BEACON FEN ENERGY PARK

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Chapter 10 – Noise and Vibration
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The Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(q)

Revision History

Revision	Revision date	Details	Authorized	Name	Position

List of Outstanding Issues and Information

Outstanding issue/info.	Section/Paragraph	Responsibility	Action

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10. NOISE AND VIBRATION

10.1 Introduction

10.1.1 This Chapter reports the preliminary assessment of the likely significant effects of the Proposed Development in terms of Noise and Vibration in the context of the Site and surrounding area. In particular it considers the likely significant effects of the following:

- The potential effects of noise and vibration from the construction and decommissioning phases of the Proposed Development on Existing Sensitive Receptors (ESR(s)); and
- The potential effects of changes in noise level at ESRs during the operational phase of the Proposed Development.

10.1.2 This Chapter (and its associated figures and appendices) is not intended to be read as a standalone assessment and reference should be made to the front end of this Preliminary Environmental Information Report (PEIR) (Chapters 1 – 5), as well as the final chapter, 'Summary of Environmental Effects' (Chapter 17).

10.1.3 This Chapter is accompanied by the following Figures and Appendices:

- Appendix 10.1 which provides details of Policy, Legislation and Guidance considered relevant and implications for the noise and vibration assessment;
- Appendix 10.2 which details the Noise Survey Results;
- Figure 10.1 which shows the Solar Array Area, Existing Noise Sensitive Receptors and Measurement Positions;
- Figure 10.2 which shows the Operational Noise Contours during light periods; and
- Figure 10.3 which shows the Operational Noise Contours during dark periods.

10.1.4 As set out within Chapter 1, the information set out within this Chapter is preliminary and intended to inform consultees (both specialist and non-specialist) about the likely environmental effects of the Proposed Development, helping to inform their consultation responses.

10.2 Legislation and Policy

10.2.1 The relevant legislation, policy and guidance are listed below, with details provided in Appendix 10.1.

Legislative Framework

10.2.2 The following Acts are relevant to the assessment of Noise.

- Control of Pollution Act 1974; and
- Environmental Protection Act 1990.

Planning Policy

10.2.3 The applicable planning policy is summarised as follows:

- National Planning Policy Framework, 2023 (NPPF);
- Emerging Overarching National Policy Statement for Energy (EN-1) (November 2023);
- Emerging National Policy Statement for Electricity Networks Infrastructure (EN-5) (November 2023);
- Emerging National Policy Statement for Renewable Energy Infrastructure (EN-3) (November 2023);
- Noise Policy Statement for England, 2010 (NPSE); and
- Central Lincolnshire Local Plan 2012-2036, adopted 2023. Policy S14.

Guidance

10.2.4 The applicable guidance is summarised as follows:

- Planning Practice Guidance – Noise, 2019 (PPG);
- British Standard 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142);
- British Standard 8233: 2014 Guidance on sound Insulation and noise reduction for buildings (BS 8233);
- British Standard 5228 -1:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise” (BS 5228-1); and
- British Standard 5228-2:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration” (BS 5228-2).

10.3 Consultation & Scope of Assessment

Consultation Undertaken to Date

10.3.1 Table 10.1 provides a summary of the consultation activities undertaken in support of the preparation of this Chapter.

Table 10.1 – Summary of Consultation Undertaken to Date

ORGANISATION	DATE	SUMMARY OF CONSULTEE RESPONSE	HOW THIS HAS BEEN ADDRESSED
Planning Inspectorate (Scoping Opinion)	25th May 2023	Survey receptors in proximity to cable route. Agree monitoring locations with the relevant statutory consultees.	Monitoring methodology and locations agreed with NKDC on 6th July 2023. Noise impacts on ecological receptors (particularly Wintering and Groundnesting birds) considered in Ecology chapter.

ORGANISATION	DATE	SUMMARY OF CONSULTEE RESPONSE	HOW THIS HAS BEEN ADDRESSED
		Consider ecological receptors. Consider vehicle generation. Justify Night-time scenarios.	Construction and operational vehicle generation has been considered or scoped out of the assessment. A more detailed breakdown of night-time scenarios has been considered in the assessment as 'worst case'.
Lincolnshire County Council (LCC) – scoping response	16th May 2023	No specific comments provided.	No action required
North Kesteven District Council (NKDC) – scoping response	18th May 2023	Wider survey area required beyond 300m proposal. Need to consider construction impacts from the cable route. Suggest baseline locations likely to change. Agree monitoring locations and period with NKDC. To consider tracking panels.	Following scoping response, details of proposed baseline survey methodology and locations were provided to NKDC on 5th July 2023. NKDC EHO agreed monitoring details by email on 6th July 2023. Tracking panels are no longer proposed as part of the Proposed Development, panels will be fixed.

Scope of the Assessment

10.3.2 Noise emissions from the Proposed Development will occur during the construction, operational and decommissioning phases. The noise levels during the construction and decommissioning phases are likely to be similar due to the similar nature of work and equipment involved.

10.3.3 The activities associated with the construction and decommissioning phases of the Proposed Development have the potential to generate noise and impact on the surrounding area including local ESRs. The potential noise impact during the construction/decommissioning phases has been assessed against BS 5228-1 ABC methodology. The magnitude of any impacts has been established and the significance of the effects has been determined.

10.3.4 During the construction and decommissioning phases of the development, vibration is likely to be generated which could propagate beyond the boundary of the Site. When using equipment such as heavy plant, vibration compaction equipment or piling rigs close to the Site boundary, nearby sensitive receptors may experience ground-borne vibration. An assessment has been carried out to determine the potential impact of construction/decommissioning vibration and whether unacceptable levels of vibration are present at ESRs. The magnitude of the impacts has been established and the significance of the effects has been determined.

10.3.5 The likely significant effects of onsite operational noise during the operational phase of the Proposed Development will be assessed with reference to the BS 4142:2014+A1:2019 'Methods for rating and assessing commercial and

industrial sound'. The focus will be on predicting the noise emissions from the proposed electrical equipment during operation at ESRs. This assessment has been carried out using SoundPLAN version 8.2 (SoundPLAN). SoundPLAN uses geographical information to generate a model of the study area to generate noise contours. The noise model includes all proposed onsite buildings and significant sources of noise associated with the operations of the facility. SoundPLAN uses the methodology set out in ISO 9613-2:1996 'Attenuation of sound during propagation outdoors'.

