Fosse Green Energy

# Fosse Green Energy

## Preliminary Environmental Information Report

VOLUME

1

**Chapter 11: Noise and Vibration**

October 2024

Prepared for:

Fosse Green Energy Limited

Prepared by:

AECOM Limited

## Table of Contents



## Tables

# 11. Noise and Vibration

## 11.1 Introduction

11.1.1 This chapter of the Preliminary Environmental Information Report (PEI Report) describes the baseline conditions and findings of an assessment of the likely significant effects from noise and vibration as a result of the Proposed Development. For more details about the Proposed Development, refer to **PEI Report Volume 1, Chapter 3: The Proposed Development**.

11.1.2 This chapter identifies and proposes measures to address the potential impacts and likely significant effects of the Proposed Development on noise and vibration, during the construction, operation, and decommissioning phases of the Proposed Development.

11.1.3 This chapter is supported by the following figures in **PEI Report Volume 2**:

a. **Figure 11-1: Receptor and Noise Monitoring Positions;** and

b. **Figure 11-2: Noise Contours – Operational Phase**.

11.1.4 It is also supported by the following appendices in **PEI Report Volume 3**:

a. **Appendix 11-A: Noise and Vibration Policy and Legislation;**

b. **Appendix 11-B: Acoustic Terminology;**

c. **Appendix 11-C: Baseline Noise Surveys;** and

d. **Appendix 11-D: Construction and Operational Noise Modelling.**

11.1.5 This chapter assesses noise and vibration effects on human receptors and does not include the assessment of noise and vibration on ecological or heritage receptors. Where relevant, the impacts of noise and vibration on heritage receptors would be assessed in **PEI Report Volume 1, Chapter 7: Cultural Heritage**. The impacts of noise and vibration on ecological receptors are assessed in **PEI Report Volume 1, Chapter 8: Ecology and Nature Conservation.**

## 11.2 Legislation and Planning Policy

11.2.1 Legislation, planning policy, and guidance relating to the assessment of Noise and Vibration effects and pertinent to the Proposed Development comprises of the documents listed below. More detail regarding these policies can be found in PEI Report Volume 3, **Appendix 11-A: Noise and Vibration Policy and Legislation.**

### Legislation

a. Control of Pollution Act 1974 (Ref. 11-1); and

b. Environmental Protection Act 1990 (Ref. 11-2).

### National Planning Policy

a. The Overarching National Policy Statement for Energy Infrastructure (NPS EN-1) (2023) (Ref. 11-3);

b. The National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (2023) (Ref. 11-4);

c. National Planning Policy Framework (NPPF) (2023) (Ref. 11-5); and

d. Noise Policy Statement for England (NPSE) (Ref. 11-6).

### Local Policy

a. Central Lincolnshire Local Plan (2023) (Ref. 11-7);

### Guidance

a. Planning Practice Guidance Noise (PPGN) (Ref. 11-8).

b. British Standard (BS) 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1: Noise (Ref. 11-9).

c. BS 5228-2:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration (Ref. 11-10)

d. BS 7445-1:2003 – Description and environment of environmental noise – Part 1: Guide to quantities and procedures (Ref. 11-11).

e. BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound (Ref. 11-12).

f. BS 8233:2014 – Guidance on sound insulation and noise reduction for buildings (Ref. 11-13).

g. World Health Organization Guidelines for Community Noise (Ref. 11-14).

h. Calculation of Road Traffic Noise (Ref. 11-15).

i. Institute of Environmental Management and Assessment Guidelines for Environmental Noise Impact Assessment (IEMA Guidelines) (Ref. 11-16).

## 11.3 Consultation

11.3.1 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023. Comments received in the EIA Scoping Opinion (**PEI Report Volume 3, Appendix 1-B**) in relation to the Noise and Vibration assessment are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses.**

11.3.2 Additional consultation has also been undertaken with North Kesteven District Council (NKDC). A technical note was provided to NKDC on 14 September 2023 detailing the following:

a. Noise and vibration study area;

b. Noise and vibration sensitive receptors; and

c. Noise monitoring locations.

11.3.3 An email response was received dated 13 September 2023 from NKDC confirming that the approach set out in the technical note was acceptable.

## 11.4 Assessment Methodology

11.4.1 This section sets out the scope and methodology for the preliminary assessment of the noise and vibration impacts of the Proposed Development.

### Study Area

11.4.2 The study area was defined to include noise and vibration sensitive receptors likely to be at risk from possible direct and indirect impacts that might arise from the Proposed Development, termed the Zone of Influence (ZoI).

11.4.3 The potential ZoI for construction and decommissioning noise effects from the Principal Site includes receptors within 300m of the Proposed Development, based on the results of preliminary modelling, and based on guidance in BS 5228-1 (Ref. 11-9) which states construction noise predictions are generally reliable up to 300m.

11.4.4 The potential ZoI for operational noise effects from the Principal Site includes receptors within 500m. The ZoI distance of 500 m is based on the results of preliminary modelling, professional judgement, and AECOM's previous experience of co-located solar and BESS projects of this scale. It is considered that receptors further than 500m from the Site Boundary will experience considerably lower levels of noise and vibration emissions as these will attenuate over distance, resulting in negligible noise and vibration effects from the Proposed Development. Therefore, the wider 500 m operational Study Area has been used for both the construction and operational noise and vibration assessment of the Principal Site.

11.4.5 The Study Area for construction and decommissioning noise effects along the Cable Corridor includes receptors within 300m, as per guidance in BS 5228-1 (Ref. 11-9). Additionally, a Study Area of 50m either side of construction traffic routes (see **PEI Report Volume 1, Chapter 13: Traffic and Transport)** has been defined. There will be no noise or vibration from the Cable Corridor during operation, except for occasional minor and temporary maintenance work, and therefore these impacts have been scoped out of the assessment and do not require a ZoI.

11.4.6 The operational and construction Study Areas were agreed in consultation with NKDC as per paragraph 11.3.2.

## Sources of Information

11.4.7 The following sources of information have been used to inform the baseline and preliminary assessment presented within this chapter:

a. **PEI Report Volume 1, Chapter 3: The Proposed Development**, **PEI Report Volume 2, Figure 3-2A: Indicative South Facing Fixed Site Layout Plan,** and **PEI Report Volume 2, Figure 3-2B: Indicative Single Axis Tracker Site Layout Plan** for the noise model;

b. Aerial imagery and OS mapping of the Site and surrounding area to define sensitive receptors and monitoring locations;

c. Plant noise source data were referenced from specification sheets provided by the Applicant and previous co-located solar and BESS project noise assessments;

d. **PEI Report Volume 1, Chapter 3: The Proposed Development** for information on the construction, operation and maintenance, and decommissioning phases of the Proposed Development; and

e. **PEI Report Volume 1, Chapter 13: Traffic and Transport** for information on construction traffic.

## Scope of the Assessment

11.4.8 The following potential impacts have been agreed to be considered as part of the EIA for the Proposed Development for which a preliminary assessment is provided in Section 11.7 of this chapter:

a. During the construction phase:
   i. Construction noise;
   ii. Construction vibration; and
   iii. Construction traffic noise.

b. During operation (and maintenance):
   i. Solar farm and Battery Energy Storage System (BESS) infrastructure noise.

c. During decommissioning activities (to be covered in the ES):
   i. Decommissioning noise;
   ii. Decommissioning vibration; and
   iii. Decommissioning traffic noise.

11.4.9 Through the EIA Scoping process the Planning Inspectorate agreed that the following potential impacts do not need to be considered in detail as part of the EIA for the Proposed Development:

a. During the construction phase:
   i. Construction traffic vibration.

b. During operation (and maintenance):

i. Operational traffic noise; and

ii. Operational vibration.

c. During decommissioning activities:

i. Decommissioning traffic vibration.

11.4.10 The potential impacts identified above are therefore not considered further within the chapter and will not be considered as part of the ES.

## Impact Assessment Methodology

### Sensitive Receptors

11.4.11 Potential sensitive receptors (i.e. buildings whose occupants may be disturbed by adverse noise and vibration levels, and structures that are sensitive to vibration) have been taken into consideration when assessing the effects associated with noise and vibration levels from the construction and operational phases of the Proposed Development.

11.4.12 The type of noise-sensitive receptors that may experience significant effects due to the construction and operation of the Scheme are identified in **Table 11-1**: as either residential or non-residential.

11.4.13 The approach to the assessment of non-residential receptors differs from that adopted for residential receptors. Government policy for noise in the NPSE is based on relationships between noise and health/quality of life, and noise insulation of a typical dwelling and is not considered applicable to non-residential receptors.

11.4.14 Non-sensitive locations include those where no human or other noise-sensitive activity takes place, or where such activity would not be affected by noise from the Proposed Development, such as barns, outbuildings, or industrial facilities.

**Table 11-1: Receptor Types**

| Receptor Group | Receptors in Group |
|---|---|
| Residential | Individual dwellings and private open spaces (e.g. gardens) |
| Non-residential | Non-residential community facilities such as schools, hospitals, places of worship, and noise sensitive commercial properties |

11.4.15 The effects of noise and vibration generated during the construction, decommissioning and operational phases of the Proposed Development are considered at nearby sensitive receptors. A number of receptors that may potentially be affected have been considered in this assessment. When considering groups of properties as a single receptor, noise and vibration is assessed at the nearest receptor to the Site (i.e. the receptor that will experience the highest levels of noise and vibration). Although noise and vibration may be perceivable at other receptors in each identified receptor group, effects will not be significant if they are suitably controlled at the identified sensitive receptors.

11.4.16 Noise-sensitive receptors have been identified through a desktop study of aerial imagery and mapping and are presented in **PEI Report Volume 2**, **Figure 11-1: Receptor and Noise Monitoring Locations** and are summarised in **Table 11-2**. The selection of receptors presented was agreed with the Local Planning Authorities through the EIA Scoping process and therefore includes some receptors that sit outside of the defined study area. The receptors will be reviewed in the ES once the Site Boundary has been finalised for the DCO application.

**Table 11-2: Sensitive Receptors**

| Receptor ID | Name | Approximate Coordinates | Receptor Type | Distance (where relevant) | |
|---|---|---|---|---|---|
| | | | | Solar and Energy Storage Park | Grid Connection Corridor |
| R1 | Grocock's Farm, Aubourn | 53.137760°, -0.609023° | Residential | 210m | 70m |
| R2 | Marlborough Farm, Aubourn | 53.140671°, -0.607029° | Residential | 600m | - |
| R3 | Larkers Farm, Fen Lane | 53.133067°, -0.623558° | Residential | 160m | - |
| R4 | Grange Farm, Linga Lane | 53.129517°, -0.621214° | Residential | 570m | - |
| R5 | North Field Farm, Aubourn Road | 53.138730°, -0.630897° | Residential | 100m | - |
| R6 | Fen Lane Properties | 53.135387°, -0.631533° | Residential | 140m | - |
| R7 | Northeast Bassingham Properties | 53.132631°, -0.633605° | Residential | 365m | - |
| R8 | West Bassingham Properties/ Saint Michael and All Angels Church | 53.127890°, -0.643638° | Residential/ Place of Worship | 190m | - |
| R9 | River Farm, Thurlby Road | 53.134280°, -0.647263° | Residential | 150m | - |
| R10 | Church Farm, Thurlby Road | 53.134169°, -0.656515° | Residential | 100m | - |
| R11 | River Farm, Norton Disney | 53.128498°, -0.656466° | Residential | 120m | - |
| R12 | Norton Disney Properties | 53.121832°, -0.671720° | Residential | 320m | - |
| R13 | Tonges Farm, Swinderby Road | 53.129815°, -0.668917° | Residential | 100m | - |

