



# BEACON FEN ENERGY PARK

Planning Inspectorate Reference: EN010151

Non-Technical Summary  
ST19595-NTS-001  
January 2024



### Revision History

Revision	Revision date	Details	Authorized	Name	Position

### List of Outstanding Issues and Information

Outstanding issue/info.	Section/Paragraph	Responsibility	Action

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### Appendix A Indicative Mitigation Layout

# 1. INTRODUCTION

- 1.1.1 This report provides a summary, in non-technical language, of the Preliminary Environmental Information Report (PEIR) prepared in support of an application for the development of ground-mounted solar photovoltaic (PV) electricity generation and battery energy storage system (BESS), together with associated grid connection infrastructure (hereafter referred to as the 'Proposed Development'). It is proposed that the Proposed Development will have a generation capacity of approximately 400 megawatts (MW) and the BESS will have 600MW of capacity. The Proposed Development will export the electricity generated into the national grid via an underground connection to the existing nearby Bicker Fen 400kV substation.
- 1.1.2 The Site is made up of three key sections, the Solar Array Area, the Cable Route Corridor, and the Access Route Corridor. The Site is located at land 2.5km north of the village of Heckington and approximately 6.5km northeast of Sleaford, Lincolnshire. The Site is wholly within the administrative area of Lincolnshire County Council (LCC), with the majority of the Site and Cable Route Corridor within the administrative area of North Kesteven District Council (NKDC) and the southern extent of the Cable Route Corridor lying within the administrative area of Boston Borough Council (BBC). Figures 1 and 2 illustrate the location of the Site, and the site boundary.

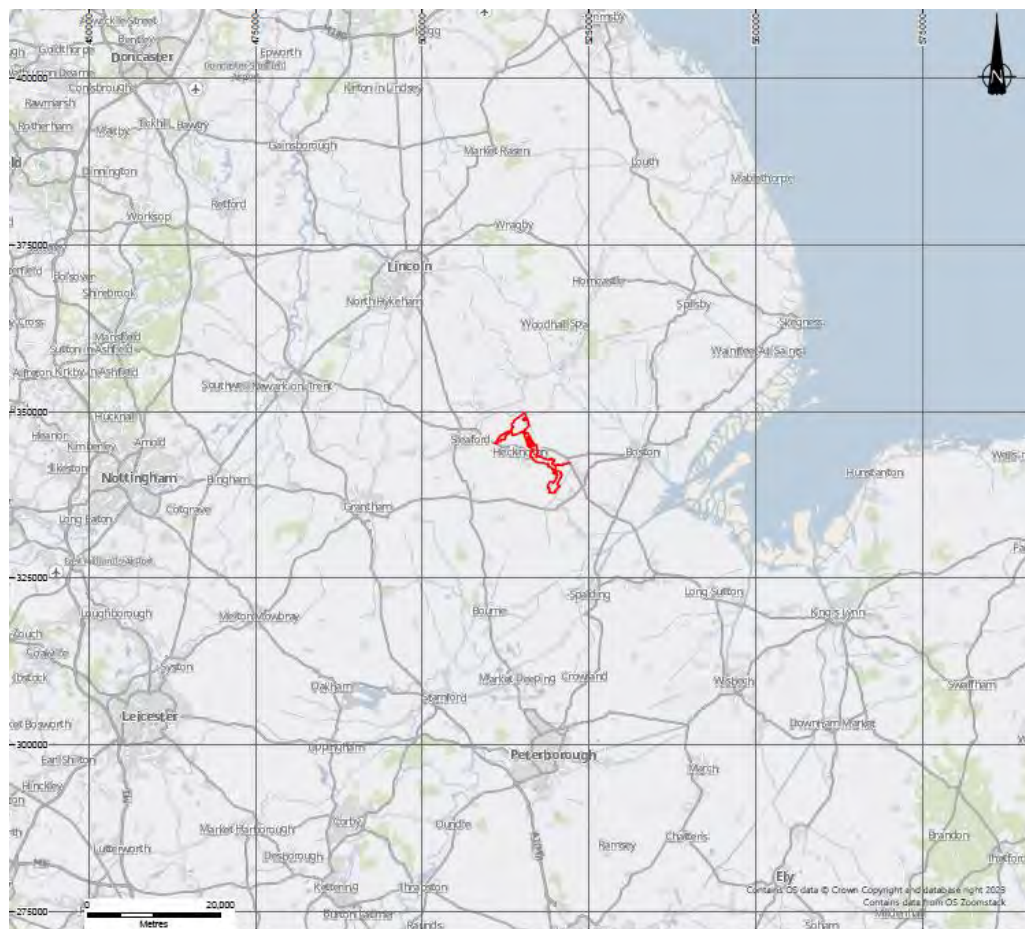
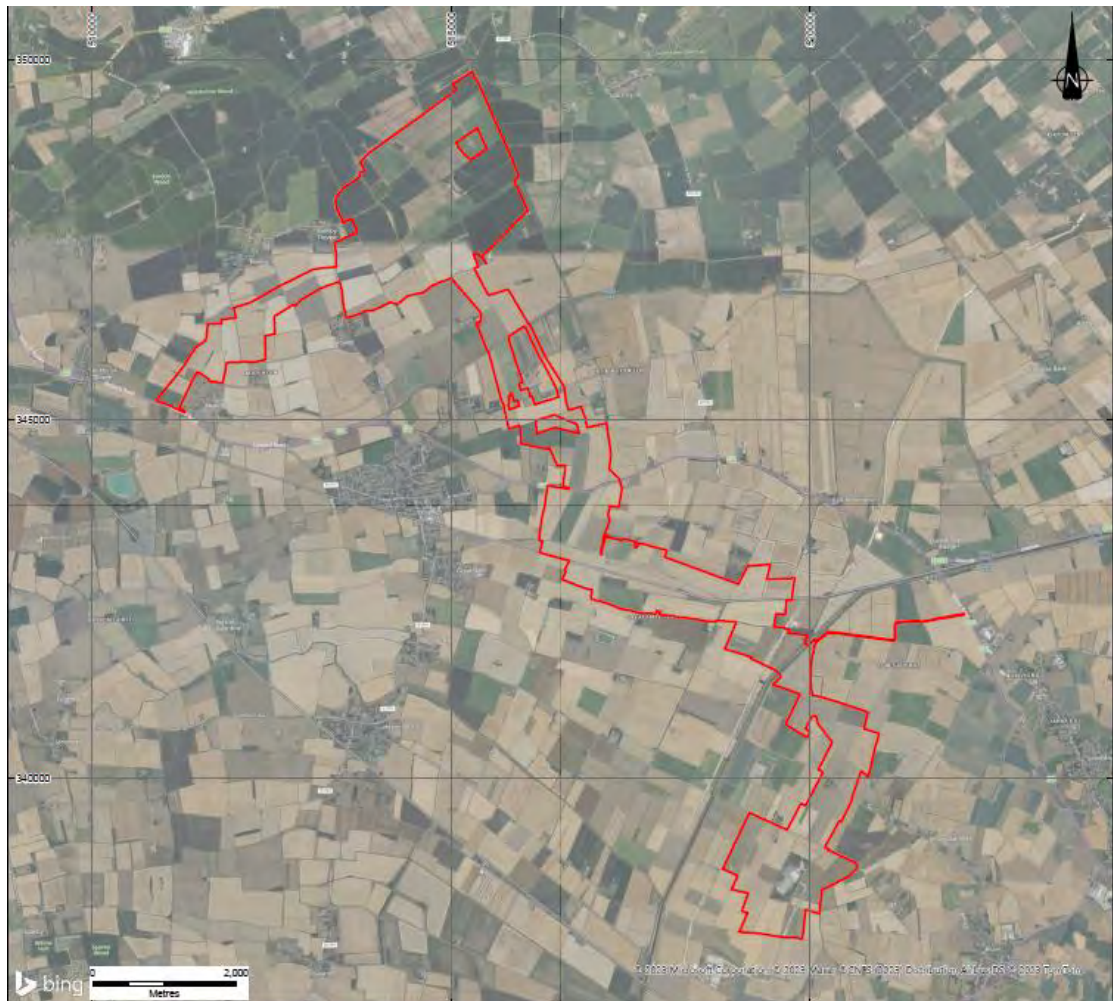