Design Assumptions

10.3.6 The Proposed Development comprises of solar farm and battery storage system, associated infrastructure, and cabling to connect to the existing Bicker Fen Substation (please see Chapter 2 for full details). The Proposed Development is covering 517 ha of land.

10.3.7 The solar panels and cable routes would not produce noise during the operational phase, but the associated infrastructure would have noise emissions. The infrastructure components most likely to emit sound that could cause an adverse noise effect at ESRs are; inverters, transformers and battery container ancillary equipment.

10.3.8 Noise emissions from the solar infrastructure components would not occur during periods of darkness. However, the BESS is expected to operate during periods of darkness and it has, therefore, been assessed on its own during this period.

Effects Not Considered within the Scope

10.3.9 Vibration levels during the operational phase are not expected to be high enough to cause any impacts on ESRs. Mitigation measures would be incorporated within the design of the facility in order to reduce or remove any vibration that would result from the onsite operation of the Proposed Development.

10.3.10 During the operational phase, traffic to and from the Proposed Development is expected to be minimal as the purpose of these will primarily be for maintenance work and equipment replacement. The volume of the additional traffic from the Proposed Development is not expected to produce any significant noise or vibration effects at ESRs.

10.3.11 Expansion of the Bicker Fen substation is unlikely to result in any noticeable increase in noise levels at nearby ESRs, which are over 1km away.

Limitations & Exclusions

10.3.12 This assessment considers the impacts on the nearby sensitive receptors only from the proposed battery storage area and solar array.

10.3.13 The information within this Chapter is preliminary and intended to inform consultees. As such, this PEIR has been prepared at a point in the design process when parameters of the design are certain enough for an assessment to be based upon, but there is still sufficient flexibility to incorporate feedback from consultees. Furthermore, a robust 'worst case' situation has been assessed to consider the maximum extent of development using existing manufacturer equipment data, prior to design refinement to incorporate

required mitigation. Operational noise has been predicted with all plant being in maximum operation at all times of day. BESS cooling fans will operate dependent on ambient temperatures and would not be in a full mode of operation during cooler temperatures.

10.3.14 At this current stage of the planning process, defining the access road and cable route is still ongoing. This matter will be completed in advance of submission and incorporated within the Environmental Statement (ES), which will be consulted upon as part of the determination process.

10.3.15 As a robust approach, it will be assumed that any ESRs near to the access road or cable route will have low background levels and the most stringent BS5228 category will be used in the construction assessment (Category A).

10.3.16 As the positioning and route of the access road within the Access Route Corridor is yet to be confirmed, the assessment of construction traffic noise will be included within the ES. To avoid adverse effects the construction associated traffic will be mitigated so as to not exceed 65dB during working hours at the identified ESRs.

10.4 Assessment Methodology & Significance Criteria

Extent of the Study Area

10.4.1 The Site is discussed within Chapter 2 of this Preliminary Environmental Information Report (PEIR). The ESRs in relation to the assessment of likely significant noise and vibration effects as a result of the Proposed Development comprise the following:

- Existing residential receptors;
- Existing leisure receptors;
- Existing community receptors and:
- Existing ecological receptors.
  (A preliminary assessment of noise impact on ecological receptors is contained within the Ecology Chapter).

10.4.2 A desk study has been undertaken in order to identify existing sensitive receptors within the vicinity of the site (as listed in Table 10.9) and a study area drawn to encompass these. The study area comprises the area of the Site and an area extending up to 300m from the Site boundary. A 300m distance is normally sufficient to encompass nearby ESRs, but other specific receptors located further afield have also been assessed, as required.

Assessment Methodology

10.4.3 The method and location of baseline data collection and assessment has been agreed with North Kesteven District Council (NKDC) and is in accordance with current guidance and industry best practice.

10.4.4 Calculations have been carried out in accordance with the prediction methodologies set out in BS5228-1 and BS4142.

10.4.5 For the operational phase, a 3D noise model was created in SoundPLAN. Each piece of noise emitting equipment has been included in the model. Noise

prediction calculations have been undertaken to predict the noise levels which are likely to be generated by typical operational activities associated with the Proposed Development and the resultant noise levels at ESR locations.

10.4.6 The prediction calculations have used noise measurement information provided by the Applicant.

10.4.7 As stated in 10.3.12, the assessment represents a 'worst case' approach prior to detailed consideration of mitigation measures for the purpose of presenting a robust PIER. To reduce the potential impact of operational noise from the Proposed Development on ESRs, mitigation measures are being considered and will inform the Environmental Statement. Possible measures are discussed in Section 10.7 of this Chapter.

Significance Criteria

10.4.8 The potential noise effects associated with the Proposed Development have been assessed in accordance with the guidance detailed in Section 10.2 of this Chapter to determine whether statutory objectives are exceeded or whether undesirable/desirable consequences may arise for the receiving environment. Where potential adverse effects are identified, appropriate mitigation measures will be developed (as set out at 10.4.7) and proposed to avoid, reduce or compensate for the adverse effects. The significance of an effect will be determined by the magnitude of the impact and the sensitivity of the receptor. The significance of construction/decommissioning noise and vibration, and operational noise is shown in Tables 10.2, 10.3 and 10.4, respectively, as well as the determination of the sensitivity of the receptor in Table 10.5, below.

Table 10.2 – Magnitude of Construction/Decommissioning Noise Impact

SENSITIVITY	DESCRIPTION
Large	Noise levels exceed the assessment category threshold level for the duration of the construction works.
Medium	Noise levels exceed the assessment category threshold level for periods of more than one month, but for significantly less than the whole duration of the construction works.
Small	Noise levels exceed the assessment category threshold level for periods of less than one month.
Negligible	Noise levels do not exceed the assessment category threshold level during any period.

Table 10.3 – Magnitude of Vibration Noise Impact

SENSITIVITY	CHANGE IN VIBRATION LEVEL	DESCRIPTION
Large	> 10mm per sec	Vibration likely to be intolerable for more than brief exposure. Approaching the level at which cosmetic damage may occur in light structures.
Medium	5mm – 10mm per second	Tolerance less likely even with prior warning and explanation.
Small	1mm – 5mm per second	Complaints are likely, but can be tolerated if prior warning and explanation given.