| Receptor ID | Name | Approximate Coordinates | Receptor Type | Distance (where relevant) | |
|---|---|---|---|---|---|
| | | | | Solar and Energy Storage Park | Grid Connection Corridor |
| R14 | Thurlby Road Properties | 53.142306°, -0.669787° | Residential | 850m | - |
| R15 | South Witham St Hughs Properties | 53.145620°, -0.662324° | Residential | 190m | - |
| R16 | Thurlby Receptors | 53.143034°, -0.645155° | Residential | 400m | - |
| R17 | Bassingham Road Properties | 53.139776°, -0.645592° | Residential | 210m | - |
| R18 | Witham Farm, Aubourn Road | 53.136541°, -0.639289° | Residential | 400m | - |
| R19 | East Witham St Hughs Properties | 53.151055°, -0.654135° | Residential | 100m | - |
| R20 | Northam Witham St Hughs Properties | 53.153993°, -0.654110° | Residential | 120m | - |
| R21 | Sheepwalks Farm, Witham St Hughs | 53.157544°, -0.656726° | Residential | 250m | - |
| R22 | Halfway Farm, Ramper Cottage, Newark Road | 53.155845°, -0.673569° | Residential | 280m | - |
| R23 | High Walks Farm, Stone Lane | 53.158374°, -0.647140° | Residential | 100m | - |
| R24 | Corner Farm, Haddington | 53.156450°, -0.636903° | Residential | 530m | - |
| R25 | Haddington Properties | 53.156269°, -0.631972° | Residential | 490m | - |
| R26 | Grange Cottage, Bassingham Road | 53.149064°, -0.631083° | Residential | 50m | - |
| R27 | Sky Lane Properties | 53.166608°, -0.638620° | Residential | 110m | |
| R28 | Crossways Farm, Old Haddington Lane | 53.168083°, -0.641319° | Residential | 170m | |
| R29 | South Thorpe on the Hill Properties | 53.176145°, -0.642586° | Residential | 110m | |
| R30 | West Thorpe on the Hill Properties | 53.179869°, -0.647644° | Residential | 430m | |

| Receptor ID | Name | Approximate Coordinates | Receptor Type | Distance (where relevant) | |
|---|---|---|---|---|---|
| | | | | Solar and Energy Storage Park | Grid Connection Corridor |
| R31 | Thorpe Park Lodges, Middle Lane | 53.179718°, -0.634767° | Residential | 420m | |
| R32 | Station Road Properties, Thorpe on the Hill | 53.184561°, -0.649474° | Residential | 650m | - |
| R33 | Eagle Lane Properties, Thorpe on the Hill | 53.183272°, -0.653727° | Residential | 430m | - |
| R34 | Cathedral View Holiday Park | 53.166640°, -0.652524° | Residential | 65m | - |
| R35 | Housham Grange, Newark Road | 53.166333°, -0.659083° | Residential | 15m | - |
| R36 | Housham Wood Farm, Newark Road | 53.169788°, -0.663586° | Residential | 220m | - |
| R37 | Scotland Farm/ Gamekeepers Cottage, Eagle Lane | 53.181063°, -0.666265° | Residential | 220m | - |
| R38 | Morton Lane Properties | 53.175712°, -0.681271° | Residential | 160m | - |
| R39 | Morton Hall Prison | 53.168047°, -0.685986° | Residential | 220m | - |
| R40 | Park Crescent Properties | 53.164268°, -0.685068° | Residential | 240m | - |
| R41 | Morton Manor, The Avenue | 53.165376°, -0.679002° | Residential | 90m | - |
| R42 | Morton Properties | 53.163378°, -0.677812° | Residential | 340m | - |
| R43 | 1-12 Bassingham Road | 53.151092°, -0.628395° | Residential | 230m | - |
| R44 | The Dovecote Pub and Restaurant | 53.157255°, -0.670243° | Residential | 90m | - |
| R45 | Rose Orchard Restaurant | 53.169665°, -0.641244° | Residential | 190m | - |
| R46 | Lowfield Farm | 53.134114, -0.622001 | Residential | 170m | - |

| Receptor ID | Name | Approximate Coordinates | Receptor Type | Distance (where relevant) | |
|---|---|---|---|---|---|
| | | | | Solar and Energy Storage Park | Grid Connection Corridor |
| R47 | Lincoln Road Properties | 53.124184, -0.530096 | Residential | - | 15m |
| R48 | Far End Properties | 53.122726, -0.533511 | Residential | - | 80m |
| R49 | Boothby Heath Farm | 53.122478, -0.499437 | Residential | - | 140m |
| R50 | 19 Park Crescent | 53.165526, -0.683522 | Residential | 60m | - |
| R51 | New Development at Witham St Hughs south of A46 | 53.157931, -0.665325 | Residential | 90m | - |

### Public Rights of Way Receptors

11.4.17 Noise is assessed based on the effect on health and quality of life. Noise generated by the construction, operational, and decommissioning phases of the Proposed Development will only affect Public Rights of Way (PRoW) users for limited periods of time when they are in close proximity to a noise source.

11.4.18 It is acknowledged that short-term exposure to noise can cause disturbance to PRoW users and result in adverse noise effects. Planning Practice Guidance Noise (Ref. 11-8) identifies an adverse noise effect as *"Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.*" This is considered to describe the level of noise effect that may be perceived by PRoW users.

11.4.19 However, given the linear nature of PRoWs, the range of noise impacts along them that forms the ambient noise environment, and the transient usage of a PRoW, a material change in the experience of using the PRoW as a whole as a result of noise emissions from the Proposed Development, which could affect PRoW users' health or quality of life, is not anticipated. As such, an assessment of noise effects on PRoW users as a result of the Proposed Development has been scoped out.

11.4.20 The NPSE (Ref. 11-6) provides a means for noise effects to be identified. It allows for adverse effects on health and quality of life to occur where all reasonable steps have been taken to reduce these effects whilst taking into account sustainable development.

11.4.21 In accordance with the NPSE, all reasonable steps to minimise the effects of noise on PRoW users will be taken during the construction, operational and decommissioning phases of the Proposed Development. These measures

are set out in the Framework Construction Environmental Management Plan (CEMP) (see **PEI Report Volume 3, Appendix 3-A**), Framework Decommissioning Environmental Management Plan (DEMP) (to be prepared as part of the ES), and a Framework Operational Environmental Management Plan (OEMP) (to be prepared as part of the ES). The production of detailed versions of these documents prior to the commencement of the relevant stage of the Proposed Development will be secured through the DCO.

### Baseline Noise Monitoring Methodology

11.4.22 Baseline noise monitoring has been carried out to establish the existing noise climate in the area. The monitoring procedures followed guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' (Ref. 11-11) and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (Ref. 11-12). All noise measurements included $L_{Aeq,T}$ and $L_{A90,T}$ sound level indicators.

11.4.23 Noise monitoring was carried out at nineteen locations for a period of one week in the period from 1 September to 29 September 2023. These locations provide suitably representative baseline noise data for sensitive receptors affected by the operational Principal Site. Noise monitoring was otherwise carried out in public areas that were considered to provide representative noise conditions to nearby sensitive receptors.

11.4.24 Monitoring locations are shown in **PEI Report Volume 2, Figure 11-1: Receptor and Noise Monitoring Locations**. The monitoring locations have been allocated as representative of the local noise environment at each of the noise-sensitive receptors (**Table 11-3**) within the Principal Site Study Area.

11.4.25 A weather station was installed along with noise monitors so weather conditions could be logged during noise monitoring. This allows periods of adverse weather conditions (i.e. wind speeds exceeding 5 m/s and precipitation) to be identified and noise data for these periods to be removed.

11.4.26 As the Cable Corridor cables are buried underground, there are no operational noise risks associated with them. Consequently, noise-sensitive receptors along the Cable Corridor have not been monitored as construction noise and vibration criteria are not dependent on measured baseline noise data (see section 11.5). However, attended measurements will be undertaken to provide representative daytime ambient noise conditions at Cable Corridor receptors (R47, R48, R49) to supplement the ES.

**Table 11-3: Noise Monitoring Locations**

| Location | Approximate Coordinates | Representative of Receptors |
|---|---|---|
| ML1 | 53.1417328, -0.6187112 | R1, R2, R5 |
| ML2 | 53.1653260, -0.6788865 | R39, R40, R41, R42, R50 |
| ML3 | 53.1678124, -0.6532607 | R34, R35 |

| Location | Approximate Coordinates | Representative of Receptors |
|---|---|---|
| ML4 | 53.1774512, -0.6690730 | R36, R37, R38 |
| ML5 | 53.1779803, -0.6451380 | R29, R30 |
| ML6 | 53.1542148, -0.6522123 | R19, R20, R21 |
| ML7 | 53.1554657, -0.6357167 | R23, R24, R25 |
| ML8 | 53.1444724, -0.6615736 | R14, R15 |
| ML9 | 53.1263084, -0.6691780 | R11, R12, R13 |
| ML10 | 53.1332978, -0.6530170 | R9, R10 |
| ML11 | 53.1329980, -0.6338144 | R7, R18 |
| ML12 | 53.1291593, -0.6432601 | R8 |
| ML13 | 53.1666593, -0.6390226 | R27, R28, R45 |
| ML14 | 53.1424162, -0.6443360 | R16, R17 |
| ML15 | 53.1796555, -0.6339880 | R31 |
| ML16 | 53.1571798, -0.6694733 | R22, R44, R51 |
| ML17 | 53.1501388, -0.6277502 | R26, R43 |
| ML18 | 53.1342486, -0.6213518 | R3, R4, R6, R46 |
| ML19 | 53.1827489, -0.6522784 | R32, R33 |

### Defining an Effect

11.4.27 The NPSE sets definitions for ‘significant adverse effects’ and ‘adverse effects’ using the concepts:

a. 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

b. 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.

11.4.28 The NPSE states that:

*“It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times”.*

11.4.29 Noise levels exceeding the SOAEL should be avoided as far as reasonably practicable. For noise levels exceeding the LOAEL, the NPSE (Ref. 11-6) 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”.*

11.4.30 All noise effects are local, only affecting nearby sensitive receptors, and are direct in nature; however, defining a likely effect and whether it is significant or not depends on the nature of a noise source. Likely effects have been defined based on guidance set out in the NPSE and PPGN.

11.4.31 A new source of noise is assessed by the absolute noise level it generates at sensitive receptors. Where an exceedance of the defined SOAEL for each noise source occurs, it is an indication of a likely significant effect. However, for the assessment of construction traffic noise where an existing noise source (road traffic noise) is changed, the assessment of the effect level due to the change in noise refers to guidance within the IEMA Guidelines (Ref. 11-16) and consideration of the absolute noise level based on guidance set out in the NPSE and PPGN.

11.4.32 Government policy for noise is based on community exposure response relationships between noise and health/quality of life, and the noise insulation of a typical dwelling. Consequently, an assessment based on LOAELs and SOAELs cannot be applied to non-residential sensitive receptors. As such, the approach to the assessment of non-residential receptors differs from that adopted for residential receptors. Non-residential receptors are considered on a case-by-case basis by considering the applicable design criteria for good internal noise levels.

**Assessment Scenario**

11.4.33 There are three options being considered for the Proposed Development regarding how the design of noise generating plant at the Solar Stations will proceed (as further described in **PEI Report Volume 1, Chapter 3: The Proposed Development**):

a. Option 1: Includes containers that will house transformers, switchgear and central inverters together.

b. Option 2: Includes containers that will house transformers and switchgear. Inverters would be provided separately as string inverters located behind or next to the panels. These are smaller than central inverters and generate lower levels of noise; however, a substantially larger number of inverters are required in a string arrangement.

c. Option 3: Transformers, switchgear and inverters (as central or string-type) each provided separately and not housed in containers.

11.4.34 For the construction assessment scenario, Option 1 is considered to represent a reasonable worst-case due to the likely requirement that Solar Stations will require more substantial foundations than alternative options. The requirement for more substantial foundations will mean either additional noise may be generated by larger plant or the construction time for robust foundations may be longer. These high generating noise activities in distributed locations will generate higher level of noise than the string inverter option, which will not require the use of heavy plant during construction.

11.4.35 Although plant within containers will require cooling fans to regulate the temperature within the units, noise emissions from internal plant will be

attenuated by the unit, which acts as a noise barrier. The level of attenuation is dependent on the surface density of the unit material, and an assumed 5mm steel construction can attenuate noise by Rw 39 dB, which is sufficient acoustic performance to noticeably attenuate noise levels. Consequently, Option 3 is considered to represent the worst-case scenario for operational noise.

11.4.36 Option 3 will be either string or central inverters. The string inverters would not generate high levels of noise; however, there would be multiple units spread throughout Principal Site. Although there would be a far smaller number of central inverters, they generate higher levels of noise than string inverters. Consequently, the Option 3 assessment considers central inverters as the worst-case scenario.