Figure 1 Site Location



**Figure 2 Site Boundary**

- 1.1.3 The PEIR has been prepared by Wardell Armstrong LLP (WA) on behalf of Beacon Fen Energy Park Ltd (the 'Applicant') in relation to an application for a Development Consent Order (DCO) for the Proposed Development. The purpose of the PEIR is to provide a preliminary assessment of the likely significant environmental effects from the construction, operational and decommissioning phases of the Proposed Development, to inform consultation prior to submission of the application.
- 1.1.4 The Proposed Development is classified as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008, meeting the criteria of an onshore generating station in England exceeding 50MW, and therefore requiring a DCO application. The DCO will be submitted to the Planning Inspectorate, with the decision to grant the DCO to be made by the Secretary of State (SoS).
- 1.1.5 This Non-Technical Summary provides a brief site description, a discussion of the proposal and then presents the preliminary assessment findings for each technical section of the PEIR. For more detailed technical information relating to the Proposed Development, the existing environmental conditions and findings of the preliminary impact assessment, reference should be made to the full PEIR.

## 2. DESCRIPTION OF THE SITE AND DEVELOPMENT

### 2.1 The Site and Surroundings

2.1.1 The Site is located approximately 6.5km northeast of the village of Sleaford and 2.5km north of Heckington in Lincolnshire. The Site is made up of three key sections, the Solar Array Area, the Cable Route Corridor, and the Access Route Corridor, as illustrated on Figure 3:

- The Solar Array Area, which is the land where the solar panels and BESS will be installed.
- The Cable Route Corridor, which is the area where the connection between the Solar Array Area and the existing Bicker Fen substation will be created.
- The Access Route Corridor, which is the area within which a bespoke access road to the Site will be constructed.