SENSITIVITY	CHANGE IN VIBRATION LEVEL	DESCRIPTION
Negligible	<1mm per second	Below level at which complaints are likely.

10.4.9 Operational noise has been assessed following BS 4142 guidance, whereby the rating level of noise emissions from activities are compared against the background level of the pre-development noise climate. However, BS 4142 advises that, where rating levels/background levels are low, the assessment of operational noise should take into context the absolute noise level.

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

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

10.4.11 Noise levels exceeding the SOAEL should be avoided as far as reasonably practicable. For noise levels exceeding the LOAEL, the NPSE states that: "It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur".

10.4.12 An external free-field noise rating level lower threshold of 35 dB L_{Ar} is proposed to represent LOAEL, which would apply even at receptor locations in cases where the background levels are low (below 30 dB L_{A90}). This would provide satisfactory external amenity during the daytime and suitable internal noise levels at night with windows open for ventilation, even taking into account the potential character of the noise. Consequently, SOAEL is considered to occur at noise rating levels greater than 10 dB above the background noise level and above 45 dB L_{Ar} .

Table 10.4 – Magnitude of Operational Noise Impact

MAGNITUDE OF IMPACT	DESCRIPTION
Large	a rating level more than 10dB above the background $L_{A90,T}$; and above 45 dB. - SOAEL
Medium	a rating level more than 5dB above the background $L_{A90,T}$; and above 35 dB.
Small	a rating level more than the background $L_{A90,T}$; but below 35 dB. - LOAEL
Negligible	a rating level below the background $L_{A90,T}$

Table 10.5 – Sensitivity of Receptor (applicable to all phases)

SENSITIVITY	RECEPTOR TYPE
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance. For example: hospitals, residential care homes, and internationally and nationally designated nature conservation sites which are known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Medium	Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example: residential dwellings, offices, schools and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Low	Receptor/resource is tolerant of change without detriment to its character or is of low or local importance. For example: industrial estates.
Negligible	Receptor/ resource is not sensitive to noise.

10.4.13 The significance of an environmental effect for construction/decommissioning noise, road traffic noise and onsite operational noise is determined by the interaction of magnitude and sensitivity. The Effect Significance Matrix used in this assessment is shown in Table 10.6, below, and used to determine the level of effect.

Table 10.6– Effect Significance Matrix

MAGNITUDE	SENSITIVITY			
	HIGH	MEDIUM	LOW	NEGLIGIBLE
Large	Very Substantial	Substantial	Moderate	None
Medium	Substantial	Substantial	Moderate	None
Small	Moderate	Moderate	Slight	None
Negligible	None	None	None	None

10.4.14 Based on the assessment methodology set out above and the definitions of the NPSE (see paragraphs 10.4.10 – 10.4.12), for the purposes of this EIA, effects of Substantial (adverse or beneficial) or greater are considered to be significant.

10.5 Baseline Conditions

Current Baseline Conditions

10.5.1 To establish the baseline noise levels at the ESRs, a background noise survey was undertaken by Wardell Armstrong LLP on 27th July 2023 and 28th July 2023.

10.5.2 Noise measurements were carried out at four monitoring locations agreed with NKDC which are in close proximity to and therefore considered to be representative of the eight ESRs. A 24-hour noise measurement was captured

at each location. The monitoring locations are shown on Figure 10.1 and are as follows:

- ML1: Unattended noise monitoring at the northern boundary of the Proposed Development. The microphone was positioned near Gashes Barn, within the redline boundary of the proposed solar array area. Distant road traffic was audible, bird song and aircraft noise were audible occasionally.
- ML2: Unattended noise monitoring at the western boundary of the Proposed Development. The microphone was positioned north of Ewerby Thorpe Lodge, within the redline boundary of the proposed solar array area. Distant road traffic was audible, bird song and aircraft noise were audible occasionally.
- ML3: Unattended noise monitoring at the south-western boundary of the Proposed Development. The microphone was positioned north of Ewerby Thorpe Lodge, within the redline boundary of the proposed solar array area. During the site visit activities from the farm yard to the west were audible, additionally very distant road traffic was audible, bird song and aircraft noise were audible occasionally.
- ML4: Unattended noise monitoring at the southern boundary of the proposed Development. The microphone was positioned north of Ewerby Thorpe Lodge, within the redline boundary of the proposed solar array area. During the site visit activities from the farm yard to the south were audible, additionally bird song and aircraft noise were audible occasionally.

10.5.3 Noise monitoring was undertaken for a 24-hour period to reflect the continuous operational hours of the Proposed Development.

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

10.5.5 The monitoring equipment used is as follows:

- Fusion SLM SN:10717
- Fusion SLM SN:10711
- Fusion SLM SN:12639
- Cube SLM SN:12197
- 01dB Cal21 Calibrator SN:34254653
- Cirrus CR:515 Calibrator SN:67438

10.5.6 The weather conditions during the survey are as follows:

- Wind speeds: 0-5 m/s
- No precipitation
- Sunny, scattered clouds
- Temperature: 14˚C - 22 ˚C

10.5.7 The sound level meters were calibrated to a reference level of 94dB at 1kHz both before and on completion of the noise survey. No drift in calibration over 0.5dB was recorded during the survey.

10.5.8 A-weighted L_{eq} and L_{90} noise levels have been measured to comply with the requirements of BS4142. A-weighted maximum sound pressure levels were also measured to provide additional information.

Existing Measured Noise Levels

10.5.9 When establishing baseline sound levels for the purpose of assessing the potential noise impact during the construction and decommissioning phases, the sound levels at each monitoring location during the 0700 and 1900 hours period have been considered.

10.5.10 For the purpose of assessing operational noise impacts, the periods specified in BS 4142 have been split further to reflect each possible operation scenario of the Proposed Development depending on whether daylight is present.

10.5.11 The five assessment scenarios and time ranges have been identified in Table 10.7, below.

Table 10.7 – Operation Scenarios and Time Frames

PERIOD	DAYTIME			NIGHT-TIME	
Time	07:00 – 19:00	19:00 – 22:00	22:00 – 23:00	23:00 – 04:00	04:00 – 07:00
Battery and Energy Storage System (BESS) Operation	Yes	Yes	Yes	Yes	Yes
Solar Farm Operation	Yes	Yes	No	No	Yes

10.5.12 As an initial robust worst case, short duration periods of early morning sunrise/late night sunset have been included in the operational scenarios identified in Table 10.7.