11.4.37 A sensitivity test of the string inverter option will be provided in the ES to demonstrate this.

11.4.38 At this stage of the Proposed Development some flexibility is required as to whether to pursue a DC-coupled arrangement where BESS units are located alongside Solar Stations, or an AC-coupled where BESS and inverter units are located at a single BESS compound. As such, BESS and inverter units for both the AC-coupled and the DC-coupled arrangements are modelled to assess operational noise effects, to identify the worst-case scenario at each receptor.

**Construction and Decommissioning Phase**

***Overview of Works***

11.4.39 As discussed in paragraph 11.4.34, Option 1 is considered to represent a reasonable worst case assessment scenario for the construction noise and vibration assessment. For the purposes of assessing noise and vibration, the construction programme has been summarised into three scenarios that represent high Noise Generating Activities (NGA). These activities are most likely to generate likely significant effects and are as follows:

a. NGA1 – Construction of the BESS, Solar Stations, and ground mounted solar PV panel arrays;

b. NGA2 – Cable installation (general works) at the Cable Corridor and the Interconnecting Cable Corridor; and

c. NGA3 – Cable installation (Horizontal Directional Drilling (HDD) activities) at the Cable Corridor and the Interconnecting Cable Corridor.

11.4.40 Detailed information on construction of the Proposed Development can be found in **PEI Report Volume 1, Chapter 3: The Proposed Development.**

11.4.41 The earliest construction is assumed to start is in 2031. Based upon the most rapid feasible construction programme, construction of the Grid Connection Cables is anticipated to require 12 months, whereas construction of the solar farm (Principal Site and Interconnecting Cable Corridors) will require an estimated 24 months, with operation therefore anticipated to commence in 2033.

11.4.42 The core working hours are defined as:

a. Monday to Friday 07:00 to 19:00 (daylight hours permitting);
b. Saturday 07:00 to 13:00 (daylight hours permitting); and
c. No Sunday or Bank Holiday working unless crucial to construction (for example Horizontal Directional Drilling (HDD) which may need to be a continuous activity) or in an emergency.

11.4.43 Emergency working and continuous work may require work to extend beyond the core working hours quoted above.

11.4.44 Cabling and groundworks will be prioritised during the drier summer months where possible.

11.4.45 Decommissioning activities are assumed to be comparable, but no worse, than construction activities. This is a conservative approach likely to overestimate the potential noise and vibration effects of decommissioning activities, which relative to construction activities are expected to be completed more quickly, with fewer onsite plant and road traffic movements, and quieter construction methodologies. The ES will include a separate assessment of decommissioning noise in accordance with Planning Inspectorate requirements.

***Prediction Methodology***

11.4.46 Noise levels experienced by sensitive receptors during construction and decommissioning works depend upon several variables, the most significant of which are:

a. The noise generated by plant or equipment used on site, generally expressed as sound power levels (Lw) or the vibration generated by the plant;
b. The periods of use of the plant on site, known as its ‘on-time’;
c. The distance between the noise/vibration source and the receptor;
d. The noise attenuation due to ground absorption, air absorption and barrier effects;
e. In some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
f. The time of day or night the works are undertaken.

***Construction and Decommissioning Noise Criteria***

11.4.47 The construction noise criteria were based on the Association of Noise Consultants Construction Noise Guide (ANC Guide) (Ref. 11-18). The ANC Guide was issued in 2021 and, although it is primarily aimed at providing a consistent approach to Section 61 applications, it also represents the most modern interpretation of example assessment methods in Annex E of BS5228-1 and the latest industry standard.

11.4.48 The ANC Guide defines the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL) for construction

noise, as presented in **Table 11-4**. The Unacceptable Adverse Effect Level (UAEL), as defined in **PEI Report Volume 3, Appendix 11-1**, for construction noise is based on the trigger level for temporary rehousing[1] as set out in section E.4 of BS 5228-1 (Ref. 11-9).

**Table 11-4: Thresholds of Potential Effects of Construction Noise at Residential Buildings**

| Time Period | Threshold Value (LAeq,T dB) | | |
|---|---|---|---|
| | LOAEL | SOAEL | UAEL |
| Day (07:00–19:00)<br>Saturday (07:00–13:00) | 65 | 75 | 85 |
| Evening (19.00–23.00)<br>Weekends (13.00–23.00 Saturdays and 07.00–23.00 Sundays) | 55 | 65 | 75 |
| Night (23.00–07.00) | 45 | 55 | 65 |

Note: The values apply to a location one metre from a residential building façade containing a window, ignoring the effect of the acoustic reflection from that façade.

***Construction and Decommissioning Vibration***

11.4.49 BS 5228-2 (Ref. 11-10) provides guidance on the perception of vibration within occupied buildings. This provides a simple method of determining acoustic annoyance alongside evaluation of cosmetic damage associated with construction and decommissioning induced vibration. **Table 11-5** details Peak Particle Velocity (PPV) levels (a standard measure of vibration effects) and their potential effect on humans.

**Table 11-5: Criteria for Construction and Decommissioning Vibration (Human Response)**

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

11.4.50 The recommended PPV vibration limits for transient vibration, above which cosmetic damage could occur for different types of buildings are provided in BS 5228-2 (Ref. 11-10) and presented in **Table 11-6**. For these limits, 'minor damage' is possible at vibration magnitudes that are greater than twice those given in **Table 11-6**, and 'major damage' can occur at values greater than four times the tabulated values. Consequently, the significance of effect has been provided based on the sensitivity of a building to vibration induced

[1] Where construction noise levels are such that noise insulation will not provide sufficient attenuation to prevent disturbance or interference with activities or sleep, then the occupants can be temporarily re-housed away from the construction site.

cosmetic damage. Cosmetic damage would precede the onset of any structural damage.

**Table 11-6: Criteria for Construction and Decommissioning Vibration (Cosmetic Building Damage)**

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

Note 1: Guide values might need to be reduced by up to 50% due to dynamic loading from continuous vibration.

Note 2: A potential negligible effect (not significant) is indicated at vibration levels up to the threshold values.

Note 3: A potential minor adverse effect (not significant) is indicated at vibration levels up to a magnitude of twice the threshold values.

Note 4: A potential moderate adverse effect (significant) is indicated at vibration levels up to a magnitude of four times the threshold values.

Note 5: A potential major adverse effect (significant) is indicated at vibration levels equal to or greater than a magnitude of four times the threshold values.

***Determining a Construction and Decommissioning Noise and Vibration Effect***

11.4.51 Although a significant effect due to construction and decommissioning activities may be determined through an assessment based on exceedances of the defined SOAELs for construction noise, consideration of the significance of the effect for temporary construction activities exceeding the LOAEL is undertaken through qualitative consideration of the following:

a. Duration of activities;

b. Frequency of events;

c. Number of receptors; and

d. Sensitivity of receptors.

***Construction and Decommissioning Traffic Noise***

11.4.52 During the peak construction period, there will be a peak of up to 50 heavy goods vehicle (HGV) and 25 light goods vehicle (LGV) deliveries per day. Traffic during decommissioning is expected to be similar to (or lesser than during) the construction phase. Construction and decommissioning traffic noise have been assessed for a representative worst-case day during the construction stage based on information in **PEI Report Volume 1, Chapter**

**3: The Proposed Development**. Predicted construction traffic noise levels along the main access routes set out in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling** have been compared to measured ambient noise levels so a potential change in noise can be derived.

11.4.53 Road traffic noise levels have been calculated with reference to methodology within the Calculation of Road Traffic Noise (CRTN) (Ref. 11-15), which contains an equation for the calculation of the Basic Noise Level (BNL) from a road relative to the 18-hour Average Annual Weekday Traffic (AAWT) flow from 06:00 to 24:00. The temporary changes in road traffic noise levels along the local road network due to construction traffic have been assessed based on short-term changes in noise from Table 7-14 of the IEMA Guidelines (Ref. 11-16). Assessment criteria are presented in **Table 11-7.**

**Table 11-7: Construction Traffic Noise Assessment Criteria**

| Effect Level | Magnitude criteria |
|---|---|
| Negligible | ≥ 0 dB and < 1 dB |
| Minor | ≥ 1 dB and < 3 dB |
| Moderate | ≥ 3 dB and < 5 dB |
| Major | ≥ 5 dB |

**Operational Noise**

11.4.54 The main sources of operational noise that are considered in the assessment are:

a. The Onsite Substation;

b. BESS Battery Containers; and

c. Inverters/ switchgears.

11.4.55 As discussed in paragraph 11.4.35, the central inverter Option 3 is considered to represent a reasonable worst case assessment scenario for the operational noise and assessment.

11.4.56 A tracker system may be used on the solar PV modules to maximise their efficiency by keeping them oriented towards the sun. Noise emissions from tracker motors are very low and unlikely to be perceptible at sensitive receptors. Consequently, tracker motors have not been included in the operational noise assessment. Details on noise emissions from tracker motors can be found in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling**.

11.4.57 Noise predictions of the operational Proposed Development have been undertaken using CadnaA®, which implements the calculation procedures of ISO 9613 ‘Acoustics – Attenuation of Sound During Propagation Outdoors’ (Ref. 11-19), to predict the propagation of noise away from the Proposed Development in all directions and to quantify resultant noise levels at the identified noise sensitive receptor locations.

11.4.58 Operational noise has been assessed following BS 4142 guidance (Ref. 11-12), whereby the rating level of noise emissions from activities is compared against the background level of the pre-development noise climate. Source data for operational noise emissions is presented in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling**. The relevant parameters in this instance are as follows:

a. Background sound level – $L_{A90,T}$ – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels;

b. Specific sound level – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr; and

c. Rating level – $L_{Ar,Tr}$ – the specific sound level plus any adjustment made for the characteristic features of the noise.

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

a. Tonality – a penalty of 2 dB is applied for a tone which is just perceptible at the receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible;

b. Impulsivity – a penalty of 3 dB is applied for impulsivity which is just perceptible at the receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible. An impulse is defined as the sudden onset of a sound;

c. Intermittency – a penalty of 3 dB can be applied if the intermittency of the specific sound is readily identifiable against the residual acoustic environment at the receptor i.e. it has identifiable on/off conditions; and

d. Other sound characteristics – a penalty of 3 dB can be applied where the specific sound features characteristics that are neither tonal nor impulsive but are readily distinctive against the residual acoustic environment.

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

*"Typically, the greater this difference, the greater the magnitude of the impact.*

*A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

*A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

*The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an*

*adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

11.4.61 BS 4142 advises that, where rating levels and background levels are low, which is the case in rural areas surrounding the Site, the assessment of operational noise should take into context the absolute noise level. The ANC Guide to BS 4142 (Ref. 11-12) provides context to this by stating:

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

11.4.62 The ANC Guide suggests that:

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

11.4.63 A minimum rating level of 35 dB $L_{Ar,Tr}$ for the LOAEL would align with guidance in PPGN, which defines noise below the LOAEL as follows:

*"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".*

11.4.64 BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (Ref. 11-13) and the World Health Organization (WHO) 'Guidelines for Community Noise' (Ref. 11-14) provide guidance levels for internal noise within dwellings of 30 dB $L_{Aeq,T}$ for good sleeping conditions at night. In accordance with examples in Annex A of BS 4142, it is assumed that building envelope attenuation would be reduced to approximately 10 dB by a partially open window. Consequently, an external SOAEL of 40 dB $L_{Ar,Tr}$ has been adopted for the night-time.