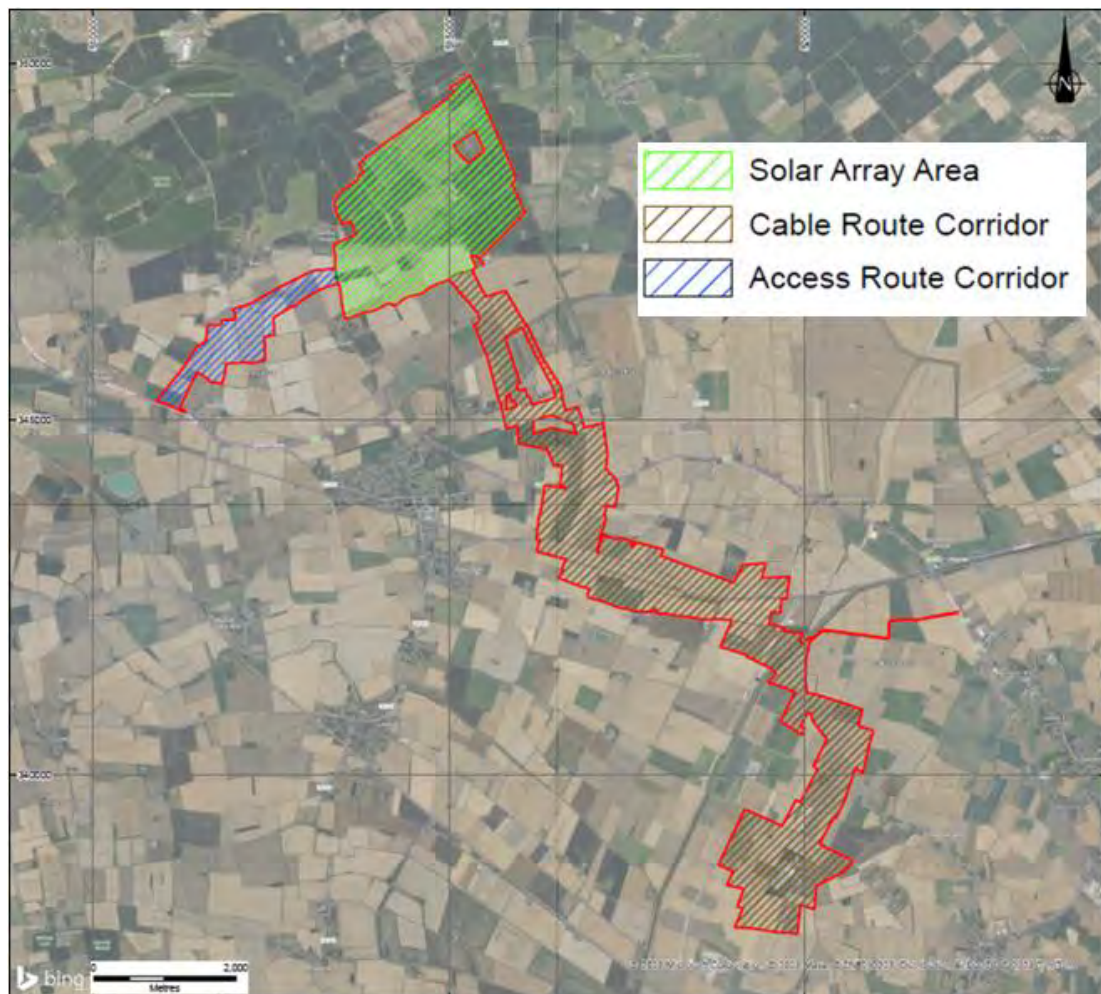


Figure 3 Site Areas

2.1.2 Further information on these three parts of the Site is set out below.

### **Solar Array Area**

2.1.3 The Solar Array Area is approximately 517ha in size and located to the north of Heckington, centred at National Grid Reference (NGR) 514682 347825, and wholly within the administrative areas of NKDC and LCC. The Solar Array Area is mostly made up of farmland, with sparse tree cover, generally limited to small areas of woodland and scattered hedgerow trees. The fields within the Solar Array Area vary in size and are separated typically by ditches and thick hedgerows. A small reservoir is located in the south-west of the Solar Array Area.

2.1.4 The Solar Array Area is bound to the south, west and north by local roads, and bound to the east by the Car Dyke. A short length of public right of way (LL/EWER/12/1) is located in the north eastern corner of the Solar Array Area east of Black Drove, but does not exist on the ground and is not connected at either end to other public rights of way or highways.

2.1.5 There are a number of individual properties in the surrounding area, as well as nearby villages to the Solar Array Area that include:

- Howell immediately to the south-west, with Heckington c. 1.7km beyond;
- Ewerby Thorpe immediately to the west, with Ewerby c. 1.1km beyond;
- Anwick c. 2.7km to the north-west;
- North Kyme c. 2.4km to the north; and
- South Kyme c. 1.5km to the east.

### **Cable Route Corridor**

2.1.6 The Cable Route Corridor is approximately 900ha in size and extends south-east from the Solar Array Area to Bicker Fen Substation, wholly within the administrative area of LCC. The majority of the Cable Route Corridor is located within the administrative area of NKDC, with the southern section located within BBC's administrative area.

2.1.7 The Cable Route Corridor has been set conservatively to allow sufficient flexibility in locating the cable route. The extent of the Cable Route Corridor will be reduced in the DCO submission, informed by results from environmental surveys and consultation feedback.

2.1.8 Land use within the Cable Route Corridor is also predominantly agricultural with sparse tree cover, generally limited to small woodland blocks and scattered hedgerow trees.

2.1.9 The section of the Cable Route Corridor that extends south from the Solar Array Area is located c. 1.1km east of Heckington at the closest point. There are also a number of individual properties located immediately adjacent to the Site boundary of the Cable Route Corridor, on Littleworth Drove and Star Fen Road where they cut across the Site. Other nearby villages to the Cable Route Corridor, not already listed above, include:



- Great Hale c. 1.1km to the west, with Little Hale and Helpringham beyond;
- East Heckington c. 1.2km to the north-east;
- Swineshead c. 2.1km to the east;
- Bicker Bar c. 1.8km to the south-east; and
- Donington c. 1.5km to the south.

2.1.10 Several local highways cross the Cable Route Corridor, and the A17 crosses east to west within the north-west section of the Corridor. The railway linking Heckington west to Sleaford and East to Swineshead cuts across the mid-section of the Corridor. There are a number of public footpaths within the Cable Route Corridor, including one alongside the South Forty Foot Drain which crosses the mid-section of the Corridor.

### Access Route Corridor

2.1.11 The Access Route Corridor is approximately 125 ha in size and extends approximately 3km south-west from the Solar Array Area to the A17. The Access Route Corridor is located wholly within the administrative areas of LCC and NKDC.

2.1.12 The Access Route Corridor has been set conservatively to allow sufficient flexibility in locating the bespoke access road. The extent of the Access Route Corridor will be refined in the DCO submission, informed by results from environmental surveys and consultation feedback.

2.1.13 Land use within the Access Route Corridor is predominantly agricultural. As for the Solar Array Area, tree cover is sparse and is generally limited to scattered hedgerow trees.

2.1.14 Where the Access Route Corridor extends south from the Solar Array Area it is located c. 400m south of Ewerby and c. 2.1km west of Heckington at the closest point. There are a small number of individual properties located adjacent to the Site boundary, on Asgarby Road and in Boughton and Asgarby. Other villages and towns near to the Access Route Corridor include:

- Kirkby la Thorpe c. 1km to the west; and
- Sleaford c. 3km to the west.

2.1.15 Asgarby Road crosses the Access Route Corridor and there four PRow within the Access Route Corridor.

### Environmental Designations

2.1.16 The Site is located within a Nitrate Vulnerable Zone, which is an area designated as being at risk from agricultural pollution.

2.1.17 Parts of the site, in the north-east of the Solar Array Area and the mid- and southern sections of the Cable Route Corridor, are at moderate to high risk of flooding.

2.1.18 There are a number of scheduled monuments and listed buildings within the nearby villages and settlements.

## 2.2 The Development Proposal

2.2.1 The Proposed Development will comprise of ground-mounted solar panels and BESS infrastructure connected via a cable route to the existing Bicker Fen National Grid 400kv substation located west of Bicker. There will be no need to develop a new National Grid substation to deliver the Proposed Development although minor extension works to the existing substation could be required.

2.2.2 The Proposed Development will have a capacity of approximately 400MW of electricity per year, and the BESS will have a capacity of 600MW. The Proposed Development would be capable of powering approximately 130,000 homes, avoiding up to 72,000 tonnes of CO<sub>2</sub> emissions annually.