10.5.13 The results of each of the monitoring locations are presented in Table 10.8. The noise monitoring results are provided in full at Appendix 10.2.

10.5.14 To assess the operational phase, the measured sound levels presented in Table 10.8 have been defined in 1-hour periods for daytime and the over 15-minute periods for night-time respectively, in accordance with reference periods required by BS 4142.

Table 10.8– Measured Noise Levels

MONITORING LOCATION	TIME	AVERAGE MEASURED AMBIENT NOISE LEVEL (dB LAEQ,T)	MEASURED BACKGROUND NOISE LEVEL (dB LA90,T)	
ML1	Daytime (07:00-19:00)	49	26-41	35
	Daytime (19:00-22:00)	36	25-37	27
	Daytime (22:00-23:00)	28	24-27	25
	Night-time (23:00-04:00)	25	20-26	21

MONITORING LOCATION	TIME	AVERAGE MEASURED AMBIENT NOISE LEVEL (dB LAEQ,T)	MEASURED BACKGROUND NOISE LEVEL (dB LA90,T)	
	Night-time (04:00-07:00)	45	23-32	29
ML2	Daytime (07:00-19:00)	52	27-43	33
	Daytime (19:00-22:00)	45	26-32	28
	Daytime (22:00-23:00)	41	24-28	26
	Night-time (23:00-04:00)	41	21-27	23
	Night-time (04:00-07:00)	47	28-33	29
ML3	Daytime (07:00-19:00)	49	31-44	37
	Daytime (19:00-22:00)	50	34-48	34
	Daytime (22:00-23:00)	37	25-34	34
	Night-time (23:00-04:00)	31	22-29	25
	Night-time (04:00-07:00)	46	29-41	38
ML4	Daytime (07:00-19:00)	51	29-43	37
	Daytime (19:00-22:00)	47	25-37	30
	Daytime (22:00-23:00)	26	24-26	25
	Night-time (23:00-04:00)	27	23-26	24
	Night-time (04:00-07:00)	46	24-44	31

Sensitive Receptors

10.5.15 The representative ESRs nearest to the Proposed Development were identified through a desktop study of the surrounding land using available maps and aerial photography. The ESRs identified in Table 10.9 and shown on Figure 10.1 are those ESRs most likely to be affected by noise from the Proposed Development. The locations chosen for the ESRs are those likely to experience the greatest impact due to noise emissions during the construction/decommissioning and operational phase of the Proposed Development.

Table 10.9– Existing Sensitive Receptors

RECEPTOR ID	RECEPTOR ADDRESS	GRID CO-ORDINATES		BEARING FROM SITE	DISTANCE TO SITE BOUNDARY (m)	RECEPTOR SENSITIVITY
		LAT	LONG			
R1	The Farm Kitchen Limited, Thorpe Rd, Ewerby Thorpe, Sleaford NG34 9PR	53.01435	0.30989	East	70	Medium
R2	Ewerby Thorpe Lodge	53.01464	0.31021	East	50	Medium
R3	Austhorpe Top House, Sleaford NG34 9PR	53.01483	0.31237	East	165	Medium
R4	Copperhill Kennels Cattery	53.02181	0.30569	North	30	Medium
R5	Cooks Farm House, Ewerby Waithe, Sleaford NG34 9PS	53.02456	0.30523	North	125	Medium
R6	Gashes Barn, Ewerby Waithe, Sleaford, NG34 9PS	53.02456	0.28268	Middle	115	Medium
R7	West Grange, Howell, Sleaford NG34 9PT	53.00291	0.30801	South	25	Medium
R8	Fen Farm Sleaford NG34 9PU	53.01039	0.28223	South	30	Medium

10.5.16 Sensitive dwellings and community facilities beyond the selected ESRs could also be affected by noise from the Proposed Development. However, the impacts at the other ESRs will be less than those experienced at the ESRs identified, above. Mitigation will be developed to reduce impacts to acceptable levels at the above ESRs which will ensure that effects at other ESRs are not significant.

Uncertainty

10.5.17 To reduce measurement uncertainty, the following steps have been taken:

- The background sound measurement locations were selected to be representative of the background sound levels at ESRs;
- Wind was typically from the south west during the survey which is indicative of the prevailing wind direction[1], and is therefore inclusive of ambient road traffic noise from the A17, which is over 1.3km away.
- In accordance with guidance, the sound level meter was mounted on a tripod 1.5m above the ground. The monitoring location was also more than 3.5m from any other reflecting surfaces;
- The noise measurements were taken during dry and calm weather conditions;

[1] https://windy.app/forecast2/spot/480925/Sleaford/statistics

- The noise measurements were undertaken during proposed operational times and are representative of the daytime and night-time periods;
- The results of each measurement period were recorded to the nearest 0.1dB; and,
- Background sound measurements were made using Class 1 integrating sound level meters.

Uncertainty in Calculations

10.5.18 Calculation methodologies for noise propagation is based on computer noise modelling algorithms which follow BS9613. Calculation methodologies for the assessment follow methodology in BS4142.

10.5.19 Baseline noise measurements made in July 2023 are considered to be representative of the area and are not expected to significantly change so are suitable for use as future baseline.

10.6 Assessment of Effects

Embedded Mitigation

10.6.1 On the Full Extents Layout (Figure 1.4) the BESS and substation have been located within the centre of the Site in order to maximise the distance from ESRs.

10.6.2 In accordance with BS 5228-1, the construction phase assessment has been undertaken on the assumption that no mitigation will be in place. Required mitigation is then identified and set out within Section 10.7.

Assessment of Effects

Construction Phase

10.6.3 Noise and vibration impacts during the construction phase will be caused by works activities associated with site preparation, plant installation, cable laying and decommissioning.

10.6.4 The above activities have the potential to generate short-term increases in noise levels above those recommended in BS 5228-1. The levels of noise received at the ESRs closest to the Proposed Development phases would depend on the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.

10.6.5 Based on the ambient noise levels measured, the appropriate category value has been determined for each of the ESRs, as detailed in Table 10.9. Details of the noise survey carried out at the ESRs are set out in Section 10.5 of this Chapter.