11.4.65 The assessment criteria for noise from fixed plant installations is summarised in **Table 11-8**.

**Table 11-8: Operational Noise Assessment Criteria**

| Effect Level | Rating Level (External) at Receptor, $L_{Ar,Tr}$ | |
|---|---|---|
| | Daytime (07:00–19:00) and Evening (19:00–23:00) | Night-time (23:00–07:00) |
| LOAEL | Less than or equal to the typical background level ($L_{A90,T}$) – minimum of 35 dB $L_{Ar,Tr}$ | Less than or equal to the typical background level ($L_{A90,T}$) – minimum of 30 dB $L_{Ar,Tr}$ |
| SOAEL | Greater than 10 dB above the background noise level – minimum of 45 dB $L_{Ar,Tr}$ | Greater than 10 dB above the background noise level – minimum of 40 dB $L_{Ar,Tr}$ |

### Non-Residential Receptors

11.4.66 One non-residential noise sensitive receptor is identified within the Study Area at R8 (Saint Michael and All Angels Church). Design criterion from BS 8233: 2014 for place of worship, counselling, meditation or relaxation is considered applicable. This design criterion is a range of 30-35 dB LAeq,T. Assuming that the church may have doors or windows open at some points during the year, the maximum external noise level (assuming 30 dB attenuation for building envelope) before the design criterion would be exceeded would be 65 dB $L_{Aeq,T}$. Should this level be exceeded, additional mitigation measures may be required.

## Assessment Assumptions and Limitations

### Baseline Assumptions and Limitations

11.4.67 The measured ambient sound levels (taken during September 2023, see **Table 11-9**) have been considered as representative of the future baseline scenarios. The earliest that construction is assumed to commence is 2031, with operation in 2033, and decommissioning assumed to be 60 years after commencement of operation, in approximately 2093. No major developments (e.g., highway or railway schemes, industrial facilities) are currently known to be proposed in the Study Area that are likely to notably alter the local baseline noise environment.

11.4.68 Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort has been made such that measurements were undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions, and school holiday periods (which are often considered to result in atypical sound levels). However, a small degree of uncertainty will always remain in the values taken from such a measurement survey.

### Noise Model Assumptions

11.4.69 A series of assumptions were made for the generation of the construction and operational noise models as follows:

a. Digital noise modelling of the operational Proposed Development has been based on the maximum worst-case parameters set out in the drawings, plans, and construction and operation details as set out in **PEI Report Volume 1, Chapter 3: The Proposed Development**;

b. Sound level data for operational noise-producing plant (i.e., inverters and transformers) have been based on industry sound pressure level measurement data (see **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling)**;

   i. Following statutory consultation, the ES will take account of a review of manufacturer specifications and refine the modelling of the BESS

to account for measured sound power levels and source parameters from current technology available on the market. This is expected to lower the impacts on noise associated with this noise source. This chapter has presented the impacts associated with worst-case sound power levels emitted vertically at 2.5m and is therefore likely to overestimate the actual impacts. The assessment has also considered that the fan speed will be 100% at all times of the year, which is unlikely and is only typically needed when ambient temperature is above 35 degrees Celsius, which in Lincolnshire is rare and does not happen during night-time hours. The ES will consider fan loads and ambient temperatures, along with specifications from modern BESS, to more accurately predict the noise levels at receptors. This is expected to reduce the residual effects at nearby receptors, and the results in this chapter therefore represent a worst-case preliminary estimate at this stage.

c. Surrounding ground conditions are rural farmland and have been modelled as soft (G=0.8);

d. Air temperature was set at 10 degrees Celsius and humidity 80%, which are typical annual average weather conditions in Lincolnshire based on historical weather data;

e. One order of reflection was modelled; and

f. Land topography has been incorporated into the noise modelling.

**Construction Noise Assumptions and Limitations**

11.4.70 The assessment of construction noise (and vibration) has considered construction activities that have the potential to result in significant effects on identified receptors, based on information presented in **PEI Report Volume 1, Chapter 3: The Proposed Development**, previous experience of co-located solar and BESS construction sites, and professional judgement. These assessments are based on a reasonable representative worst-case scenario. Construction noise predictions have been undertaken using the computer modelling software CadnaA® (v2023 MR1) (Ref. 11-17), based on an example schedule of plant items that are typically used in such developments for the purposes of carrying out a quantitative assessment at this stage. Construction plant is summarised in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling**.

11.4.71 Construction noise predictions in CadnaA® have been undertaken using BS 5228-1 (Ref. 11-9) methodologies. Construction sound sources are taken to be representative of the plant and/or activities that will be used during the construction process of the Proposed Development. Noise predictions were carried out to represent a conservative scenario where construction plant is active nearest to the identified receptors and does not take into account quieter periods when limited activities take place or at further distances. Consequently, noise predictions may overestimate construction noise levels and are therefore considered to be a reasonable likely worst-case.

11.4.72 The solar PV mounting structures will be installed on galvanised steel piles that are driven or screwed into the ground. Piling is unlikely to be required for

the construction of foundations for the Solar Stations, although this is dependent upon local ground conditions and other types of foundation such as concrete blocks or plinths, ground screws, or reinforced concrete piles may be used. To present a worst case for the assessment it is assumed that driven piling will be used as a worst-case.

**Operational Assumptions and Limitations**

11.4.73 Operational noise has been predicted with all plant being in maximum operation at all times of day. Cooling fans on inverters and battery units will operate dependent on ambient temperatures and would not be in a full mode of operation during cooler temperatures. Consequently, noise predictions represent a reasonable worst-case and are likely to overestimate actual impacts.

11.4.74 Sound level data for transformers in reduced modes of operation is not available from manufacturers and therefore not available for the purposes of this assessment (because specific equipment has not been selected at this stage). Noise predictions for transformers are based on inverters and cooling fans operating at full load so are likely to represent an overestimate of actual conditions.

11.4.75 There may be a requirement for component replacement works in the solar PV areas during the operational phase of the development if any infrastructure needs replacing. These works would be equivalent, but no worse than, activities during the construction phase. As such, construction phase predictions are considered representative of any potential component replacement works that may occur in the future.

## 11.5 Baseline Conditions

### Existing Baseline

11.5.2 The land use within the Site Boundary is primarily agricultural. Other surrounding land uses in proximity to the Site boundary are arable farming, woodland, residential and quarries. There are individual and clusters of residential properties located adjacent to the Site Boundary.

11.5.3 The dominant sources of sound in the area are road traffic on:

a. A46;
b. Haddington Lane;
c. Fosse Lane;
d. Butts Lane;
e. Bassingham Road; and
f. Moor Lane.

11.5.4 Additionally, the former RAF Swinderby site to the west of the Proposed Development is now used by Cemex as a quarry.

11.5.5 Results of baseline noise monitoring are presented in **Table 11-9**. More detailed results are presented in **PEI Report Volume 3, Appendix 11-C: Baseline Noise Surveys**.

**Table 11-9: Baseline Noise Monitoring Results**

| Location Reference | Sound Level Indicator | Day (07:00–19:00) dB | Evening (19:00–23:00) dB | Night (23:00–07:00) dB |
|---|---|---|---|---|
| ML1 | $L_{Aeq,1h}$ dB | 45 | 39 | 41 |
| | $L_{A90,1h}$ dB | 34 | 28 | 27 |
| ML2 | $L_{Aeq,1h}$ dB | 51 | 43 | 39 |
| | $L_{A90,1h}$ dB | 36 | 34 | 30 |
| ML3 | $L_{Aeq,1h}$ dB | 61 | 56 | 52 |
| | $L_{A90,1h}$ dB | 50 | 50 | 45 |
| ML4 | $L_{Aeq,1h}$ dB | 47 | 42 | 36 |
| | $L_{A90,1h}$ dB | 37 | 33 | 30 |
| ML5 | $L_{Aeq,1h}$ dB | 50 | 45 | 42 |
| | $L_{A90,1h}$ dB | 42 | 40 | 33 |
| ML6 | $L_{Aeq,1h}$ dB | 45 | 43 | 37 |
| | $L_{A90,1h}$ dB | 38 | 32 | 29 |
| ML7 | $L_{Aeq,1h}$ dB | 46 | 44 | 43 |
| | $L_{A90,1h}$ dB | 40 | 35 | 34 |
| ML8 | $L_{Aeq,1h}$ dB | 50 | 44 | 40 |
| | $L_{A90,1h}$ dB | 36 | 31 | 30 |
| ML9 | $L_{Aeq,1h}$ dB | 48 | 40 | 38 |
| | $L_{A90,1h}$ dB | 35 | 31 | 28 |
| ML10 | $L_{Aeq,1h}$ dB | 48 | 45 | 40 |
| | $L_{A90,1h}$ dB | 38 | 32 | 29 |
| ML11 | $L_{Aeq,1h}$ dB | 47 | 41 | 39 |
| | $L_{A90,1h}$ dB | 34 | 28 | 24 |
| ML12 | $L_{Aeq,1h}$ dB | 46 | 42 | 37 |
| | $L_{A90,1h}$ dB | 38 | 32 | 32 |

| Location Reference | Sound Level Indicator | Day (07:00–19:00) dB | Evening (19:00–23:00) dB | Night (23:00–07:00) dB |
|---|---|---|---|---|
| ML13 | $L_{Aeq,1h}$ dB | 59 | 53 | 50 |
| | $L_{A90,1h}$ dB | 53 | 48 | 42 |
| ML14 | $L_{Aeq,1h}$ dB | 55 | 48 | 43 |
| | $L_{A90,1h}$ dB | 42 | 34 | 29 |
| ML15 | $L_{Aeq,1h}$ dB | 50 | 47 | 42 |
| | $L_{A90,1h}$ dB | 44 | 41 | 35 |
| ML16 | $L_{Aeq,1h}$ dB | 87 | 84 | 79 |
| | $L_{A90,1h}$ dB | 80 | 69 | 58 |
| ML17 | $L_{Aeq,1h}$ dB | 58 | 54 | 49 |
| | $L_{A90,1h}$ dB | 41 | 36 | 33 |
| ML18 | $L_{Aeq,1h}$ dB | 54 | 38 | 38 |
| | $L_{A90,1h}$ dB | 35 | 31 | 28 |
| ML19 | $L_{Aeq,1h}$ dB | 48 | 44 | 40 |
| | $L_{A90,1h}$ dB | 41 | 37 | 33 |

11.5.6 The noise monitoring location at ML16 was approximately 5m from the nearside kerb of the A46. As such, measured noise levels are not representative of receptors in the area. As such, distance corrections have been applied to measured noise data at ML16 to provide representative noise data. Corrected noise data is presented in **Table 11-10**.

**Table 11-10: Corrected ML16 Noise Data**

| Receptor | Approximate Distance to A46 (m) | Sound Level Indicator | Corrected Noise Data | | |
|---|---|---|---|---|---|
| | | | Day (07:00–19:00) dB | Evening (19:00–23:00) dB | Night (23:00–07:00) dB |
| R22 | 45 | $L_{Aeq,1h}$ dB | 80 | 77 | 72 |
| | | $L_{A90,1h}$ dB | 73 | 62 | 51 |
| R44 | 40 | $L_{Aeq,1h}$ dB | 81 | 78 | 73 |
| | | $L_{A90,1h}$ dB | 74 | 63 | 52 |
| R51 | 50 | $L_{Aeq,1h}$ dB | 80 | 77 | 72 |

| Receptor | Approximate Distance to A46 (m) | Sound Level Indicator | Corrected Noise Data | | |
|---|---|---|---|---|---|
| | | | Day (07:00–19:00) dB | Evening (19:00–23:00) dB | Night (23:00–07:00) dB |
| | | $L_{A90,1h}$ dB | 73 | 62 | 51 |

### Future Baseline

11.5.7 The future baseline scenarios are set out in **PEI Report Volume 1, Chapter 5: EIA Methodology**. In the absence of the Proposed Development, it is considered likely that the future baseline noise environment will be higher than represented by the September 2023 measurements of the ambient sound levels. This is due to natural growth of road traffic flows resulting in increased noise in the local area. However, natural growth alone is unlikely to result in perceptible changes to baseline noise and measured current baseline data is therefore considered representative of future baseline conditions.

11.5.8 The assessment of construction traffic noise effects accounts for the future peak construction year, which includes natural traffic growth. However, the operational noise assessment assumes that the measured baseline data is representative (i.e. no higher) than future baseline conditions, which represents a reasonable worst-case scenario.

## 11.6 Embedded Mitigation Measures

11.6.1 Where practicable, mitigation measures have been incorporated into the Proposed Development design and/or how it shall be constructed. Through iterative assessment, potential impacts have been predicted and opportunities to mitigate them identified with the aim of preventing or reducing impacts as much as possible. This approach provides the opportunity to prevent or reduce potential adverse impacts from the outset. This embedded mitigation/mitigation by design approach has been taken into account when evaluating the significance of the potential impacts.

