farm area, as presented in the PEIR, to the centre of the Oaklands Farm area. The BESS is located adjacent to the Proposed Development's substation, towards the centre of the Oaklands Farm area. The extra distance and screening provided by the panels help to minimise the effects of noise from the Proposed Development's substation and BESS on nearby residential properties. The effect of these changes is discussed in paragraph 11.142.

11.130 The layout used for the assessment is shown on **Figure 4.1a** and **b: Illustrative Concept Design**, with the operational plant items set out in **Appendix 11.3: Operational Noise Source Data**. This represents the best available information for the required plant known at this

[31] Some assumptions in the model differ slightly to the design parameter in Chapter 4, however this does not change the outcome of the modelling.

stage, with overall sound power levels of each unit (or an equivalent sound pressure level, distance measured and dimensional information to derive the sound power level).

11.131 The string inverters and MV transformer stations are located at the end of panel rows (shown with turquoise lines in **Figure 4.1a** and **b: Illustrative Concept Design**). The actual number may vary depending on the capacity of the inverter used.

11.132 As set out in paragraph 11.65 detailed frequency data for each kit is not available, but typical data is presented in **Appendix 11.3: Operational Noise Source Data**. It is expected that the only plant items that may potentially have significant tonal character are the transformers, which do not currently have a significant contribution to the overall noise level at receiver positions. It is not expected than any of the proposed plant will have any impulsive character. It is considered that there will be a degree of intermittency of the sources, which may change on a diurnal and seasonal basis.

11.133 The following assumptions were made in the operational effects assessment:

- The String inverters and associated MV transformers cooling fans cut-in only with daylight and with temperatures exceeding approximately 20°C and therefore, only have an impact during the daytime.
- The BESS may run at any time of day or night, at full or partial load, and would discharge electricity for a maximum duration of three hours. Charging could take 15-20% longer due to conversion losses (cooling fans could operate for up to 30 minutes after full charge/discharge).
- The two x132kV transformers within the Proposed Development's substation are sized to operate at significantly less than their full load to maximise their efficiency.
- It is assumed that there are no other significantly noisy plant items in the Proposed Development's substation area.
- The final equipment selected may vary from our preliminary assumptions, but there is an intention that a reasoned allowable worse-case sound power level, as used in this assessment, for each plant will be included in any design specification.

11.134 A literature search of manufacturer's information has been completed on the BESS and inverter noise levels. Some of the data is limited and variable in its quality and this has shown that noise levels for these units vary significantly, however, the data used represent the likely

worst case. The final equipment selected may vary from preliminary assumptions, but there is an intention that a reasoned allowable worse-case sound power level for each plant will be included in any design specification, and that this is within the assessment parameters established for this ES. The developer will be required to undertake and submit an operational noise assessment to the local planning authority prior to the start of works on site (DCO requirement 15).

11.135 Predictions have been carried out to the main receptors of interest. **Table 11.16** and **Table 11.17** show the predicted worst case operational noise levels at the nearest receptors with no additional mitigation, for the daytime and night-time periods respectively. The term ‘Solar plant’ referred to in the table is defined as the string inverters and distributed medium voltage transformers. Daytime levels are predicted at 1.5m above ground and night-time levels at 4.5m above ground to represent a first-floor window height. The predicted noise levels are also shown as noise contours in **Figure 11.3** and **Figure 11.4** in **Volume 2** of the ES. It can be seen that the solar plant makes the highest contribution to predicted noise levels at each receptor during the day, and from the BESS at night.