Table 10.10– Construction Noise Assessment Criteria

MONITORING LOCATION	EXISTING SENSITIVE RECEPTOR LOCATION	AVERAGE MEASURED DAYTIME (07:00-19:00) NOISE LEVELS dB $L_{AEQ,T}$	AMBIENT NOISE LEVEL ROUNDED TO THE NEAREST 5dB L_{AEQ}	APPROPRIATE CATEGORY VALUE A, B OR C IN ACCORDANCE WITH BS5228-1	NOISE LEVEL AT WHICH THE CONSTRUCTION PHASE ACTIVITIES MAY CAUSE A SIGNIFICANT EFFECT AT THE RECEPTOR dB L_{AEQ}
ML1	ESR6	49	50	A	65
ML2	ESR1, ESR2, ESR3, ESR4, ESR5	52	50	A	65
ML3	ESR7	49	50	A	65
ML4	ESR8	51	50	A	65

10.6.6 Noise generated by the earthworks and construction phases of the Proposed Development may have a short-term, adverse effect at the above ESRs. However, the construction activities would be transient as the works will progress through the Site or along the cable route.

10.6.7 At the time of writing, the details of the cable route and bespoke access road are not known, however as a robust approach, it will be assumed that any ESRs near to the Cable Route Corridor and Access Route Corridor will have low background levels and the most stringent BS5228 category will be used in the assessment (Category A).

10.6.8 Activities on the Site that could give rise to construction noise impacts could include (but are not limited to):

- Construction of the inverters and transformers;
- PV module construction;
- construction of the BESS;
- Cable installation; and
- Horizontal Directional Drilling (HDD).

10.6.9 The above activities have the potential to generate short-term increases in noise levels above those recommended in BS 5228-1. Potential plant that can be used to undertake the construction works are shown in Table 10.11 and predicted noise levels are shown in Table 10.12. The duration for each activity is not currently known, but it has been assumed that each activity will not take more than one month at any one location. Construction noise predictions have been undertaken to present a worst-case scenario where all plant is operational concurrently.

Table 10.11– Plant List

ACTIVITY	PLANT NAME	BS 5228 REFERENCE	SOUND POWER L_W (DBA)	QUANTITY
Construction of inverters and transformers	Tracked excavator	C.2.14	107	1
	Wheeled loader	C.2.27	108	1
	Wheeled mobile telescopic crane	C.4.38	112	1
	Dump truck (tipping fill)	C.2.30	107	2
	Telescopic handler	C.2.35	99	1
	Cement mixer truck (discharging)	C.4.18	103	1
PV Module Construction	Articulated dump truck	C.5.16	104	1
	Wheeled mobile telescopic crane	C.4.38	106	1
	Diesel generator	C.4.85	94	1
	Continuous flight auger piling	C.3.17	104	1
	Cement mixer truck (discharging)	C.4.18	103	1
	Dumper	C.4.9	105	1
Construction of BESS and main substation	Tracked excavator	C.2.14	107	2
	Lorry	C.2.34	108	4
	Telescopic handler	C.2.35	99	2
	Continuous flight auger piling	C.3.17	104	1
	Wheeled mobile crane	C.3.30	98	4
	Hand-held welder (welding piles)	C.3.31	101	4
	Generator for welding	C.3.32	101	4
	Gas cutter	C.3.34	96	4
	Mobile telescopic crane	C.4.41	99	2
	Lifting platform	C.4.57	95	4
	Site lift for workers	C.4.62	94	4
	Diesel generator	C.4.85	94	2

ACTIVITY	PLANT NAME	BS 5228 REFERENCE	SOUND POWER L_W (DBA)	QUANTITY
Cable Installation	Tracked excavator	C.4.63	105	1
	Wheeled backhoe loader	C.4.66	97	1
	Dumper	C.4.9	105	2
	Telescopic handler	C.4.55	98	1
	Vibratory roller	C.5.27	95	1
Horizontal Directional Drill	Directional drill	C.2.44	105	1
	Water pump	C.2.45	93	1
	Tracked excavator	C.2.14	107	1
	Drilling Rig	C.3.15	110	1

Table 10.12– Construction Noise Predictions

RECEIVER	CONSTRUCTION PHASE NOISE LEVELS DB $L_{AEQ,T}$				
	Construction Of Inverters And Transformers	Pv Module Construction	Construction Of Bess And Main Substation	Cable Installation	Horizontal Directional Drill
R1	70	66	47	64	67
R2	71	66	47	65	67
R3	59	54	45	53	55
R4	77	73	48	71	74
R5	62	57	46	56	58
R6	63	58	46	57	59
R7	79	78	47	73	76
R8	48	47	42	42	44

10.6.10 The affected ESRs are of Medium sensitivity, in accordance with Table 10.6. It is considered that the magnitude of the noise impact will be Small, in accordance with Table 10.6. Where construction activities take place in one location for a period greater than one month, the magnitude of the noise impact would be Medium.

10.6.11 For reference cable laying and solar array construction are expected to progress fast and might be under one month duration at any one location. Substation and BESS construction are expected to be of longer duration than one month.

10.6.12 It is considered that the effect would be Moderate to Substantial adverse (where construction activities take place in one location for a period greater than one month), therefore construction and decommissioning activities have the potential to be Significant, when considered in accordance with Table 10.6.

10.6.13 To mitigate noise impacts, best working practice will be adopted (see Section 10.7 of this Chapter).

Vibration from Construction Phase Activities

10.6.14 BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. BS 5228 also indicates that it is likely that vibration of 1.0 mm/s in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents. The standard also indicates that 10 mm/s is likely to be intolerable for any more than a very brief exposure to this level.

10.6.15 The Highways Agency Research Report No. 53 Ground Vibration caused by Civil Engineering Works (1986) suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.

10.6.16 BS 6472: 2008 Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting (BS 6472-1) suggests that adverse comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec. Continuous vibration is defined as “vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours”. The proposed earthworks and construction work at the Site will not cause continuous vibration as defined in BS6472-1.

10.6.17 Human perception of vibration is extremely sensitive. People can detect and be annoyed by vibration before there is any risk of structural damage. Cases where damage to a building have been attributed to vibration alone are extremely rare, even when vibration has been considered to be intolerable by the occupants.

10.6.18 It is not possible to establish exact vibration damage thresholds that may be applied in all situations. The likelihood of vibration induced damage or nuisance will depend upon the nature of the source, the characteristics of the intervening solid and drift geology and the response pattern of the structures around the Site. Most of these variables are too complex to quantify accurately and thresholds of damage, or nuisance, are therefore conservative estimates based on a knowledge of engineering.