### Construction

11.6.2 Measures to control noise are defined in Annex B of BS 5228-1 (Ref. 11-9) and measures to control vibration are defined in Section 8 of BS 5228-2 (Ref. 11-10). These embedded measures represent Best Practicable Means (BPM) (as defined in Section 72 of the Control of Pollution Act, (Ref. 11-1)) and are secured within the Framework CEMP (see **PEI Report Volume 3, Appendix 3-A: Framework CEMP)**, which is secured by the DCO requirements.

11.6.3 Best Practicable Means that would be implemented during construction works and secured through the CEMP are presented below:

a. Ensuring that all appropriate processes, procedures and measures are in place to minimise noise before works begin and throughout the construction programme.
b. All contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which should form a prerequisite of their appointment.
c. Ensuring that, where reasonably practicable, noise and vibration are controlled at source (e.g., the selection of inherently quiet plant and low vibration equipment), review of the construction programme and methodology to consider quieter methods, consideration of the location of equipment on-site and control of working hours.
d. Use of modern plant, complying with applicable UK noise emission requirements.
e. Hydraulic techniques for breaking concrete or rocks to be used in preference to percussive techniques, where reasonably practicable.
f. When piling, use of lower noise piling where reasonably practicable.
g. Off-site pre-fabrication where reasonably practicable.
h. Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications.
i. All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use.
j. Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Site to be conducted in such a manner as to minimise noise generation, as far as reasonably practicable.
k. All vehicles used on-site shall incorporate broadband reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance where reasonably practicable.
l. Appropriate routing of construction traffic on public roads and along access tracks to avoid sensitive areas where practicable (see **PEI Report Volume 1, Chapter 3: The Proposed Development** and **PEI Report Volume 1, Chapter 13: Traffic and Transport**).
m. Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use.
n. Drop heights of materials will be minimised.
o. Plant and vehicles will be sequentially started up rather than all together.
p. Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas.

q. Noise generating activities near residential properties, such as use of power tools or piling, would be limited to the hours between 08:00 and 18:00 from Monday to Friday and between 08:00 and 13:00 on Saturday.

11.6.4 Core working hours onsite will be 07:00 to19:00 Monday to Friday and 07:00 to 13:00 on Saturday but will be shortened if working would necessitate artificial lighting and therefore the working day may be shorter in the winter months (with the exception of activities such as HDD which may require continuous working). There will be no work on a Sunday or Bank Holiday unless crucial to construction (e.g., HDD may require continuous activity etc.) or in an emergency.

11.6.5 A construction noise monitoring scheme shall be developed as per requirements of the Framework CEMP (see **PEI Report Volume 3, Appendix 3-A**) following appointment of a principal contractor and prior to commencement of construction works.

11.6.6 The effect of noise and vibration on nearby sensitive receptors can be minimised through a good communication strategy. Prior to construction works being undertaken, liaison will be undertaken with occupiers of sensitive receptors that may be adversely affected by construction noise and vibration.

11.6.7 Noise complaints will be monitored and reported to the Applicant for immediate investigation and action. A display board will be installed on-site, and a website will be set up. These will include contact details for the Community Liaison Officer or alternative with whom nuisance or complaints can be lodged. A logbook of complaints will be prepared and managed by the Site Manager.

11.6.8 The communication strategy and noise complaint system will be secured through the DCO as part of the Framework CEMP (see **PEI Report Volume 3, Appendix 3-A**).

11.6.9 Where high noise generating works are required to be undertaken outside of core daytime working hours, consents will be sought from the relevant local authority under Section 61 of the Control of Pollution Act 1974 (Ref. 11-1) for the proposed construction works, excluding non-intrusive surveys. The Section 61 application will set out the specific method of working, calculations of noise levels at nearby receptors, the actual working hours required, noise monitoring locations, details of communication measures and the mitigation measures implemented to minimise noise and vibration impacts.

11.6.10 As requirements for HDD activities will not be finalised until a principal contractor is appointed, a hierarchy of mitigation measures is contained in the Framework CEMP (see **PEI Report Volume 3, Appendix 3-A**) to ensure that significant noise effects do not occur due to potential night-time works:

a. Where practicable, avoid HDD works within 200 m (the distance at which significant effects are predicted at night) of residential receptors (although this will depend on the results of the ground investigation survey);

b. Where HDD activities may occur within 200 m of sensitive receptors, the option for open cut cable laying will be explored as an alternative to HDD. (This is not viable if HDD is a commitment in specific locations due to stakeholder requests or other environmental issues);

c. The potential for the use of quieter equipment than listed in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling** will be explored by the principal contractor; and

d. Depending on the location, plant and timing of works, temporary acoustic fencing will be installed around the HDD site boundary to screen receptors from noise emission if HDD works are required within 200 m of a sensitive receptor. This mitigation could provide 10 dB of attenuation when the noise screen completely hides the sources from the receptor.

11.6.11 Consideration has been given to traffic routing, timing, and access points to the Proposed Development to minimise noise impacts at existing receptors as detailed in **PEI Report Volume 1, Chapter 13: Traffic and Transport**. Management of Heavy Goods Vehicles (HGV) on the highway network will be managed through the Framework Construction Traffic Management Plan (CTMP) (to be produced at the ES stage), which will be secured through the DCO. Appropriate routing of construction and decommissioning traffic on public roads and along access tracks will be pursuant to the CTMP.

## Operation (and maintenance)

11.6.12 Embedded mitigation measures that will be applied for the operational phase of the Proposed Development are summarised as follows:

a. Plant selection;

b. Design, location and orientation of Solar Stations, BESS and the Onsite Substation to minimise noise at receptors.

11.6.13 Plant that will be used in the Proposed Development has not yet been finalised. Consequently, a conservative approach has been taken when defining sound data for noise sources and it may be possible that quieter plant can be incorporated into the final design. Quieter plant would be the most effective way of controlling noise emissions. Noise source data for inverters has been referenced from SMA Solar (model Sunny Central Up) and is considered to represent a reasonable worst-case assessment.

11.6.14 The Proposed Development layout has been optimised to locate inverters as far as practically possible from sensitive receptors where the highest levels of noise were predicted. The illustrative site layout has been designed to locate Solar Stations at least 200m from residential properties.

11.6.15 Although the indicative Proposed Development layout has been optimised to minimise noise levels at sensitive receptors, there is a requirement to retain some flexibility on where infrastructure will be located on-site. Consequently, if there is a decision in the future to move noise generating infrastructure closer to sensitive receptors than shown in **PEI Report Volume 2, Figure 11-1: Receptor and Noise Monitoring Locations**, the Applicant commits that noise at sensitive receptors will be no higher than the levels

presented in the ES. The measures to achieve this are discussed in Section 11.6 and will be secured in the **Framework OEMP**.

11.6.16 Low frequency noise can be very difficult to predict with a high level of certainty and similarly hard to identify and resolve if present. This is because it can be generated by the unexpected interactions between system components and can be amplified by the geometry of the site and receptor buildings. The issue of low frequency noise will be considered during the detailed design post consent for the Onsite Substation and eliminated through design, or appropriately mitigated (isolation and attenuation measures) where appropriate and would be secured through the **Outline Design Parameters** in the DCO application.

### Decommissioning

11.6.17 Embedded mitigation measures would be secured within the **Framework DEMP** for the decommissioning phase. Best Practicable Means detailed at paragraph 11.6.3 would be implemented during construction works and secured through the DEMP, which is secured through DCO requirements.

11.6.18 Requirements for monitoring during the decommissioning stages are outlined in the **Framework DEMP**.

11.6.19 The effect of noise and vibration on nearby sensitive receptors can be minimised with a good communication strategy. Prior to construction works being undertaken, liaison will be undertaken with occupiers of sensitive receptors that may be adversely affected by construction noise and vibration. The communication strategy and noise complaint system will be secured through the DCO as part of the **Framework DEMP**.

## 11.7 Preliminary Assessment of Effects

11.7.1 The preliminary assessment takes into account the embedded mitigation measures as detailed in Section 11.6 above, the potential effects of the Proposed Development are assessed using the methodology as detailed in Section 11.4 of this Chapter.

### Construction (2031 to 2033)

#### Construction Noise Effects

***NGA1***

11.7.2 Noise predictions have been undertaken for NGA1, which will be undertaken during core daytime working hours. It is likely that construction activities will be carried out in phases, however confirmation on phasing is not finalised at this time. Noise predictions have assumed that all phases are being constructed at the same time which simulates a worst-case scenario. The results of construction noise predictions are summarised in **Table 11-11**.

## Table 11-11: Construction Noise Predictions for NGA1

| Receptor Reference | Representative Measured Daytime Ambient Noise Level $L_{Aeq,12h}$ dB | Indicative Free-Field Construction Noise Levels During Daytime Construction Activity (dB $L_{Aeq,T}$) |
|---|---|---|
| Below LOAEL | | |
| R1 | 45 | 64 |
| R2 | 45 | 60 |
| R4 | 54 | 61 |
| R7 | 47 | 61 |
| R12 | 48 | 62 |
| R14 | 50 | 60 |
| R15 | 50 | 64 |
| R16 | 55 | 64 |
| R17 | 55 | 64 |
| R18 | 47 | 63 |
| R22 | 80 | 64 |
| R24 | 46 | 63 |
| R25 | 46 | 60 |
| R30 | 50 | 60 |
| R31 | 50 | 58 |
| R32 | 48 | 58 |
| R33 | 48 | 62 |
| R37 | 47 | 63 |
| R40 | 51 | 64 |
| Above or equal to LOAEL and below SOAEL | | |
| R3 | 54 | 65 |
| R5 | 45 | 67 |
| R6 | 54 | 65 |
| R8 | 46 | 65 |
| R9 | 48 | 67 |
| R10 | 48 | 69 |
| R11 | 48 | 69 |
| R13 | 48 | 70 |
| R19 | 45 | 68 |

| Receptor Reference | Representative Measured Daytime Ambient Noise Level $L_{Aeq,12h}$ dB | Indicative Free-Field Construction Noise Levels During Daytime Construction Activity (dB $L_{Aeq,T}$) |
|---|---|---|
| R20 | 45 | 69 |
| R21 | 45 | 67 |
| R23 | 46 | 68 |
| R26 | 58 | 72 |
| R27 | 59 | 67 |
| R28 | 59 | 68 |
| R29 | 50 | 65 |
| R34 | 61 | 72 |
| R36 | 47 | 70 |
| R38 | 47 | 65 |
| R39 | 51 | 67 |
| R41 | 51 | 69 |
| R42 | 51 | 70 |
| R43 | 58 | 68 |
| R44 | 40 | 69 |
| R45 | 59 | 67 |
| R46 | 54 | 67 |
| R50 | 51 | 67 |
| R51 | 80 | 69 |
| Above or equal to SOAEL | | |
| R35 | 61 | 76 |

11.7.3 For NGA1, there is potential for exceedances of the SOAEL to occur at receptor R35 (Housham Grange, Newark Road). This is a **significant** effect.

11.7.4 There are several receptors that are predicted to experience noise levels exceeding the LOAEL but below the SOAEL. At this stage of the process, the duration of exposure to noise is not known as works will be mobile covering the extents of the site and transient in nature. However, occupants of nearby receptors can be more tolerant of high noise events if they are regularly communicated with and kept informed of timings and duration of high noise generating events. Paragraph 6.3 of BS5228-1 states that:

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

11.7.5 The communication strategy, which will be secured through the DCO process as part of the detailed CEMP, will ensure that occupants of affected properties will be notified of the timings and duration of works. Consequently, the preliminary assessment of construction noise assessment at all receptors except R35 identifies noise effect as **not significant.** More information on the potential duration of noise levels exceeding LOAEL will be provided in the ES.

11.7.6 There is a place of worship at R8 where construction noise levels of up to 65 dB LAeq,T are predicted. It is not anticipated that desirable internal noise levels (see paragraph 11.4.66) would be exceeded; however, as construction noise predictions are on the threshold of significance, consultation should be undertaken with the church to make sure that the timings of piling for Solar PV Mounting Structures avoid any periods when the church may be particularly sensitive to noise.