2.2.3 The Proposed Development will include the following primary components:

- **Solar panels** (see Figure 4): Solar panels convert sunlight into electrical current (as direct current (DC)) by absorbing the sun's energy and generating a flow of electricity.
- **Inverters** (see Figure 5): Inverters convert the direct current (DC) produced by the solar PV modules into alternating current (AC) which is used by the National Grid.
- **Transformers** (see Figure 6): Transformers are required to 'step-up' the voltage of the electricity generated to a higher voltage prior to it reaching the substation. Separate transformers are required to increase the voltage of the electricity generated by the solar panels to support the inverters.
- **Battery Energy Storage Systems (BESS)**: BESS are used to store electricity as chemical energy during periods of surplus electricity generation by the solar panels and export it to the grid during periods when electricity demand exceeds generation.
- **Substation**;
- **Onsite Cabling**;
- **Fencing**;
- **Water Supply and drainage infrastructure**;
- **Cable Route Connection**: The Proposed Development will be connected to the National Grid via an underground cable connection between the Solar Array Area and the existing substation located at Bicker Fen.
- **Bespoke Access Road**: Access to be the Proposed Development will be provided via a bespoke access road from the A17.



Figure 4 Solar panels



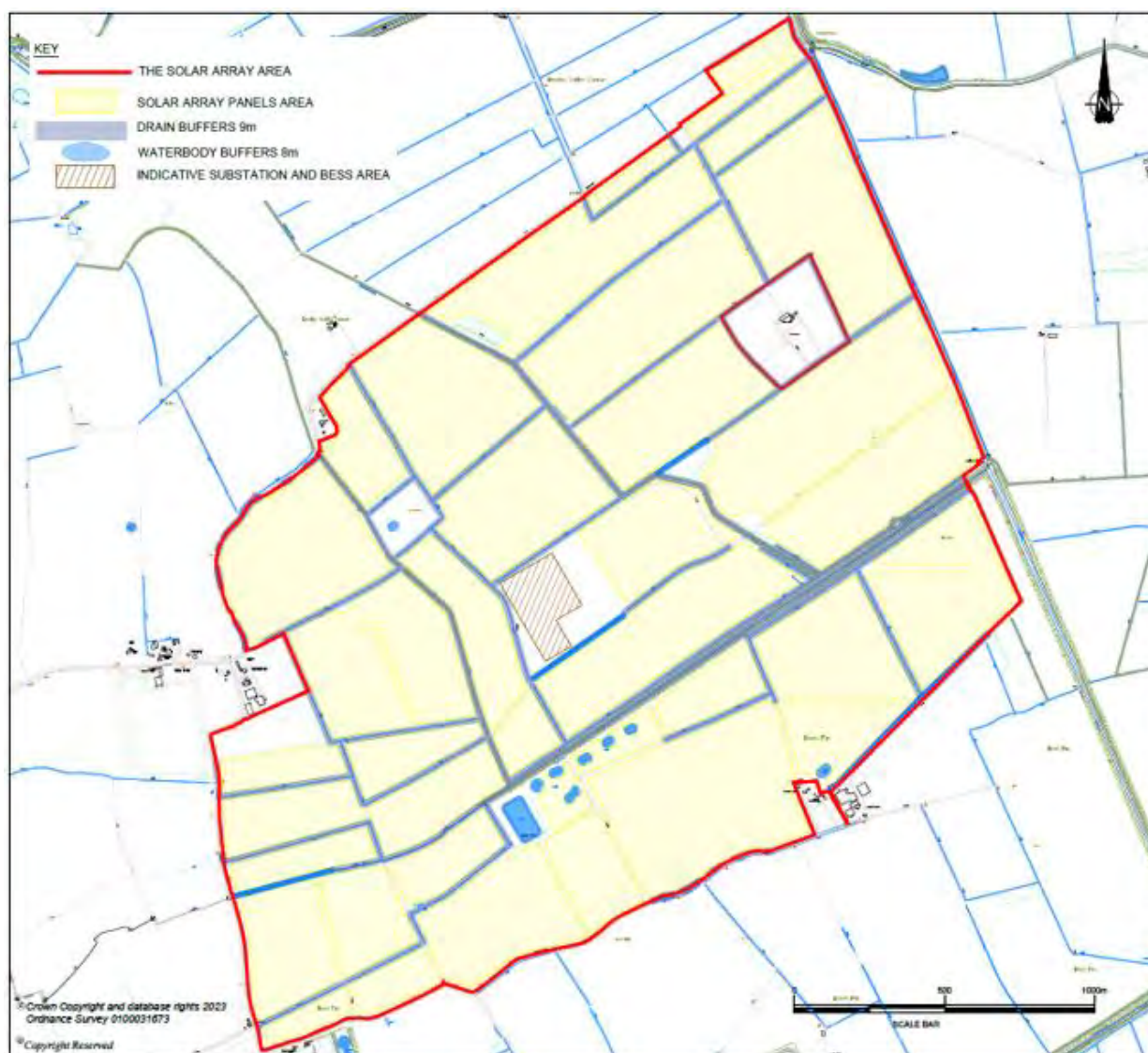
Figure 5 Typical String Inverter (image reproduced courtesy of Huawei)



**Figure 6 Typical transformer cabin (including switchgear) (Image reproduced courtesy of Selma)**

## Development Layout

- 2.2.4 Some of the design details remain flexible at this stage in the DCO process, with reasonable ‘worst-case’ assumptions made consistent with EIA good practice. For the PEIR, a worst-case layout (see Figure 7) which considers the full extents of development has been assessed in order to identify all potential significant effects of the Proposed Development.
- 2.2.5 Wherever flexibility is maintained in the design parameters, the maximum extent has been considered within assessments to ensure the likely worst-case impacts are reported in the PEIR. The maximum parameters considered within the PEIR include the following:
- Maximum footprint of the development;
  - Maximum size and heights of the development components; and
  - Capacities for output and storage.
- 2.2.6 The assessments undertaken to date have informed the production of a preliminary Indicative Mitigation Layout (Appendix A) which provides an illustration of the direction of the likely evolution of the Proposed Development. The Indicative Mitigation Layout incorporates key initial environmental considerations identified at this preliminary stage, including ecological, landscape and visual mitigation and enhancements, avoidance of areas of archaeological potential and buffers to residential properties.
- 2.2.7 It is intended that the Mitigation Layout will continue to evolve based on ongoing environmental assessment work and feedback from the Statutory Consultation. This will ensure the creation of a robust design for assessment within the ES which reduces environmental effects as far as practical whilst still delivering low-carbon electricity to contribute to meeting the UK’s Net Zero target.