10.6.19 BS 5228-2 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).

10.6.20 WA's archives contain field trial measurements of ground vibration associated with types of machinery likely to be used during the construction of the Proposed Development. The representative measured levels made by WA using a Vibrock B801 Digital Seismograph are set out in Table 10.13, below.

Table 10.13– Construction Vibration Predictions

PLANT TYPE	DISTANCE FROM SOURCE		
	10m (mm/s)	20m (mm/s)	30m (mm/s)
25-30 tonne excavator	0.175	0.075	Background
25 tonne dumptruck (Volvo A25):			
Loaded	1.000	0.150	Background
Empty	0.225	0.050	Background
Dozer	1.050	0.400	Background
Vibrating roller drum:			
Vibrator on	4.470	3.270	2.350
Vibrator off	0.500	0.150	0.050
Loading shovel	1.025	0.150	Background

10.6.21 Vibration generated by the construction phase of the Proposed Development may have a short-term, adverse effect at the ESRs. The nearest ESR has been identified to be 25m away from the Proposed Development and it is considered unlikely that the construction activities will generate vibration levels in excess of those detailed in Table 10.13, above.

10.6.22 The affected ESR is of Medium sensitivity, in accordance with Table 10.5. It is considered the magnitude of vibration impact will be Small due to the distance of ESR to the Proposed Development and the short duration of impacts as the works are transient. Therefore, it is anticipated that the effect of vibration during construction would be Moderate Adverse and Not Significant, in accordance with Table 10.6.

10.6.23 Owing to the distance of the ESRs from the Proposed Development and construction lasting for short periods at any one location, it is considered that vibration does not need to be considered further as the effects are not expected to be Significant, nor last longer than 1 month at any one location.

Operational Phase

Identification of the Specific Sound

10.6.24 The Full Extents Layout, considered as a worst case within this PEIR, shows a total of 119 transformers spread out across the Site. The BESS consists of 204 battery containers and 204 transformers. Site layout and plant location is shown on Figure 10.1. The potential noise impact from the solar farm has been assessed using plant data provided by the Applicant.

10.6.25 Noise modelling software SoundPLAN 8.2 has been used to calculate the operational noise impacts at the ESRs. The assessed plant is summarised in

Table 10.14, below, and the locations of the equipment and ESRs are shown on Figure 10.1.

Table 10.14: Operational Source Noise Levels

EQUIPMENT	QUANTITY	SOUND POWER LEVEL	OPERATIONAL TIME
Solar Transformers	119	95.8	04:00 – 22:00
BESS Transformers	204	95.0	00:00 – 24:00
Battery Containers	204	72.0	00:00 – 24:00

10.6.26 For the purpose of this assessment, it has been assumed that the transformers will operate during the times of sunlight, between 04:00 hours and 22:00 hours as worst-case scenario, representing the longest day of the year. An assumption has also been made that the BESS will operate continuously during the day and night-time.

Identification of the background sound level

10.6.27 Section 8 of BS 4142 provides guidance on the selection of the background sound to be used in the assessment. BS 4142 states that the background sound levels used for the assessment should be representative of the period being assessed (i.e. daytime or night-time periods) and that there is no 'single' background sound level.

10.6.28 For the purpose of the assessment, a range of background sound levels during the day and night-time periods, measured at monitoring locations 1-4, have been used to represent different periods. The data collected is considered representative of the $L_{A90,1\ hour}$ daytime and $L_{A90,15\ minutes}$ night-time, background sound levels at ESRs. The background sound levels measured throughout the daytime and night-time have been determined for each monitoring location and are summarised in Table 10.15, below.

Table 10.15: Background Sound Levels at Existing Sensitive Receptors

MONITORING LOCATION	RECEPTOR	BACKGROUND NOISE LEVEL				
		Daytime $L_{A90,\ 1hr}$ (07:00-19:00)	Daytime $L_{A90,\ 1hr}$ (19:00-22:00)	Daytime $L_{A90,\ 1hr}$ (22:00-23:00)	Night-time $L_{A90,\ 15min}$ (23:00-04:00)	Night-time $L_{A90,\ 15min}$ (04:00-07:00)
ML1	ESR6	35	27	25	21	29
ML2	ESR1, ESR2, ESR3, ESR4, ESR5	33	28	26	23	29
ML3	ESR7	37	34	34	25	38
ML4	ESR8	37	30	25	24	31

Application of Weighting for Characteristics of Specific Sound

10.6.29 BS 4142 includes guidance on the application of additional weighting to be applied in cases where the industrial noise is considered to be either 'tonal', 'impulsive', 'intermittent' or 'other sound characteristics' at an ESR.

10.6.30 No penalty for impulsivity or intermittency has been applied as the operation of the plant does not give rise to such characteristics. The proposed plant would produce noise that is broadband in nature, and equipment selection will ensure there are no significant tonal characteristics.

10.6.31 A penalty of +3dB has however been applied as the sound emitted from the proposed plant will be clearly audible at the ESRs and is distinctive from the current noise climate in the area.

10.6.32 The initial daytime and night-time BS 4142 results are summarised in Tables 10.16 to 10.20, below.

Table 10.16: Initial BS4142 Assessment of the Noise from the Proposed Development as received at ESRs during the Daytime between 07:00 and 19:00 (Solar Panels and BESS)

Receptors Location	Daytime (dBA) (07:00 – 19:00)							
	ESR1	ESR2	ESR3	ESR4	ESR5	ESR6	ESR7	ESR8
Specific Level – $L_{Aeq,t}$	45	45	43	46	44	44	41	45
Acoustic Feature Correction	+3							
Calculated Rating Level	48	48	46	49	47	47	44	48
Background Sound Level – $L_{A90,t}$	33	33	33	33	33	35	37	37
Exceedance	+15	+15	+13	+16	+14	+12	+7	+11
Effect Level	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Between LOAEL and SOAEL	Above SOAEL

Table 10.17: Initial BS4142 Assessment of the Noise from the Proposed Development as received at ESRs during the Daytime between 19:00 and 22:00 (Solar Panels and BESS)