***NGA2***

11.7.7 Receptors and worst-case distances to potential locations of cable laying activities are identified in **Table 11-12**. Details on how noise predictions have been derived are detailed in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling**. Representative ambient noise data for receptors R47 to R49 will be included in the ES.

**Table 11-12: Cable Laying Construction Noise Effects – NGA2**

| Receptor Reference | Representative Measured Daytime Ambient Noise Level $L_{Aeq,12h}$ dB | Indicative Free-Field Construction Noise Levels During Daytime Construction Activity (dB $L_{Aeq,T}$) |
|---|---|---|
| Below LOAEL | | |
| R48 | - | 62 |
| R49 | - | 63 |
| Above or equal to LOAEL and below SOAEL | | |
| R1 | 45 | 67 |
| R47 | - | 68 |
| Above or equal to SOAEL | | |

No exceedances of SOAEL have been predicted

11.7.8 For NGA2, noise predictions at sensitive receptors indicate that the SOAEL will not be exceeded; however, the LOAEL is predicted to be exceeded at R1 and R47.

11.7.9 For continuous construction noise activities exceeding the LOAEL for a month or longer, a significant effect could be identified. Cable laying activity will be relatively short in duration and individual receptors would be exposed to noise for a period of less than a month. As such, NGA2 construction noise effects are **not significant**.

***NGA3***

11.7.10 For NGA3, HDD activities may last for up to three days and involve activities at a drill site and a reception pit. At this stage of the Proposed Development, three locations that require trenchless cable installation methods have been identified for the interconnecting cables between solar PV areas. For the purposes of the noise assessment, HDD has been identified as worst-case trenchless cable installation method due to the potential requirement for night-time working. Potential HDD locations are listed in **Table 11-13** and shown in **PEI Report Volume 2, Figure 3-1: Construction Compound and Access**.

**Table 11-13: Potential HDD Locations and Distance to Nearest Receptor**

| HDD ID | Description | Distance to Nearest Receptor |
|---|---|---|
| HDD1 | Under the A46 in the east end of the northern section | 160m |
| HDD2 | Under the A46 at the west end of the northern section | 235m |
| HDD3 | Under the river Witham | 290m |
| HDD4 | Under the river Brant | 460m |
| HDD5 | Under a line of trees | 900m |

11.7.11 It is noted that HDD operations will only occur during the construction phase (cable installation) and will not occur during decommissioning (as cables are either left in situ or pulled back through the ducting from discrete locations without the need for HDD). As the drilling activities at the entry pit will generate the highest level of noise, calculations of noise have been based on a reasonable worst-case assumption that all potential HDD sites are entry pits.

11.7.12 The most onerous noise criteria of 55 dB $L_{Aeq,T}$ for continuous HDD works is during the night-time period. Calculations of HDD noise (see **PEI Report Volume 2, Appendix 11-D: Construction and Operational Noise Modelling**) indicate that significant effects (an exceedance of SOAEL) may occur at night at sensitive receptors within 200 m of activities. Adverse levels of noise may occur at receptors farther away; however, embedded mitigation measures satisfy NPSE requirements that allow adverse impacts to occur providing reasonable steps have been taken to reduce these effects. Consequently, the assessment of HDD noise focuses on receptors within 200 m of a potential drill site location.

11.7.13 Receptors within 200 m of the Cable Corridor at likely HDD locations that may be subjected to significant effects have been selected. Results of noise calculations at receptors within 200 m of the Cable Corridor and Interconnecting Cable route boundaries are presented in **Table 11-14**.

**Table 11-14: HDD Noise Effects – NGA3**

| HDD ID | Receptor | Approximate Distance (m) | Calculated Noise Level $L_{Aeq,T}$ dB |
|---|---|---|---|
| HDD2 | R28 | 160m | 57 |

11.7.14 HDD activities are not predicted to exceed the SOAEL during the daytime, weekday evening and weekend at any receptors; however, if works extend into the night, the SOAEL may be exceeded. Noise calculations indicate that the SOAEL would be exceeded during night works that occur within 200 m of a receptor. Consequently, HDD activities at all identified locations have the potential to result in significant noise effects if they extend into the night-time period.

11.7.15 The hierarchy of mitigation measures for HDD activities listed in paragraph 11.7.15 will ensure that HDD activity noise effects will be reduced as far as reasonably practicable. This hierarchy includes the use of acoustic fencing which, if required, could provide 10 dB of noise attenuation. Consequently, noise from HDD activities at locations R28 would reduce to below the night-time SOAEL of 55 dB $L_{Aeq,T}$. As such, HDD noise effects are **not significant**.

11.7.16 For all works that are undertaken outside core work periods, a Section 61 consent (Control of Pollution Act, Ref. 11-1) would be applied for and will contain details on the methodology, mitigation, communication strategy and monitoring. If Section 61 consent is not applied for, it will be open for the local authority to serve a notice pursuant to Section 60 of that Act specifying actions to control noise if it considers it appropriate to do so, in accordance with the terms of that provision. It is not a pre-requisite for Section 61 consent to be in place at any time for the purposes of construction or operation of the Proposed Development although it is common practice for such applications to be made in advance.

**Construction Vibration Effects**

***NGA1***

11.7.17 It is generally accepted that, without a highly detailed understanding of the media, waveform, and frequency distribution, ground-borne vibration prediction methods are “beset with complexities and uncertainties” (Ref. 11-20). However, it is unlikely that typical construction and decommissioning working routines would generate levels of vibration at local receptors at a level where cosmetic damage would be expected to be sustained or cause adverse effects for local residents. The level of impact at different receptors will be dependent upon several factors including distance between the works, ground conditions and the specific activities being undertaken. Consequently, vibration effects are defined with reference to information in guidance documents identified in the following paragraph.

11.7.18 Surface plant, such as cranes, compressors and generators, are not recognised as sources of high levels of ground-borne vibration. Reference to Figure C2 of ‘Control of Vibration and Noise During Piling’ (Ref. 11-21) confirms that PPVs significantly less than 5 mm/s are generated by such

machinery, even at distances of only 10 m. For example, the indication is that a bulldozer would generate a PPV of approximately 0.6 mm/s and a 'heavy lorry on [a] poor road surface' would generate a PPV of less than 0.1 mm/s at 10 m. These values are well below levels at which cosmetic building damage are predicted to occur; the lower levels being 15 mm/s for predominantly transient vibrations and 7.5 mm/s for continuous vibrations at the base of residential or lighter framed commercial buildings. The aforementioned values are also below the 1.0 mm/s SOAEL (see **Table 11-5**) where it is likely that vibration in residential environments will result in complaints but can be tolerated if prior warning and explanation is given to residents.

11.7.19 Driven piling is assumed to be used for construction of PV modules as a worst-case scenario from the vibration perspective. Piling vibration calculations based on regression analysis of driven piling data from Table D.2 of BS 5228-2. This data relates to large scale driven piles and is referenced as there is no available vibration data for mini-pilers used in the construction of solar PV mounting frames. As such, calculated vibration levels are likely to be overestimated and conservative.

11.7.20 Regression analysis is presented in **PEI Report Volume 3, Appendix 11-D, Construction and Operational Noise Modelling** and identifies that the SOAEL is potentially exceeded at receptors within 60m of driven piling activities. Three receptors are identified at a distance of 60 m or closer to the driven piling activities within the Principal Site: R26, R35, and R50.

11.7.21 The minimum distance between any piling works for the construction of PV modules and the nearest receptor is approximately 15 m at R35. A PPV of 3.4 $mms^{-1}$ is calculated at this distance. The next closest property located at a distance of 50 m is R26, which may experience piling induced vibration of 1.2 $mms^{-1}$. R50 is at a distance of approximately 60 m and may experience piling vibration levels of 1.0 $mms^{-1}$.

11.7.22 At this stage of the Proposed Development, the duration of exposure to levels of vibration exceeding the SOAEL is not certain. Consequently, as the SOAEL is exceeded at these receptors when using large scale driven pile data which is worst case, construction vibration effects are identified as **significant**.

11.7.23 At all other receptors, ground borne vibration is below the SOAEL and would occur for a short duration so is concluded as **not significant**.

***NGA2***

11.7.24 The highest levels of vibration that would be generated by cable laying activities would be the use of vibratory roller during reinstatement. Vibratory rollers may generate adverse levels of vibration (i.e., exceeding 0.3 mm/s) at receptors within 50 m and significant levels of vibration (i.e., exceeding 1.0 mm/s) at receptors within 25 m.

11.7.25 No receptors within a distance of between 25 and 50 m of the Cable Corridor are identified in **Table 11-2**. One receptor within 25 m of the Cable Corridor

is identified in **Table 11-2** as R47, which may experience vibration up to a PPV of 1.9 $mms^{-1}$.

11.7.26 For PPV level above 1.0 m/s, BS 5228-2 (Ref. 11-10) states that:

*"It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents".*

11.7.27 For PPV vibration levels exceeding 1.0 mm/s, prior warning will be provided on the timings and duration of vibration generating activities. This will be secured through the **Framework CEMP,** which will be secured through the DCO. Given the short duration of these activities (i.e., less than a day) affecting individual receptors, prior warning is considered sufficient to offset significant effects. Accordingly, at this stage, it is anticipated that vibration at nearby sensitive receptors would be **not significant** for cable laying activities.

***NGA3***

11.7.28 HDD activities would generate similar levels of vibration to bored piling. Bored piling calculations are based on analysis of data from Table D.6 of BS 5228-2, which is presented in **Appendix 11-3, ES Volume 3**.

11.7.29 The nearest receptor (R17) to the potential HDD works is approximately 160 m away. The predicted vibration level from bored piling at this distance is lower than the LOAEL of 0.3 mm/s as detailed in **Table 11-5**. Therefore, ground borne vibration is **not significant** during HDD activities. As such, vibration at nearby sensitive receptors from HDD activities would be **not significant**.

**Construction Traffic Noise Effects**

11.7.30 The potential changes in road traffic noise from these roads as a result of the Proposed Development have been considered by calculating a CRTN BNL at 10 m next to roads within the CRTN prediction range and comparing the change. **Table 11-15** presents the results of the assessment. Refer to **PEI Report Volume 2, Figure 13-6: Surrounding Highway Network** for the locations of the road links shown in **Table 11-15**.

**Table 11-15: Construction Traffic Noise Assessment**

| Link Reference | Road Link | Baseline BNL dB | Baseline with Construction Traffic BNL dB | Change in BNL dB | Effect Level |
|---|---|---|---|---|---|
| RL1 | A46 west of Halfway House Roundabout | 76.0 | 76.1 | +0.1 | Negligible |
| RL2 | Halfway House Lane | 65.7 | 65.9 | +0.2 | Negligible |
| RL4 | A46 east of Halfway House Roundabout | 76.2 | 76.2 | 0.0 | Negligible |

| Link Reference | Road Link | Baseline BNL dB | Baseline with Construction Traffic BNL dB | Change in BNL dB | Effect Level |
|---|---|---|---|---|---|
| RL5 | Haddington Lane (between Fosse Lane and Old Haddington Lane) | 65.5 | 65.8 | +0.3 | Negligible |
| RL6 | Fosse Lane (north of Haddington Lane) | 63.5 | 63.5 | 0.0 | Negligible |
| RL7 | Old Haddington Lane (between Haddington Lane and A46) | 65.2 | 65.5 | +0.3 | Negligible |
| RL8 | A46 east of Fosse Lane | 75.6 | 75.6 | 0.0 | Negligible |
| RL9 | Haddington Lane (south of Old Haddington Lane) | 67.6 | 67.9 | 0.0 | Negligible |
| RL11 | South Hykeham Road | 66.3 | 66.5 | +0.2 | Negligible |
| RL12 | Church Road (east of Bassingham Road) | 67.1 | 67.1 | 0.0 | Negligible |
| RL13 | Bassingham Road (southwest of Bridge Road) | 59.6 | 60.2 | +0.3 | Negligible |
| RL14 | Haddington Lane (south of Stone Lane) | 62.2 | 62.5 | +0.3 | Negligible |
| RL16 | Moor Lane | 63.5 | 63.9 | +0.4 | Negligible |
| RL17 | Bassingham Road (between Moor Lane and Clay Lane) | 61.8 | 61.9 | +0.1 | Negligible |
| RL19 | Unnamed Road (south of Halfway House Roundabout) | 70.0 | 70.1 | +0.1 | Negligible |
| RL20 | Fosse Lane (between A46 and Haddington Lane) | 63.9 | 64.4 | +0.5 | Negligible |
| RJ1 | Halfway House Roundabout (Halfway House Lane/A46(E)/Unnamed Road/A46(W)) | 76.7 | 76.8 | +0.1 | Negligible |
| RJ2 | A46 EB On-Slip and Off-Slip (Fosse Lane(N)/Fosse Lane(E)/Haddington Lane) | 66.0 | 66.4 | +0.4 | Negligible |

| Link Reference | Road Link | Baseline BNL dB | Baseline with Construction Traffic BNL dB | Change in BNL dB | Effect Level |
|---|---|---|---|---|---|
| RJ3 | A46 WB On-Slip and Off-Slip (Haddington Lane(W)/Old Haddington Lane/Haddington Lane) | 68.0 | 68.3 | +0.3 | Negligible |
| RJ4 | Haddington Lane(N)/Butts Lane/Haddington Lane(S)/Stone Lane | 67.9 | 68.1 | +0.2 | Negligible |
| RJ5 | Bridge Road/Church Road/Bassingham Road | 67.5 | 67.6 | +0.1 | Negligible |
| RJ6 | Haddington Lane/Bassingham Road/Moor Lane | 65.3 | 65.3 | 0.0 | Negligible |
| RJ7 | Unnamed Road/Moor Lane/Norton Lane | 64.7 | 64.9 | +0.2 | Negligible |
| RJ8 | North Hykeham Roundabout (A46(N)/ Newark Road/ A46(S)/ Middle Lane) | 76.3 | 76.3 | 0.0 | Negligible |