**Figure 7 'Worst Case' Full Extents Layout**

## Phasing

- 2.2.8 The phasing of the Proposed Development would comprise construction, operation (plus maintenance and equipment replacement) and eventual decommissioning. Following the anticipated submission of the DCO application in 2024 and subject to DCO consent then being granted in 2025, construction is anticipated to begin in 2026/2027 and last for a duration of approximately 24 to 36 months. The operational life is anticipated to be approximately 40 years with decommissioning lasting a further 12 to 24 months to complete, after which the Site would be returned to its former use as agricultural land.
- 2.2.9 As part of the decommissioning phase, all PV modules, mounting structure, inverters and transformers would be removed from the Site and recycled or disposed of in accordance with good practice and market conditions at the time. Cabling would also be removed where possible.

# 3. ALTERNATIVES AND DESIGN EVOLUTION

## 3.1 Introduction

3.1.1 The PEIR includes information on realistic alternatives in line with good practice and regulatory requirements. The alternatives considered include the following:

- No Development Scenario: summarising the need for and benefits of the Proposed Development.
- Site Selection Process: The process undertaken by the Applicant in identifying a suitable site for development.
- Design Evolution – Site Extents: The evolution of the Site including the removal of Beacon Fen South and the alternatives considered in relation to the location and extent of the Cable Route Corridor.
- Design Evolution – Layout & Technologies: The alternative design and layout options, including alternative technologies.

## 3.2 No Development Scenario

3.2.1 As part of the consideration of alternatives, the likely future evolution of the Site without the Proposed Development has been considered alongside the need for the Proposed Development. It is considered likely that in the absence of the Proposed Development, the Site will continue in its current agricultural use. Whilst this scenario would eliminate the potential adverse environmental impacts as a result of the Proposed Development, it would not contribute to meeting the urgent need for significant amounts of new low-carbon electricity generation infrastructure as established in the Overarching National Policy Statement for Energy (EN-1). The valuable contribution to meeting UK net zero targets would therefore be lost. In addition, the Site will be returned to its current use once the Proposed Development is removed, therefore any impacts are not permanent.

## 3.3 Site Selection Process

3.3.1 The Applicant has undertaken a site selection process to determine the location of Beacon Fen Energy Park and confirm the Site's suitability. This process comprised of three stages:

- Stage 1 – identification of a 10km search area for potential solar development sites centred on the fixed point of connection to the Bicker Fen National Grid Substation to ensure a viable connection can be secured.
- Stage 2 – review of land within the study area identified in Stage 1 in order to discount sites based on land ownership and major environmental constraints, including flood risk and agricultural land quality. In accordance with emerging policy brownfield or non-agricultural sites were prioritised, followed by sites of lower agricultural land quality.

- Stage 3 – from the land that remains within the search area after Stage 2, identification of sites that would be potentially suitable and available for solar development of around 400-600 MW generation capacity, considering factors such as the size of the site, site topography, access requirements, and land available for a long lease at acceptable commercial terms.

3.3.2 An assessment and evaluation by environmental and planning specialists was undertaken to consider the potential site locations. This process identified the most suitable site location for development of a solar and BESS development taking into consideration potential environmental and social impacts, whilst also having viable and sufficient grid connection capacity.

## 3.4 Design Evolution – Site Extents

3.4.1 Key alternatives considered in relation to the evolution of the Proposed Development include the removal of Beacon Fen South and the location and extent of the Cable Route Corridor.

### Removal of Beacon Fen South

3.4.2 A key change to the proposals was the removal of a second solar panel array area to the south-west of Helpringham, referred to as Beacon Fen South (BFS). BFS was excluded from the Proposed Development following initial early (non-statutory) consultation due to the area being identified by Anglian Water for the proposed Lincolnshire reservoir. This project will not apply for (or receive) a DCO for some years later than Beacon Fen and awaiting clarity on the status of this reservoir would create uncertainty that would have caused delays to the Proposed Development. It is considered that excluding BFS from the Proposed Development is likely to result in fewer environmental effects than the alternative option of developing both solar array areas due to the greater scale of development required which would potentially result in greater environmental effects in combination.

### Cable Route Corridor

3.4.3 The Applicant has undertaken a number of rounds of review, considering environmental constraints and opportunities, in order to identify the most suitable cable route for the Proposed Development, as summarised below:

- Stage 1: Identification of the initial cable route search area between BFN, BFS and Bicker Fen substation as presented in the Scoping Report.
- Stage 2: Identification of potential routes within the search area.
- Stage 3: Reappraisal of route options following the removal of BFS to identify if a more direct route would be more suitable now that a connection to BFS was no longer required.

3.4.4 The above review process led to the identification of the current Cable Route Corridor, which is shorter than other alternatives and therefore reduces the area over which impacts will experience. It also avoids sensitive receptors including heritage assets and homes in and around the edges of Heckington and Helpringham.

- 3.4.5 The Cable Route Corridor considered within the PEIR is currently being refined through ongoing environmental surveys and assessment and a reduced cable corridor will be presented within the ES.

## 3.5 Design Evolution – Layout & Technologies

### Assessment of Alternative Technologies

- 3.5.1 A degree of flexibility has been maintained regarding a number of design matters that are not fixed at this stage in the DCO application. This is to ensure that there is sufficient flexibility to utilise the latest technologies at the time of construction, to enable potential improvements in efficiency and functionality beyond what can be achieved by current technologies.
- 3.5.2 Several technological design options have been considered including use of alternative renewable technologies, and the preferred options have been taken forward, taking into account the objectives of the Proposed Development and requirement for optimal functionality.

### Design Alternatives

- 3.5.3 Alternative design parameters and layouts have also been considered, informed by the results of environmental surveys and assessments. Key matters include:
- Substation and BESS Location
  - Access Routes

### Substation and BESS Location

- 3.5.4 Two options were considered in relation to the location of the substation and BESS compound within the Site. Option 1 was for the compound to be located centrally within the Solar Array Area; and Option 2 was for the compound to be located on the southern edge of the Solar Array Area, adjacent to the reservoir.
- 3.5.5 Following a review of environmental considerations it was determined that Option 1, in the centre of the Site, is the more suitable option. This provides greater opportunity for visual screening to be implemented, and maximises the distance from nearby properties.

### Access Routes

- 3.5.6 The Applicant has considered the following options for a bespoke access route to the Site (see Figure 8):
- Option 1: South from the Site to the A17, within the Cable Route Corridor (3.89km)
  - Option 2: South-west from the Site to the A17 (3.38km)
  - Option 3: East from the Site to the B1395, south of South Kyme (3.91km)
  - Option 4: East from the Site to the B1395, north of South Kyme (1.16km)
  - Option 5: North from the Site to the A153 (2.24km)



3.5.7 An initial desk-based review of the above options has been undertaken based on the information currently available which identified that Option 2 is likely to be the most suitable option in terms of environmental impact. It does not cross a main river and it also provides access directly from the A17, minimising potential impacts on the existing local highway network.