Table 11.16: Predicted worst case operational daytime noise at nearest receptors

Receptor	Solar plant (dB L_{Aeq})	Substation plant (dB L_{Aeq})	Energy storage plant (dB L_{Aeq})	**All Plant (dB L_{Aeq})**
Fairfield Farm	27	14	27	30
Old Barn Farm	23	11	20	25
Corner Farm	28	17	29	32
The Old Byre	29	18	30	32
Walton Hill Farm	34	17	28	35
Rosliston	32	15	24	33
Twin Oaks House	35	17	29	36
Boroughfields Cottage	31	14	25	32
Ladsgrave Cottage	34	17	26	35

Table 11.17: Predicted worst case operational night-time noise levels at nearest receptors

Receptor	Solar plant (dB L_{Aeq})	Substation plant (dB L_{Aeq})	Energy storage plant (dB L_{Aeq})	**All Plant (dB L_{Aeq})**
Fairfield Farm	6	18	28	29
Old Barn Farm	6	16	25	25
Corner Farm	8	18	32	33
The Old Byre	9	19	30	31
Walton Hill Farm	13	19	30	30
Rosliston	11	16	25	26
Twin Oaks House	14	18	30	30
Boroughfields Cottage	12	16	28	28
Ladsgrave Cottage	14	18	27	28

11.136 For assessment, a penalty of 3dB has then been applied to the solar plant and BESS for intermittency. A penalty of 5dB has been applied to the Proposed Development's substation plant, made up of 3dB for intermittency and 2dB for potentially 'just perceptible' tonality of the transformers as a worst case. In practice the most prominent tone at 100Hz from the Proposed Development's substation transformers is not expected to be above the threshold of hearing at the nearest receptor.

11.137 Table 11.18 and **Table 11.19** show the predicted Specific Level, L_s[32] and the Rating Level, L_{Ar}[33], with penalties for character of sound applied. An indication of existing background noise level at each receptor is also presented with the assessment of the significance of the noise levels recorded, following the magnitude criteria in **Table 11.11** and the significance criteria derived from **Table 11.12**.

[32] Specific Level defined in BS 4142, Ls = $L_{Aeq,Tr}$ is the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, where T_r = 1 hour between 07:00 and 23:00 and 15 min between 23:00 and 07:00.

[33] Rating Level defined in BS 4142 rating level, L_{Ar} = $L_{Aeq,T}$ is the specific sound level plus any adjustment for the characteristic features of the sound.

Table 11.18: Assessment of worst-case operational daytime noise levels

Receptor	Background noise level (dB L_{A90})	Predicted specific level L_s[32] (dB $L_{Aeq, 1\ hour}$)	BS 4142 rating level, L_{Arr}[33] (dB $L_{Aeq, 1\ hour}$)	Magnitude of change[34]	Significance of Effect[35]
Fairfield Farm	33	30	33	Minimal	Negligible
Old Barn Farm	33	25	28	Minimal	Negligible
Corner Farm	33	32	35	Minimal	Negligible
The Old Byre	33	32	36	Minimal	Negligible
Walton Hill Farm	34	35	38	Minimal	Negligible
Rosliston	34	33	36	Minimal	Negligible
Twin Oaks House	41	36	39	Minimal	Negligible
Boroughfields Cottage	41	32	35	Minimal	Negligible
Ladsgrave Cottage	33	35	38	Minimal*	Negligible*

* As predicted rating level is below the absolute threshold (of 40dB L_{Aeq}) set out in **Table 11.11**.

[34] as per **Table 11.11**

[35] as per criteria in **Table 11.12**

Table 11.19: Assessment of worst-case operational night-time noise levels

Receptor	Background noise level (dB L_{A90})	Predicted specific level, L_s[32] (dB $L_{Aeq, 1\ hour}$)	BS 4142 rating level L_{Ar}[33] (dB $L_{Aeq, 1\ hour}$)	Magnitude of change[36]	Significance of Effect[37]
Fairfield Farm	26	29	32	Minimal*	Negligible*
Old Barn Farm	29	25	29	Minimal	Negligible
Corner Farm	29	33	36	Minimal*	Negligible*
The Old Byre	29	31	34	Minimal	Negligible
Walton Hill Farm	26	30	34	Minimal*	Negligible*
Rosliston	30	26	29	Minimal	Negligible
Twin Oaks House	36	30	34	Minimal	Negligible
Boroughfields Cottage	35	28	32	Minimal	Negligible
Ladsgrave Cottage	25	28	31	Minimal*	Negligible*

* As predicted rating level is below the absolute threshold (of 40dB L_{Aeq}) set out in **Table 11.11**.