Receptors Location	Daytime (dBA) (19:00 – 22:00)							
	ESR1	ESR2	ESR3	ESR4	ESR5	ESR6	ESR7	ESR8
Specific Level – $L_{Aeq,t}$	45	45	43	46	44	44	41	45
Acoustic Feature Correction	+3							
Calculated Rating Level	48	48	46	49	47	47	44	48
Background Sound Level – $L_{A90,t}$	28	28	28	28	28	27	34	30
Exceedance	+20	+20	+18	+21	+19	+20	+10	+18
Effect Level	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Between LOAEL and SOAEL	Above SOAEL

Table 10.18: Initial BS4142 Assessment of the Noise from the Proposed Development as received at ESRs during the Daytime between 22:00 and 23:00 (BESS only)

Receptors Location	Daytime (dBA) (22:00 – 23:00)							
	ESR1	ESR2	ESR3	ESR4	ESR5	ESR6	ESR7	ESR8
Specific Level – $L_{Aeq,t}$	43	43	42	44	42	41	37	43
Acoustic Feature Correction	+3							
Calculated Rating Level	46	46	45	47	45	44	40	46
Background Sound Level – $L_{A90,t}$	26	26	26	26	26	25	34	25
Exceedance	+20	+20	+19	+21	+19	+19	+6	+21
Effect Level	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Between LOAEL and SOAEL	Between LOAEL and SOAEL	Above SOAEL

Table 10.19: Initial BS4142 Assessment of the Noise from the Proposed Development as received at ESR during the Night-time between 23:00 and 04:00 (BESS only)

Receptors Location	Night-time (dBA) (23:00 – 04:00)							
	ESR1	ESR2	ESR3	ESR4	ESR5	ESR6	ESR7	ESR8
Specific Level – $L_{Aeq,t}$	43	43	42	44	42	41	37	43
Acoustic Feature Correction	+3							
Calculated Rating Level	46	46	45	47	45	44	40	46
Background Sound Level – $L_{A90,t}$	23	23	23	23	23	21	25	24
Exceedance	+23	+23	+22	+24	+22	+23	+15	+22
Effect Level	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Between LOAEL and SOAEL	Between LOAEL and SOAEL	Above SOAEL

Table 10.20: Initial BS4142 Assessment of the Noise from the Proposed Development as received at ESR during the Night-time between 04:00 and 07:00 (Solar Panels and BESS)

Receptors Location	Night-time (dBA) (04:00 – 07:00)							
	ESR1	ESR2	ESR3	ESR4	ESR5	ESR6	ESR7	ESR8
Specific Level – $L_{Aeq,t}$	45	45	43	46	44	44	41	45
Acoustic Feature Correction	+3							
Calculated Rating Level	48	48	46	49	47	47	44	48
Background Sound Level – $L_{A90,t}$	29	29	29	29	29	29	38	31
Exceedance	+19	+19	+17	+20	+18	+18	+6	+17
Effect Level	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Above SOAEL	Between LOAEL and SOAEL	Above SOAEL

10.6.33 The results in Table 10.16 to Table 10.20 indicate that, during the operational phase, the predicted rating level likely to be generated by the Proposed Development will exceed the background noise levels at all ESRs.

10.6.34 In summary, it has been found that noise from the Proposed Development, based on the 'worst case' Full Extents Layout, would exceed the background sound level at all ESRs by +6 to 23dB during all time periods, thereby exceeding the LOAEL. Furthermore, with the exception of ESR6, the SOAEL

is exceeded both during the day and night time periods. This is an indication that the worst case impact of the Proposed Development will be large resulting in a Substantial Adverse effect which is Significant in EIA terms. Refinement of the site design and equipment selection is therefore ongoing and is discussed further under the additional mitigation in section 10.7 below.

Decommissioning Phase

10.6.35 The decommissioning phase will have a similar scope and duration as the construction phase. The future baseline during the year of decommissioning is likely to be broadly similar in nature and level to that measured during the 2023 baseline survey. As such the sensitivity and threshold of significance will be the same and the assessment of effects mirror those reported for the construction phase.

10.7 Mitigation

Construction Phase

10.7.1 To reduce the potential impact of noise and vibration generated by the construction phase of the Proposed Development at ESR locations in the immediate vicinity of the Site, mitigation measures in the form of good practice are suggested and Construction Environmental Management Plan ('CEMP') will be implemented to further reduce the potential impacts.

10.7.2 Best working practice will be implemented during each phase of the earthworks and construction works at the Site. The construction works will follow the guidelines in BS 5228 and the following measures will be put in place in the CEMP, to minimise impacts:

- All plant and machinery will be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;
- A Programme of all works to be distributed to all identified sensitive receptors in the area and updated as the scheme progresses.
- Broadband reversing alarms will be chosen instead of tonal alarms;
- Site staff will be made aware that they are working adjacent to a residential area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
- A further measure to reduce noise levels at the ESRs will include, as far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same ESR;
- Adherence to the restriction of operating hours imposed by Lincolnshire County Council;
- Ensure engines are turned off when possible;
- Should construction activities need to be carried out during night-time hours, this will be discussed with the local authority; and
- Where noise and vibration levels have the possibility to exceed the threshold of significant adverse effect, bespoke monitoring to be undertaken at the ESR to ensure that levels are not exceeded.

Operational Phase

10.7.3 The initial assessment indicates that mitigation measures will be required in order to reduce the Significant Adverse effect predicted during the operational phase of the Proposed Development. Noise associated with the operation of the Proposed Development (inverters, transformers and battery storage containers) can be reduced implementing one or a combination of the following:

- Changes to equipment location and numbers.
- Placement of Noise Barriers,
- Sourcing 'silenced' or quieter equipment,
- Use of alternative equipment such as string inverters.

10.7.4 The number, location or sound characteristics of String Inverters or alternative equipment is not currently available and as such a scheme of mitigation will be developed using a combination of some or all of the above measures.

Decommissioning Phase

10.7.5 To reduce the potential impact of noise and vibration generated by the decommissioning phase of the Proposed Development at ESR locations in the immediate vicinity of the Site, mitigation measures as proposed during the decommissioning phase in the form of good practice are suggested and an Environmental Management Plan should be implemented to further reduce the potential impacts.

10.7.6 Mitigation measures for the decommissioning phase will be secured through the Decommissioning Environmental Management Plan (DEMP).