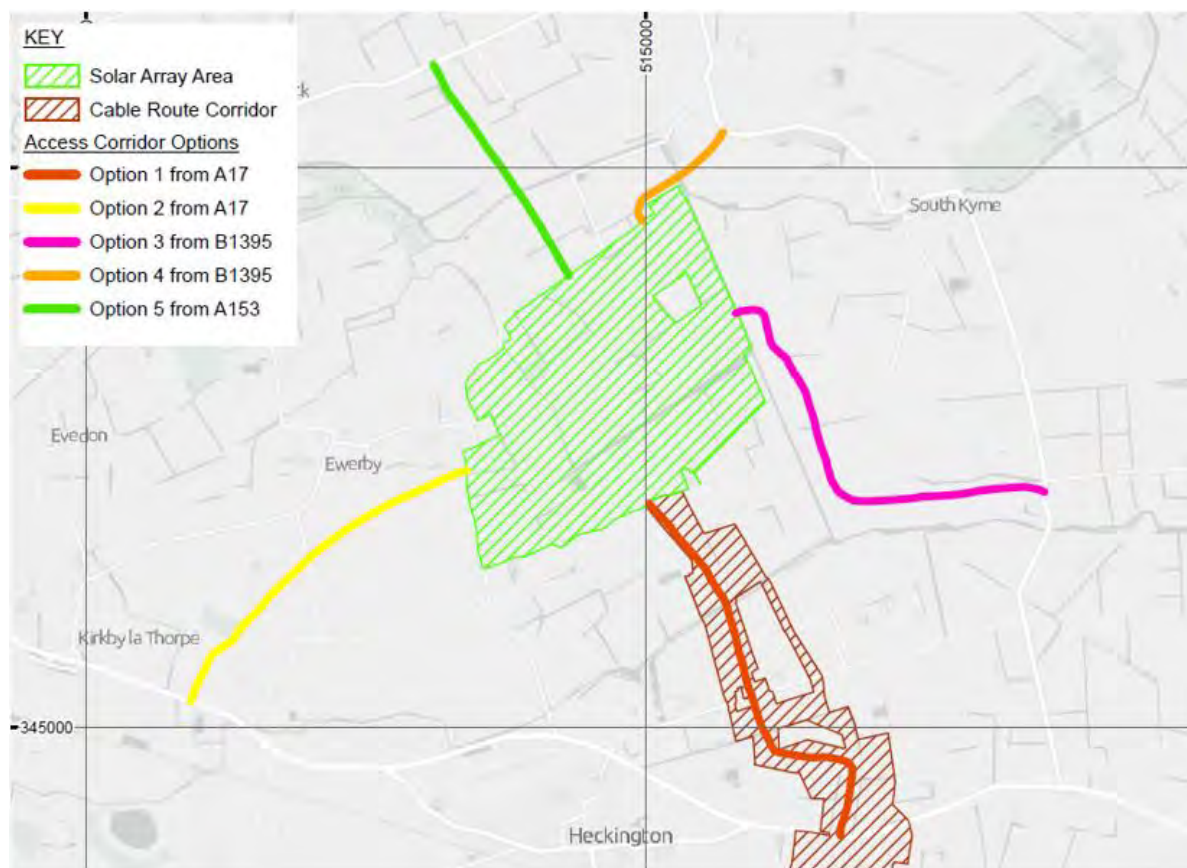


Figure 8 Access Corridor Options

## 4. SCOPE AND METHODOLOGY

### 4.1 Scope of Assessment

4.1.1 A PEIR is the first major output of the Environmental Impact Assessment (EIA) process provided to support statutory consultation and the DCO process. The PEIR sets out the environmental baseline conditions, a preliminary identification of the likely significant impacts of the Proposed Development and initial proposals to reduce or manage any significant adverse effects.

4.1.2 The scope of the EIA was agreed with the Planning Inspectorate and relevant consultees, including LCC, BBC and NKDC. The following environmental assessments have been undertaken as part of the PEIR:

- Landscape & Visual;
- Ecology;
- Cultural Heritage;
- Access & Traffic;

- Noise & Vibration;
- Water Resources;
- Climate Change;
- Glint;
- Soils & Agricultural Land;
- Socio-economics; and
- Air Quality.

4.1.3 In addition, a Ground Conditions Desk Study and Arboricultural Impact Assessment were undertaken as standalone assessments in order to inform the development design and required mitigation:

## 4.2 General Assessment Approach

4.2.1 For each topic under consideration, the method of assessment differs according to the specific guidance documents that relate to the discipline. However, each technical chapter broadly follows the below systematic approach to ensure the information required by the EIA Regulations is included:

- **Baseline Conditions:** A description of the relevant aspects of the current state of the environment and how it is expected to evolve in the absence of the Proposed Development, enabling identification of sensitive receptors that could be affected by the Proposed Development.
- **Assessment Methodology:** A description of the methods used within each subject area to assess potential impacts, explaining any assumptions or modifications to the general impact assessment methodology with reference to relevant technical guidance.
- **Limitations:** Description of any limitations identified to the assessment including the absence of information or other limitations (e.g. restriction on access) that have constrained the assessment in any way.
- **Embedded Mitigation:** A description of mitigation measures that have been incorporated within the Proposed Development in order to design out (e.g. through the adoption of best practice or design principles) potential adverse effects prior to impact assessment.
- **Assessment of Effects:** Undertaken in accordance with the methodology set out in order to identify the potential effects of the Proposed Development, prior to mitigation.
- **Mitigation:** Identification of any additional mitigation measures that would be used to reduce potential impacts to acceptable levels.
- **Residual Effects:** Identification of residual (remaining) environmental impacts and their significance after additional mitigation is applied.
- **Cumulative Effects:** Identification of cumulative (in-combination) effects.
- **Monitoring:** Description of the level of monitoring that could be necessary, over a defined period, to ensure that mitigation measures remain appropriate and maintain actual impacts within acceptable limits.

## 4.3 Cumulative Effects

4.3.1 Cumulative effects are the in-combination effects that need to be considered as part of an EIA. There are two key types of cumulative effects:

- Intra-Cumulative Effects: Effects occurring as a result of different impacts of the Proposed Development in combination with each other; and
- Inter-Cumulative Effects: Effects occurring as a result of the Proposed Development in combination with other nearby developments.