11.7.31 Changes in road traffic noise due to construction traffic are identified as negligible and **not significant**.

11.7.32 Changes in road traffic noise have only been calculated from roads with flows of greater than 1,000 Annual Average Weekday Traffic (AAWT). This is because the CRTN (**Ref. 11-15**) calculations are unreliable for traffic flows below an AAWT of 1,000. Consequently, a qualitative assessment of potential construction traffic noise effects has been undertaken based on average hourly construction traffic flows.

11.7.33 The maximum number of average hourly vehicle movements along a low traffic flow road is approximately three movements per hour on The Avenue. Whilst this level of construction traffic may cause disturbance, construction traffic flows are not considered of sufficient magnitude to result in an adverse effect i.e., "*Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response* " (referenced from PPGN noise exposure hierarchy table – reproduced in **PEI Report Volume 2, Appendix 11-A: Noise and Vibration Policy and Legislation**). Consequently, construction traffic noise effects on low flow roads are considered to be, at worst, negligible and **not significant**.

## Operation (and Maintenance)

### Operational Noise

11.7.34 For the purpose of this assessment plant are assumed to operate continuously so there will not be any noticeable impulsive or intermittent characteristics from plant noise emissions experienced at the surrounding receptors. Transformers can have tonal features, although noise emissions from central inverters will be dominated by the cooling fans such that any tonal features of the transformers will not be noticeable. However, overall plant noise emissions will likely be experienced at receptors as a distinctive continuous and steady hum; therefore a 3 dB correction to account for noise that is 'distinctive against the residual acoustic environment' has been applied in determining the rating level as per BS 4142 guidance in paragraph 11.4.59.

11.7.35 Details of the operational noise modelling methodology are provided in **PEI Report Volume 3, Appendix 11-D: Construction and Operational Noise Modelling.**

11.7.36 As the night-time period provides the most onerous assessment criteria and operational noise is assumed to be consistent, the assessment presented in **Table 11-16** considers night-time noise only.

**Table 11-16: Operational Noise Effects**

| Receptor Reference | Lowest Measured Background Level LA90,1h dB | LOAEL / SOAEL (Night-time) dB | Predicted Rating Level LAr,Tr dB |
|---|---|---|---|
| Below LOAEL | | | |
| R22 | 51 | 51/61 | 32 |
| R25 | 34 | 34/44 | 29 |
| R27 | 42 | 42/52 | 40 |
| R28 | 42 | 42/52 | 41 |
| R30 | 33 | 33/43 | 30 |
| R31 | 35 | 35/45 | 26 |
| R32 | 33 | 33/43 | 28 |
| R33 | 33 | 33/43 | 31 |
| R34 | 45 | 45/55 | 38 |
| R35 | 45 | 45/55 | 41 |
| R44 | 52 | 52/62 | 36 |
| R45 | 42 | 42/52 | 39 |
| R51 | 51 | 51/61 | 35 |
| Above or equal to LOAEL and below SOAEL | | | |
| R1 | 27 | 30/40 | 35 |

| Receptor Reference | Lowest Measured Background Level LA90,1h dB | LOAEL / SOAEL (Night-time) dB | Predicted Rating Level LAr,Tr dB |
|---|---|---|---|
| R2 | 27 | 30/40 | 33 |
| R3 | 28 | 30/40 | 36 |
| R4 | 28 | 30/40 | 32 |
| R6 | 28 | 30/40 | 36 |
| R7 | 24 | 30/40 | 33 |
| R8 | 32 | 32/42 | 32 |
| R9 | 29 | 30/40 | 32 |
| R10 | 29 | 30/40 | 37 |
| R11 | 28 | 30/40 | 36 |
| R12 | 28 | 30/40 | 33 |
| R13 | 28 | 30/40 | 36 |
| R14 | 30 | 30/40 | 30 |
| R15 | 30 | 30/40 | 35 |
| R16 | 29 | 30/40 | 37 |
| R17 | 29 | 30/40 | 30 |
| R18 | 24 | 30/40 | 35 |
| R19 | 29 | 30/40 | 37 |
| R20 | 29 | 30/40 | 36 |
| R21 | 29 | 30/40 | 35 |
| R23 | 34 | 34/44 | 35 |
| R24 | 34 | 34/44 | 34 |
| R29 | 33 | 33/43 | 36 |
| R36 | 30 | 30/40 | 39 |
| R37 | 30 | 30/40 | 32 |
| R38 | 30 | 30/40 | 35 |
| R39 | 30 | 30/40 | 34 |
| R40 | 30 | 30/40 | 32 |
| R41 | 30 | 30/40 | 37 |
| R42 | 30 | 30/40 | 39 |
| R43 | 33 | 33/43 | 41 |
| R46 | 28 | 30/40 | 39 |
| R50 | 30 | 30/40 | 33 |

| Receptor Reference | Lowest Measured Background Level LA90,1h dB | LOAEL / SOAEL (Night-time) dB | Predicted Rating Level LAr,Tr dB |
|---|---|---|---|
| Above or equal to SOAEL | | | |
| R5 | 27 | 30/40 | 41 |
| R26 | 33 | 33/43 | 46 |

11.7.37 The SOAEL is predicted to be exceeded at two receptor locations (R5 and R26) so operational noise effects at these receptors are identified as **significant**.

11.7.38 The LOAEL is exceeded at some receptors locations (as detailed in **Table 11-16** above) and adverse levels of noise are identified. The NPSE (Ref. 11-6) states 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".*

11.7.39 Reasonable steps to reduce noise are covered in section 11.6 and have been applied in noise predictions. Consequently, although adverse levels of noise are identified at some receptors, NPSE requirements are complied with through provision of embedded mitigation.

**Equipment Replacement Works**

11.7.40 During the proposed 60-year operational life of the Proposed Development, site-wide replacement of the solar PV panels, inverters, batteries and other equipment may be required in line with the design life of these components, as explained in **PEI Report Volume 1 Chapter 3: The Proposed Development**. Site-wide replacement of these components will be similar to those assessed in NGA1; however these activities will be planned to occur in stages, which means that replacement activities will be of much lower intensity compared to construction phase.

11.7.41 For the purposes of the Noise and Vibration assessment these equipment replacement works are assumed (as a worst-case scenario) to be similar to those assessed in NGA1. As such, there is potential for significant effects to occur at R35. As the level of maintenance works that may be required is uncertain at this stage of the Proposed Development, any identification of significant effects based on NGA1 is conservative. More information will be provided in the ES on effects during maintenance works.

## Decommissioning (2093 to 2095)

11.7.42 Noise effects during the decommissioning phase of the Proposed Development will be similar or less than noise effects during the construction phase as each phase will utilise similar heavy plant. Decommissioning noise is likely to be of shorter duration and most probably without drilling or excavation noise along the cable routes. The noise assessment presented

for the construction phase is therefore considered representative (or an overestimate) of the decommissioning phase. As such, the construction noise assessment identifies any likely significant effects that may occur during decommissioning. A more detailed decommissioning noise assessment will be provided in the ES.

## 11.8 Additional Mitigation and Enhancement

### Construction Noise and Vibration

11.8.2 Significant construction noise effects due to NGA1 are identified at R35. This is considered to be a precautionary significant effect as construction noise assumptions are conservative and likely to over-estimate noise levels. However, it is anticipated that additional mitigation measures in the form of temporary, mobile acoustic screening could be implemented to reduce noise levels below the SOAEL. Construction assumptions and any requirement for additional mitigation measures will be explored in preparation of the ES and commitments will be made to secure additional mitigation within the Framework CEMP.

11.8.3 Three properties (R26, R35 and R50) are identified as located at 60 m or closer to the Principal Site. These properties may experience temporary exceedances of the SOAEL if driven piling is undertaken at a distance of 60 m or closer. This is considered to be a precautionary approach to construction vibration and likely to over-estimate vibration levels. A review of construction vibration assumptions and any requirement for additional mitigation measures will be explored in the ES to avoid exceedances of the SOAEL.

### Operational Noise

11.8.4 Significant operational noise effects are identified at two receptor groups: R5, and R26. Operational noise is modelled as a worst-case covering both an AC-coupled and a DC-coupled layout. As such, noise levels are likely to be overestimated as only one of the options is likely to be brought forward. As such, the noise model will be refined and updated for the ES, and any required mitigation measures will be explored based on the results of the updated noise predictions.

11.8.5 Following statutory consultation, the ES will also take account of measured sound power levels and source parameters from current technology available on the market, which is currently being collated by the Applicant. This is expected to lower the impacts on noise associated with this noise source. The ES will consider fan loads and ambient temperatures, along with specifications from modern BESS, to more accurately predict the noise levels at receptors. This is expected to reduce the residual effects at nearby receptors, and the results in this chapter therefore represent a worst-case preliminary estimate at this stage

## 11.9 Residual Significant Effects and Conclusions

11.9.1 **Table 11-17** and **Table 11-18** summarise the residual significant effects during the construction and operational phase of the Proposed Development on noise and vibration sensitive receptors following implementation of mitigation. Decommissioning noise and vibration effects are, for the purposes of the preliminary assessment identified as equivalent to but no worse than significant effects identified during the construction phase. A detailed decommissioning noise and vibration assessment will be included in the ES.

## Table 11-17: Summary of Significant Residual Effects (Construction)

| Receptor | Sensitivity (value) | Description of impact | Additional mitigation/ enhancement measure | Magnitude of impact after additional mitigation | Residual effect after additional mitigation |
|---|---|---|---|---|---|
| R35 | Residential | NGA1 construction noise | To be confirmed in the ES | Above or equal to SOAEL | Significant |
| R26, R35, R50 | Residential | NGA1 construction vibration | To be confirmed in the ES | Above or equal to SOAEL | Significant |

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

| Receptor | Sensitivity (value) | Description of impact | Additional mitigation/ enhancement measure | Magnitude of impact after additional mitigation | Residual effect after additional mitigation |
|---|---|---|---|---|---|
| R5, R26 | Residential | Operational noise | To be confirmed in the ES | Above or equal to SOAEL | Significant |

## 11.10 Cumulative Assessment

11.10.1 This section presents a preliminary assessment of the potential for cumulative effects to arise between the Proposed Development and other proposed and committed plans and projects including other developments (referred to as 'Cumulative Schemes') within the surrounding area.

11.10.2 This preliminary assessment has been made with reference to the methodology and guidance set out in **PEI Report Volume 1, Chapter 5: EIA Methodology and Consultation** and **Chapter 15: Cumulative Effects and Interactions** and shortlist of cumulative schemes identified also identified in **Chapter 15: Cumulative Effects and Interactions**.