10.8 Residual Effects

Construction phase assessment

10.8.1 A Construction Environmental Management Plan (CEMP) will need to be implemented prior to the commencement of any construction works. This will ensure best practice means are followed and will reduce the impact of noise and vibration from earthworks and construction. The magnitude of impact is considered to be Negligible and the effect is considered to be None with site specific mitigation measures in place. The site-specific mitigation would ensure that there is no significant effect.

Operational phase assessment

Solar and BESS Operations

10.8.2 Further investigation and assessment of mitigation measures described in 10.7.3 above will take place to enable to preparation of a revised mitigation scheme (further to the initial Mitigation Layout included at Appendix 1.5). This layout will be considered within the ES to ensure the residual effects reduce below Substantial Adverse and Significant.

Decommissioning phase assessment

10.8.3 A Decommissioning Environmental Management Plan (DEMP) will need to be implemented prior to the commencement of any decommissioning works. This

will ensure best practice means are followed and will reduce the impact of noise and vibration from earthworks and plant removal. The magnitude of impact is considered to be Negligible and the effect is considered to be None with site specific mitigation measures in place. The site-specific mitigation would ensure that there is no significant effect.

10.9 Assessment of Cumulative Effects

Inter-Cumulative Effects

10.9.1 There are no other noise sources in close proximity to the Proposed Development for cumulative noise impacts to occur at the ESRs.

10.9.2 It is considered that there could be significant effects in-combination with Heckington Fen, if there is overlap between construction of both cable routes. However, it is considered that this can be mitigated through control of timings of works in proximity to one another.

Intra-Cumulative Effects

10.9.3 The initial findings reported in the technical chapters of this PEIR have been considered to identify potential interactions with Noise and Vibration effects upon single receptors.

10.9.4 The initial review identified the following other types of environmental effects, that interact with single receptors:

- Ecology: Potential ecological effects as a result of increased noise and vibration have been considered within Chapter 7 Ecology, which concluded that these effects will not be significant.
- Landscape & Visual: Noise effects can impact upon landscape character, and noise mitigation can have visual impacts. As the design process is ongoing these potential effects will be considered within the ES.
- Cultural Heritage: Potential effects on heritage assets as a result of increased noise and vibration have been considered within Chapter 9 Cultural Heritage, which concluded that these effects will not be significant.

10.10 Summary

10.10.1 This Chapter describes an assessment of the potential noise and vibration impacts associated with the Proposed Development. To establish baseline noise levels at a number of ESRs, an unattended noise survey was carried out in 2023. The potential noise and vibration impacts upon the ESRs with regard to construction, operational and decommissioning activities associated with the Proposed Development have been considered and have been assessed using appropriate guidance. A robust, ‘worst-case’ scenario has been considered with the Solar Array Area operating fully. Mitigation measures are required to control potential noise levels from the Proposed Development, details of such measures require further consideration.

10.10.2 A summary of the likely significant residual effects of the Proposed Development on the receptors considered within this chapter are summarised in Table 10.21 at the end of this section.

Noise from Construction Phase Activities

10.10.3 During the construction phase, any work carried out at the Site may generate noise that may propagate beyond the redline boundary. The affected ESRs are of Medium sensitivity, in accordance with Table 10.5. It is considered that the magnitude of the noise impact will be Small in accordance with Table 10.6. Therefore, it is considered that the effect of construction noise would be Moderate Adverse and Not Significant.

10.10.4 Where construction activities occur for more than a month in close proximity to an individual receptor, there is a possibility of a medium magnitude of impact which would be a substantial adverse effect.

10.10.5 To minimise the potential levels of noise generated by the construction works, best working practice will be put in place and construction works will follow the guidelines in BS5228-1. This will be secured by way of a CEMP.

10.10.6 Once mitigation measures following best practice and guidance in the bespoke CEMP are implemented, all noise impacts will be reduced to Small or Negligible magnitude which are a moderate adverse effect and not significant.

Vibration from Construction Phase Activities

10.10.7 During the construction phase, any work carried out at the Site may generate vibration that may propagate beyond the redline boundary. However, due to the distance of the ESRs, this is unlikely to be felt. The affected ESR are of Medium sensitivity, in accordance with Table 10.5. It is considered the magnitude of vibration impact will be Small due to the distance of ESRs to the Proposed Development and the short duration of impacts as the works progress through the Site, in accordance with Table 10.3. Therefore, it is considered that the effect of vibration during construction would be Moderate Adverse and Not Significant, in accordance with Table 10.6.

10.10.8 Mitigation implemented during construction as defined in the CEMP, would likely result in the magnitude of any impact from vibration be Negligible and the Effect would be None.

Noise from the Operational Phase

10.10.9 Prediction calculations have been carried out to determine the noise levels likely to be generated by the Proposed Development at each of the ESRs. Noise levels have been predicted based on data provided by the Applicant.

10.10.10 Based on the initial assessment undertaken in accordance with BS4142, it has been found that there is a potential for operational noise levels to exceed background levels and the SOAEL during the daytime, evening and night-time periods at the ESRs located closest to the Proposed Development. The affected ESRs are of Medium sensitivity, in accordance with Table 10.5. It is considered the magnitude impact during operation will be Large in accordance with Table 10.4. Therefore, it is considered that the effect of the Proposed

Development during the operational phase would be Substantial and Significant, in accordance with Table 10.6.

10.10.11 Mitigation proposals will be developed in order to reduce overall noise levels from the Proposed Development to ensure the residual effects reduce below Substantial Adverse and Significant.

Noise from the Decommissioning Phase

10.10.12 Noise impacts during the decommissioning phase will be similar in scope and duration to those defined in the Construction Phase.

Table 10.21: Discipline - Summary Assessment Matrix

Issue	Description of Impact	Geographical Significance							Impact	Nature	Significance	Mitigation Measures
		I	N	R	C	D	P	L				
Noise & Vibration												
Effect of increased noise levels from the Proposed Development	Operation: Long term impact on the nearby noise sensitive receptors during the day and night during the operational phase due to industrial noise from electrical components installed.							X	Substantial Adverse	Lt, R	Significant	Use of barriers, change in equipment type and location will be developed in a mitigation plan

Key:
Geographical Significance: I = International N = National R = Regional C = County D = District P = Parish L = Low to Local
Nature: St = Short Term Mt = Medium Term Lt = Long Term R = Reversible Ir = Irreversible

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