11.138 At all locations the significance of effect is predicted to be **negligible (not significant)**. It should be noted that although the predicted rating levels exceed the typical low background noise level by more than 5 dB at some locations, the methodology and the development of the magnitude criteria calls for the absolute level to also be considered, as explained at paragraphs

[36] as per **Table 11.11**

[37] as per criteria in **Table 11.12**

11.48 to 11.56. In these predictions, the absolute levels are all predicted to be lower than the minimum threshold noise level.

11.139 Notwithstanding, some sound may be audible outside at times when the background noise from all other environmental sources is very low.

11.140 With reference to the noise contours in **Figure 11.3** and **11.4** in **Volume 2** of the ES, worst case operational noise levels at some positions along the existing PRoW, and the proposed permissive path, are up to approximately 50 dBA. This indicates operational noise levels at the PRoW are likely to be less than WHO guidelines[15] for amenity areas; As discussed at paragraph 11.10, the PRoW is not considered to have significant amenity and therefore a higher noise level would be expected to be acceptable. Operational noise effects on the PRoW are therefore not considered to be significant.

Proposed Mitigation

11.141 No additional mitigation is proposed to that already included as embedded design mitigation within the Proposed Development.

11.142 Following the initial review, the Proposed Development's substation and BESS have been located as far as possible from noise sensitive receptors to mitigate their impact. The originally proposed position was closer to Rosliston Road, approximately 200m from The Old Byre. Using the current worst-case assumptions for the Proposed Development's substation and BESS, this change results in an overall reduction to the night-time noise levels of approximately 15 dBA at The Old Byre, 9 dBA reduction at Old Barn Farm, and 6 dBA reduction at Corner Farm. The assessment with the original position would have resulted in moderate/major effects (significant) at The Old Byre. The change to all other receptor positions is less than 5 dBA, for which the assessments remain negligible (not significant).

11.143 The string inverters are predicted to be the highest contributors to daytime noise levels, due to the quantity required and proximity to receptors. These have been located on the ends of rows of panels furthest from receptors where required.

11.144 As part of the detailed design stage, the Applicant will be required to undertake and submit an operational noise assessment to the local planning authority prior to the start of works on site (DCO requirement 15) to demonstrate that detailed design and plant selected do not demonstrably affect noise sensitive receptors in accordance with the conclusions of this

assessment. A noise complaint procedure is also included in the Outline Operational Environmental Management Plan (see **Appendix 4.4**).

Residual Operational Effects

11.145 The predictions indicate that the residual effects are likely to remain **negligible.** Some low levels of sound may be audible outside at times when the background noise from other sources is very low.

Cumulative Effects

Predicted Cumulative Effects

11.146 The proposed developments considered for this assessment in the vicinity of the Site are listed below. Sites further away would not be expected to have any cumulative effect on operational noise, and do not share connection to main arterial routes on lightly trafficked roads, so would not be expected to have any cumulative construction traffic noise effects.

- 18MW Renewable Energy Centre and associated infrastructure on land at the former Drakelow C Power Station (SDDC application DMOT/2020/0598 and Derbyshire County Council CW9/0420/7).
- Battery Storage Facility at Royle Farm Business Park, Burton-upon-Trent (SDDC application DMPA/2021/1221).
- Energy Storage Facility at Breach Farm, Swadlingcote (SDDC applications 9/2017/0541, DMPA/2020/0542 and DMOT/2021/1569).
- Scoping Opinion for Energy Storage System and Substation on Land at Barr Hall Farm, Drakelow (SDDC application DMOT/2023/0621).
- Battery Energy Storage facility on Land to the North West of Barn Farm and to the South of Walton Road and the former Drakelow Power Station (SDDC application DMPA/2023/0170).