11.10.3 Of the shortlisted developments listed in **Chapter 15: Cumulative Effects and Interactions**, and shown on **PEI Report Volume 2, Figure 15-2**, seven other developments are considered to have the potential for cumulative effects when considered alongside the Proposed Development due to being located within the 500m Zone of Influence for noise and vibration.

11.10.4 This preliminary cumulative effect assessment identified for each receptor those areas where the predicted effects of the Proposed Development could interact with effects arising from other plans and, or developments on the same receptor based on a spatial and, or temporal basis.

11.10.5 The Cumulative Schemes in **Table 11-19** were given consideration owing to their proximity to the Proposed Development or potential for impacts on the same sensitive receptors as the Proposed Development. The anticipated significance of potential construction and operational phase cumulative effects are presented in **Table 11-19**. Similar cumulative effects would be anticipated during decommissioning as those identified during the construction phase.

## Table 11-19: Preliminary Assessment of Cumulative Effects during Construction and Operation

| ID | Application reference | Cumulative Scheme description | Distance from the Proposed Development (m) | Preliminary Assessment of cumulative effects |
|---|---|---|---|---|
| 5 | 15/1347/OUT<br>Associated applications:<br>24/0456/RESM / 22/0174/RESM / 21/0276/RESM | Erection of up to 1,100 dwellings and 150 care/retirement units (C2/C3), the formation of a roundabout to Camp Road, A46 junction improvement works, public open spaces and associated service infrastructure (outline with means of access)<br>Associated applications:<br>- Reserved matters application for construction of private access road to Sheepwalks Farm pursuant to outline application 15/1347/OUT-Erection of up to 1,100 dwellings and 150 care/retirement units (C2/C3), the formation of a roundabout to Camp Road, A46 junction improvement works, public open spaces and associated service infrastructure (outline with means of access)<br>- Reserved matters application for the erection of 154 dwellings (Cell 6) with layout, scale, appearance, landscaping and access to be considered pursuant to outline planning application 15/1347/OUT - Erection of up to 1,100 dwellings and 150 care/retirement units (C2/C3), the formation of a roundabout to Camp Road, A46 junction improvement works, public open spaces and associated | 123 | **Construction:**<br>Construction of the Proposed Development is scheduled to commence in 2031. Construction of the cumulative development (ID5) is already underway so is anticipated to be complete prior to construction of the Proposed Development commencing. As such, there are unlikely to be any cumulative construction effects together with the proposed development.<br><br>**Operation:**<br>Construction and operation noise effects from the Scheme have been assessed on this cumulative development, which is identified as R51 in **Table 11-16** of this chapter. Noise and vibration effects during operation of the Proposed development are anticipated to be as **not significant**. |

| ID | Application reference | Cumulative Scheme description | Distance from the Proposed Development (m) | Preliminary Assessment of cumulative effects |
|---|---|---|---|---|
| | | service infrastructure (outline with means of access) (Resubmission of 20/1659/RESM)<br>- Application for approval of reserved matters for 181 dwellings (Cells 2a, 3a and 3b) comprising details of appearance, landscaping, layout and scale pursuant to Outline Planning Permission 15/1347/OUT - Erection of up to 1,100 dwellings and 150 care/retirement units (C2/C3), the formation of a roundabout to Camp Road, A46 junction improvement works, public open spaces and associated service infrastructure (outline with means of access) | | |
| 13 | 18/1560/EIASCO | Development of a 55km potable water pipeline from Lincoln to Grantham with associated infrastructure including partially buried 20 million litre bulk potable water storage tank, 3km connecting pipeline to Anglian Water (AWS) site at Bracebridge Heath (Bracebridge Spur), connecting sections of pipeline to the existing Central Lincs Trunk Main, partially buried 3million litre break tank and the erection of 3 pumping stations (the Grantham Resilience Pipeline Project). | 0 | **Construction:**<br>The redline boundary of the cumulative development (ID13) overlaps the Cable Corridor of the Proposed Development. Whilst there may be potential for overlapping construction activities, it is considered that this is unlikely due to the short duration required for the Proposed Development cable laying activities and cumulative development (ID13) pipeline laying activities. As such, cumulative construction effects are not anticipated to be significant.<br><br>**Operation:**<br>The cumulative development redline boundary overlaps with the Cable Corridor. Operational infrastructure |

| ID | Application reference | Cumulative Scheme description | Distance from the Proposed Development (m) | Preliminary Assessment of cumulative effects |
|---|---|---|---|---|
| | | | | associated with ID13 would be underground and any noise emitted from pipelines would not be perceptible above ground. As such, cumulative operational noise effects are not anticipated to be significant. |
| 34 | 20/1736/RESM | Residential development of 70 no. affordable dwellings (Cell 2B). Reserved Matters application comprising details of appearance, landscaping, layout and scale pursuant to outline planning permission 15/1347/OUT - Erection of up to 1,100 dwellings and 150 care/retirement units (C2/C3), the formation of a roundabout to Camp Road, A46 junction improvement works, public open spaces and associated service infrastructure (outline with means of access) | 257 | **Construction:**<br>Construction of the Proposed Development is scheduled to commence in 2031. By this time, it is anticipated that construction of the cumulative development would be complete. As such, there are not anticipated to any cumulative construction effects, so they are considered to be **not significant**.<br><br>**Operation:**<br>Both construction and operational noise effects from the Proposed Development have been assessed on this cumulative development, which is identified as R51 in **Table 11-16** of this chapter. Noise and vibration effects on this receptor during the construction and operation of the Proposed Development are anticipated to be **not significant**. |
| 49 | 22/0520/FUL | Installation of a ground based solar PV array (approximately 6KW) | 364 | **Construction:**<br>The cumulative development (ID49) is small in scale and construction activities are expected to be minimal. |

| ID | Application reference | Cumulative Scheme description | Distance from the Proposed Development (m) | Preliminary Assessment of cumulative effects |
|---|---|---|---|---|
| | | | | As such, cumulative construction noise and vibration effects are not anticipated to be significant.<br><br>**Operation:**<br>No operational noise assessment was submitted with the cumulative development application as operational noise emissions would be minimal. As such, cumulative operational effects are not anticipated to be significant. |
| 63 | EN010149 | Springwell Solar Farm is a proposed new solar farm with battery storage and supporting grid connection infrastructure in North Kesteven, Lincs. | 0 | **Construction:**<br>The redline boundary of the cumulative development overlaps the Cable Corridor of the Proposed Development. Whilst there may be potential for overlapping construction activities, it is considered that this is unlikely due to the short duration required for cable laying activities. As such, cumulative construction effects are anticipated to be **not significant**.<br><br>**Operation:**<br>No operational noise emissions would occur from cable laid in the Cable Corridor. As such, cumulative operational effects are **not significant**. |
| 86 | 23/0584/EIASCR<br>23/0390/EIASCO | Erection of 400MW Battery Storage Development incorporating 324no. Containerised Battery Storage Units, 54no. transformer/inverter blocks and 8 back up auxiliary transformers, 4no. storage | 0 | **Construction:**<br>The redline boundary of the cumulative development overlaps the Cable Corridor of the Proposed Development. Whilst there may be potential for overlapping construction activities, it is considered that |

| ID | Application reference | Cumulative Scheme description | Distance from the Proposed Development (m) | Preliminary Assessment of cumulative effects |
|---|---|---|---|---|
| | | containers for spare parts etc, substation comprising 4-6no. switchgear units, a control room and a HV compound with 2 Step-up Transformers, associated access tracks, inverter, switchgear substations, boundary treatments and CCTV - Request for Scoping Opinion | | this is unlikely due to the short duration required for the Proposed Development cable laying activities. As such, cumulative construction effects are anticipated to be **not significant**.<br><br>**Operation:**<br>No operational noise emissions would occur from cable laid in the Cable Corridor. As such, cumulative operational effects are **not significant**. |
| 95 | PL/0087/23 | For construction of the North Hykeham Relief Road (NHRR) between the A46 Hykeham Roundabout and the A15 Sleaford Road Roundabout at the end of the Lincoln Eastern Bypass, with junctions at South Hykeham Road, Brant Road and Grantham Road. The Proposed Scheme will comprise 8km of dual all-purpose carriageway with a 70mph speed limit (120kph design speed) and associated structures, earthworks, drainage, street lighting, traffic signals, utility diversions and installations, pipeline diversion, temporary materials processing, landscaping, and highway features | 0 | **Construction:**<br>Construction of the Proposed Development is scheduled to commence in 2031. The cumulative development is set to open in 2028 so, even allowing for delays, construction activities are anticipated to be complete prior to commencement of construction of the Proposed Development. As such, there are not anticipated to be any cumulative construction effects, so they are considered **not significant**.<br><br>**Operation:**<br>R31 is located within the operational noise study area of the cumulative development. Changes in road traffic noise at R31 are less than 1dB and would not be perceptible. As such, there would be no perceptible interaction between noise from the Proposed Development and noise from the cumulative |

| ID | Application reference | Cumulative Scheme description | Distance from the Proposed Development (m) | Preliminary Assessment of cumulative effects |
|---|---|---|---|---|
| | | | | development, therefore cumulative operational noise effects are anticipated to be **not significant**. |
| 99 | EIA/03/24 | For the installation of floating Solar PV arrays plus terrestrial based ancillary infrastructure and equipment, cable route and access | 499 | The cumulative development is in close proximity to receptors R32, R33 and R37 from **Table 11-16**. As such, there is potential for **significant** construction and operational cumulative effects. The cumulative development is at the screening stage and therefore no assessment of construction or operational noise have been submitted. Consequently, identification of cumulative significant effects is precautionary and will be reviewed in the ES stage based on any additional information available. |

## 11.11 References

Ref. 11-1 Her Majesty's Stationery Office (1974); Control of Pollution Act.

Ref. 11-2 Her Majesty's Stationery Office (1995); Environmental Protection Act.

Ref. 11-3 Department of Energy and Climate Change. (2023) Overarching National Policy Statement for Energy (EN-1).

Ref. 11-4 Department of Energy and Climate Change (2023) National Policy Statement for Renewable Energy Infrastructure (EN-3).

Ref. 11-5 Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework.

Ref. 11-6 Department for Environment Food and Rural Affairs (2010); Noise Policy Statement for England.

Ref. 11-7 Central Lincolnshire County Council (2023); Central Lincolnshire Local Plan Adopted 2023.

Ref. 11-8 Ministry of Housing, Communities & Local Government (2019); Planning Practice Guidance - Noise.

Ref. 11-9 British Standards Institute (2009 with 2014 amendments) BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites Part 1: Noise, BSi, London.

Ref. 11-10 British Standards Institute (2009 with 2014 amendments) BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites Part 2: Vibration, BSi, London.

Ref. 11-11 British Standards Institute (2003); BS 7445 – Description and environment of environmental noise – Part 1: Guide to quantities and procedures, BSi, London.

Ref. 11-12 British Standards Institute (2014 with 2019 amendments); BS 4142 – Methods for rating and assessing industrial and commercial sound, BSi, London.

Ref. 11-13 British Standards Institute (2014); BS 8233 – Guidance on sound insulation and noise reduction for buildings, BSi, London.

Ref. 11-14 World Health Organization (1999); Guidelines for Community Noise.

Ref. 11-15 Department of Transport/Welsh Office (1988), Calculation of Road Traffic Noise. Her Majesty’s Stationery Office, London.

Ref. 11-16 Institute of Environmental Management and Assessment (2014); Guidelines for Environmental Noise Impact Assessment.

Ref. 11-17 CadnaA®, registered trademark of Datakustik GmbH (Munich, Germany).

Ref. 11-18 ANC Acoustics & Noise Consultants BS4142:2014+A1:2019 Technical Note, Version 1.0 March 2020

Ref. 11-19 International Standards Organization (Part 1: 1993, Part 2: 1996) ISO 9613 – Acoustics – Attenuation of sound during propagation outdoors, ISO.

Ref. 11-20 Hiller, D. M., and G. I. Crabb, (2000); Groundborne Vibration Caused by Mechanised Construction Works. TRL Report 429.

Ref. 11-21 Selby, A.R. (1997). “Control of vibration and noise during piling.” Brochure publication, British Steel, UK