4.3.2 The nearby developments considered within the inter-cumulative assessment were identified through a staged process, summarised below.

4.3.3 A long list was initially created which included the following:

- Within the county of Lincolnshire:
  - All DCO applications / current NSIPS
- Within 5km from the Site boundaries:
  - Full planning applications for major developments
  - Lawful development certificate (major development)
  - EIA Scoping
  - Overhead line consent
  - Any other major projects of interest

4.3.4 The long list was then reviewed against the following criteria in order to identify the short list:

- Current status of schemes (e.g. under construction, constructed);
- Overlap in timing of construction and operational activities;
- Geographical overlap of potential impacts;
- The sensitivity and extent of common receptors;
- The scale, size and nature of the schemes in question; and
- Whether the application has been supported by an EIA.

4.3.5 A full list of the schemes considered is provided within the PEIR.

## 5. CONSULTATION

- 5.1.1 Consultation is a key stage during the preparation of DCO applications and within the EIA process. The Applicant has undertaken early and ongoing engagement to inform the design of the Proposed Development and also assist in the identification of potential environmental issues for consideration within the EIA.
- 5.1.2 The PEIR forms an important part of the consultation process, providing consultees with information on the likely significant effects of the Proposed Development.
- 5.1.3 Consultation will be ongoing throughout the preparation of the DCO application; however, it can broadly be divided into the following key stages:
- 5.1.4 Consultation will be ongoing throughout the preparation of the DCO application; however, it can broadly be divided into the following key stages:
- EIA Scoping
  - Early Non-Statutory Consultation
  - Statutory Consultation (the current stage)
- 5.1.5 In addition to the above key stages, the following has also been undertaken:
- A project website has been set up to provide up to date information on the Proposed Development and the planned timeline for consultation ([www.beaconfenenergypark.co.uk](http://www.beaconfenenergypark.co.uk));
  - Meetings have been held with statutory consultees to introduce the Proposed Development, and consult on specific matters including the development of the design; and
  - Information leaflets have been provided to nearby homes and businesses to give updates on the progress of the application.
- 5.1.6 Full details of the consultation undertaken in relation to the Proposed Development will be provided within a Consultation Report which will be submitted with the DCO application.

## 6. ENVIRONMENTAL ASSESSMENT

- 6.1.1 An overview of the preliminary information in relation to each of the environmental assessments being undertaken is provided below.

### 6.2 Landscape and Visual

- 6.2.1 The likely significant effects on nearby landscape and visual receptors have been considered, drawing on landscape and visual surveys undertaken between March 2023 and August 2023. Winter photography will be undertaken in early 2024 and included within the ES. Published Landscape Character Assessments at the regional and local levels have been reviewed

to inform the assessment of landscape effects on the site and at the local and regional levels.

- 6.2.2 The Site is not located within any national statutory protected landscape designations, nor any regional or local non-statutory landscape designations. Overall, the value of the landscape on the Site and within the immediate surroundings is considered medium.
- 6.2.3 Construction of the Proposed Development will result in changes to the landscape character of the Site and its surroundings including the change of land use from arable farmland to solar arrays, along with elements associated with construction such as construction trucks, access routes and temporary material stockpiles, influencing the presence of man-made features within the Site. The introduction of these will have significant effects to the landscape character of the Site during the construction and operational phases of the Proposed Development. However, the effects during construction are short term and reversible, and the effects during operation will reduce as the existing vegetation and proposed mitigation planting combine over time to integrate the Proposed Development within the landscape.
- 6.2.4 There is the potential for significant visual effects at the construction stage on nearby receptors, such as residents of Gashes Barn and Ewerby Thorpe Farm and users of the footpath within the north of the Site. A range of recreational and residential receptors in the proximity of the Cable Route Corridor and Access Route Corridor also have the potential for significant effects at the construction stage.
- 6.2.5 Following construction, there will be considerably fewer visual receptors that have the potential for significant effects, and these would be limited to those located close to the Proposed Development, such as Ewerby Thorpe Farm, The Grange or Gashes Barn.
- 6.2.6 Fifteen years following construction, the proposed planting will provide effective screening, reducing the effects to not significant for the majority of visual receptors with the exception of residents at Ewerby Thorpe Farm and Ewerby Thorpe Lodge.
- 6.2.7 At decommissioning, the potential effects will be very similar to the construction stage, with the exception of the Solar Array Area, where the effects will be considerably reduced as the key elements of the proposed green infrastructure will be matured and retained.

## 6.3 Ecology

- 6.3.1 Baseline data has been collected through a combination of desk study and field surveys including habitat and species surveys. These identified a number of key sensitive ecological features that could be exposed to adverse effects arising from the Proposed Development including the statutory designated Wash and North Norfolk Coast Special Area of Conservation (SAC), one Site of Special Scientific Interest (SSSI), ten Local Wildlife Sites, and habitats and species within the Site, including reptiles, birds, bats, badgers and otters.
- 6.3.2 Construction of the Proposed Development has the potential to cause significant loss of or damage to habitats and/or species including woodland and hedgerows, as well as increased levels of disturbance (i.e. noise) and

increased presence of humans in areas used by wildlife. However, mitigation measures will be implemented to avoid adverse impacts and ensure key retained ecological habitats are protected. A Construction Environmental Management Plan (CEMP) will be produced to ensure construction works are carried out in an environmentally responsible manner. Mitigation measures include the creation of buffer zones around areas of woodland, hedgerows, ditches and badger setts; use of acoustic and visual barriers; storage of hazardous materials away from sensitive features and water courses; minimisation of lighting; and creation of new habitats.

- 6.3.3 The CEMP will also deliver specific mitigation to protected species including Great Crested Newts, reptiles, birds, bats, otters and water voles such as the improvement of habitats within the open buffer areas (i.e. adjacent to ditches) which will support ground nesting birds and increase the density of birds supported, replacing the areas lost.
- 6.3.4 There are no further impacts resulting in significant effects anticipated to occur during the operational phase, as whilst occasional maintenance visits will be required, these will be short-term and on a small scale. There is potential for the Proposed Development to have significant beneficial impacts on the conservation status of habitats and the species they support as the Site will no longer be of agricultural use, allowing the creation of new habitats such as lowland meadows; enhancement of existing habitats such as hedgerows; and a reduction in the amount of chemicals (i.e. fertilisers, pesticides and/or herbicides) applied onto land that runoff into water bodies. Habitats will be retained, where possible, during decommissioning.
- 6.3.5 Monitoring of habitats and species will be undertaken in accordance with species licenses and/or precautionary method statements and to deliver Biodiversity Net Gain.
- 6.3.6 Following provision of the above mitigation measures, monitoring and remedial actions there would be no significant adverse impacts overall with residual impacts likely to be beneficial to the habitats and species, leading to an overall slight increase in the ecological value and diversity of habitats within the Site.