11.147 No significant cumulative effects from any of the above developments are considered likely for the reasons set out below:

18MW Renewable Energy Centre at Former Drakelow Power Station

11.148 The development of the Energy from Waste centre is approximately 1km to the north of the Proposed Development's nearest property of interest, and is due to be completed and operational in 2023, before likely construction of the Proposed Development and therefore construction noise effects would not coincide. The noise assessment report accompanying the application indicates low operation noise levels in the range of 25-30 dB L_{Aeq} at Park Farm. No significant operational noise effects from the Site are predicted as far as Park Farm.

Battery Storage Facility at Royle Farm Business Park

11.149 The proposal for a Battery Storage Facility at Royle Farm Business Park, Burton-upon-Trent is approximately 1.5km to the east of the Site. The noise assessment for the Royle Farm site indicates operational noise will be below 30 dB L_{Aeq} beyond approximately 400m from the proposed facility and consequently will not have any contribution to the predicted operational noise levels. The application is permitted and likely to have been built before the Proposed Development and therefore there would be no cumulative construction traffic impacts.

Energy Storage Facility at Breach Farm, Caldwell

11.150 The proposal for an Energy Storage Facility at Breach Farm, Caldwell, Swadlincote is approximately 2km to the east of the Site. The noise assessment for the Breach Farm site indicates operation noise will be below 30 dB L_{Aeq} at approximately 300m from the proposed facility and consequently will not have any contribution to the predicted operational noise levels. The application is permitted and likely to have been built before the Proposed Development and therefore there would be no cumulative construction traffic impacts.

Energy Storage System and Substation on Land at Barr Hall Farm, Drakelow

11.151 The Scoping Opinion for an Energy Storage System (ESS) and Substation on Land at Barr Hall Farm, Drakelow identifies a site approximately 400m from the receptors Park Farm and Park Farm Cottages, approximately 500m from Grove Lodge, and less than 300m from the receptor Fairfield Farm. The Scoping Opinion states that access is anticipated from Walton Road and also identifies a cable route towards Walton Road, and potentially following the line of Walton Road east before crossing north to Drakelow.

11.152 The Barr Hall Farm ESS is much closer to these receptors identified above than the operational noise sources on the Site (the closet of these to the Site is Fairfield Farm, which is over 700m from the nearest operational noise sources). The predicted operational noise effects from the Proposed Development are Negligible and therefore the cumulative effect is also **Negligible**. Combined operational noise levels would only become significant if noise from the Barr Hall Farm ESS was significant.

11.153 Predicted construction noise effects from the Site are Negligible at these receptors identified above, with the exception of development of the nearest parts of access track which is predicted to have Minor significance at receptors on Park Farm for short periods. If similar construction noise levels from the development of the Barr Hall ESS were to coincide, the combined magnitude could increase to Medium and therefore Moderate Significance for short periods. However, as Park Farm is around 400m away from the Barr Hall ESS proposal it is estimated that construction impacts from Barr Hall ESS would be Negligible at Park Farm assuming typical construction methods. Therefore cumulative construction noise impacts would be expected to be **Negligible**.

11.154 The Barr Hall Farm ESS also proposes to use Walton Lane as the main access point. Walton Lane is a relatively busy road. The relative traffic volumes from both the Proposed Development and the Barr Hall Farm ESS are small compared to the level of traffic on Walton Lane and the cumulative operational and construction traffic noise levels would remain **Negligible**.

Battery Energy Storage facility on Land to the North West of Barn Farm

11.155 The application for a Battery Energy Storage facility on Land to the North West of Barn Farm and to the South of Walton Road and the former Drakelow Power Station is consented. The site is approximately 800m from the receptors Park Farm, and over 1.8km from the nearest receptor considered for operational noise levels from the Proposed Development, which is Fairfield Farm.

11.156 The noise assessment accompanying the application predicts worst case noise levels of 41 dB L_{Aeq} during the daytime and 35 dB L_{Aeq} at night at the nearest noise sensitive receptors to identified in the assessment. These are Barn Farm at 220m to the south and the new residential development at Drakelow Park at 240m to the north. Using a simple calculation following the methodology in ISO 1996 and the same assumptions for source height and ground effects used

in the accompanying noise assessment, it is calculated that this would be equivalent to a worst case daytime contribution of less than 30 dBA L_{Aeq} at Park Farm, and less than 20 dB L_{Aeq} at Fairfield Farm. Therefore there would no contribution to the operational noise from the Proposed Development.

11.157 At over 800m from receptors considered for the Proposed Development, there is unlikely to be any significant contribution to construction noise levels if construction was to coincide.

11.158 The Battery Energy Storage facility on Land to the North West of Barn Farm proposes to use Walton Lane as the main access point. Walton Lane is a relatively busy road. The CTMP accompanying the application indicates relatively low construction traffic volumes (3-4 HGVs/OGVs and 8-10 staff vehicles per day during an 18 week program) and very little operational traffic. The relative traffic volumes the Proposed Development are also small compared to the level of traffic on Walton Lane. The cumulative operational and construction traffic noise levels would remain **Negligible**.

Table 11.20: Summary of Cumulative noise effects

Development	Cumulative Significance on Construction	Cumulative Significance on Operation
18MW Renewable Energy Centre at Former Drakelow Power Station	None	None
Battery Storage Facility at Royle Farm Business Park	None	None
Energy Storage Facility at Breach Farm, Caldwell	None	None
Energy Storage System and Substation on Land at Barr Hall Farm, Drakelow	Negligible	Negligible
Battery Energy Storage facility on Land to the North West of Barn Farm and to the South of Walton Road and the former Drakelow Power Station	Negligible	None

Combined Effects

11.159 Combined effects on users of PRoW could arise as a result of the combination of noise (not significant), dust (not significant) and visual (significant) effects during construction. These would be short term effects that are transitory in nature and only experienced when using the PRoW (i.e. could be avoided by temporarily using other PRoW in the area during construction). With reference to the principles in the NPPG on Noise (see **Table 11.1**), a minor adverse effect above the LOAEL may occur as a result of the combined effect, as users may be more likely to make changes to behavior some of the time, such as using a different path or route, but is not considered to be a significant effect (SOAEL) as it is not a permanent change. The combination of these effects is therefore anticipated to be **Minor** (not significant) and would not lead to any adverse health effects.

11.160 Combined operational effects would be **Negligible** as noise and dust effects would be insignificant and only visual effects would impact users of the PRoW.

Further Survey Requirements and Monitoring

11.161 No further monitoring is considered necessary unless appropriate in line with noise complaints procedures as part of the CEMP and OEMP.

Summary of Effects

11.162 Table 11.21 below summarises the predicted effects of the Proposed Development due to Noise and Vibration.

Table 11.21: Summary of Effects

Predicted Effect	Significance	Mitigation	Significance of Residual Effect
Construction			
Construction noise	Negligible – minor (High magnitude for short duration at	Noise consideration to be included in CEMP, including	Negligible – minor (not significant)

Predicted Effect	Significance	Mitigation	Significance of Residual Effect
	Corner Farm if night-time works are required = Moderate significance)	selection of plant, construction hours, phased construction programme, haul routes and deliveries to Site.	Moderate (significant) for short duration at night if required
Construction traffic	Negligible – minor		Negligible – minor (not significant)
Operation			
Noise from plant	Negligible	Mitigation has been embedded in the design of the Proposed Development, including optimising the location of the energy storage facility away from receptors. The design places string inverters away from noise sensitive properties where possible. Good practice measures will be implemented when finalising the operational plant to be used on-site, such as limiting	Negligible

Predicted Effect	Significance	Mitigation	Significance of Residual Effect
		sound power in plant selection and selection of string inverters.	
Cumulative Construction			
None	Negligible	None	Negligible
Cumulative Operation			
None	n/a	n/a	n/a
Combined Construction			
Noise, dust and visual effects on users of PRoW	Minor	Mitigation in the CEMP (also detailed in **Chapter 5: Landscape and Visual and Appendix 16.1: Air Quality Assessment**).	Minor
Combined Operation			
Noise, dust and visual effects on users of PRoW	Negligible	N/A	Negligible