## 6.4 Cultural Heritage

- 6.4.1 Preliminary archaeological evaluation works have been undertaken which will be refined and revisited as the scheme design progresses. Baseline information has been gathered from the Lincolnshire Historic Environment Record, Historic England datasets, site walkover surveys, aerial assessments and fieldwork.
- 6.4.2 There is potential for archaeological remains to be present within the Solar Array Area, dating from the prehistoric period onwards and peaking from the early medieval period, associated with the Car Dyke, known farmsteads, agricultural practices, nearby settlements and transient activity. There is no evidence for the presence of archaeological remains within the Site of high (National) significance.
- 6.4.3 No designated heritage assets were identified within the boundary of the Site. A number of sensitive cultural heritage receptors have been identified within

the Site boundary and its vicinity including one Scheduled Monument, two Grade II\* Listed Buildings and four Grade II Listed Buildings within 1km of the Site. Six sensitive receptors of an archaeological nature found within the Site boundary such as a Medieval pottery figure found on Ewerby Common, as well as other key sensitive receptors including Gashes Barn, a non-designated heritage asset.

- 6.4.4 Construction of the Proposed Development could potentially impact archaeological remains and other heritage assets including the historic landscape character within the Site. This would be a result of ground disturbance associated with the installation of the solar panels and the change in land use from agricultural land to energy infrastructure. Temporary impacts during the construction phase would arise from noise and visual disturbance occurring as a result of the presence of plant, cranes, vehicles, flashing lights, etc. within the Site, however these are not considered to be significant.
- 6.4.5 The operational phase could impact buried archaeological remains within the Site through maintenance/repair works and the removal of infrastructure and potential removal of landscaping respectively resulting in significant effects to four receptors within the vicinity of the Site including the remains of a medieval monastery, moated manor house, fishpond and post-medieval garden, Kyme Tower and the Church of St Mary and All Saints.
- 6.4.6 No additional mitigation has been identified at this stage. This is likely to be identified through on-going work and investigations ahead of the preparation of the ES. A Cultural Heritage Management Plan (CHMP) will be utilised to mitigate potentially significant impacts. The CHMP will include measures such as the use of recessive finishes to infrastructure equipment and fencing to protect the significance of heritage assets, and the use of an archaeological watching brief.

## 6.5 Access and Traffic

- 6.5.1 An assessment has been undertaken of the transport related effects on the environment. In particular, it considered the effects of perceived division (severance) to communities, delays, amenity and safety of motorised and non-motorised road users.
- 6.5.2 Access to the solar array site will be via the A17 and a new bespoke access road, which includes a small section of Asgarby Road. Access to the Bicker Fen substation site is via the existing National Grid haul route from the A52. The study area therefore comprises the site access roads, the A17 from the Kirby la Thorpe interchange in the west to the A52 interchange in the East and the A52 as far south as the National Grid haul route to Bicker Fen substation. Baseline data collection comprises the traffic conditions of the highway network, levels of use of the network and road traffic accident records.
- 6.5.3 The A17 was identified as the principal road in the vicinity of the Site, maintained by LCC. The existing recorded traffic flows on the A17 comprise c. 18,000 vehicles a day on average, including c. 16% Heavy Good Vehicles (HGV). Minimal levels of cycling are recorded within the vicinity of the Site and there are no pedestrian facilities. No recurring accident problems have been identified. Potential key sensitive receptors principally comprise the individual residential and commercial premises that have vehicular access onto the A17,.

- 6.5.4 Detailed estimates of construction workers specific to the Proposed Development have not yet been undertaken, however, 73 vehicle movements per day including 49 HGV movements are estimated for the combined total of construction traffic including construction workers travelling to the site.
- 6.5.5 During construction traffic flows on the A17 will increase by 0.4% and HGV traffic by 1.6%, resulting in a negligible change to the traffic flows on the A17 and no significant effect to driver delay, accidents and safety.
- 6.5.6 Traffic impacts will be reviewed as part of a Transport Assessment (TA) report which will be agreed with Lincolnshire County Council, the local highway authority, and accompany the forthcoming ES. A CTMP (Construction Traffic Management Plan) and a DMP (Delivery Management Plan) will be submitted as part of the full ES to minimise the impacts heavy vehicles have on the safety of road users of the A17 including the standard safety mitigation measures associated with the transportation of abnormal loads such as transformers and other energy infrastructure, including potential rolling road closures.
- 6.5.7 Monitoring of the development traffic impacts will be undertaken via the CTMP, the DMP and a construction staff Travel Plan which will encourage use of minibuses rather than cars and monitor construction staff travel patterns.
- 6.5.8 In summary, the effects resulting from the increase in traffic generated by the Proposed Development are assessed as negligible and not significant, including cumulative traffic effects with the Heckington Fen development.

## 6.6 Noise and Vibration

- 6.6.1 An assessment has been undertaken of potential noise and vibration impacts from the construction and decommissioning phases of the Proposed Development on existing sensitive receptors (ESR) as well as the potential impact of changes in noise level at existing receptors during the operational phase. ESRs were identified by a desktop study of the surrounding land, using available maps and aerial photography, as locations likely to experience the greatest impact due to noise from the Proposed Development.
- 6.6.2 Baseline noise levels were established at eight ESRs by carrying out background noise surveys over 24 hours. Software was used to create a 3D noise model accounting for each piece of noise emitting equipment associated with the Proposed Development. Noise prediction calculations have been undertaken to predict the noise levels which are likely to be generated by typical operational activities associated with the Proposed Development and the resultant noise levels at ESR locations.
- 6.6.3 Noise is anticipated to be generated during construction of the Proposed Development, caused by works/ activities associated with site preparation, plant installation and cable laying. The construction phase is only short term and these noise levels can be mitigated by the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the noise. The impact of noise and vibrations from construction phase activities is assessed as not significant due to the short-term period and best working practice mitigation being in place.
- 6.6.4 Best working practice will be implemented during each phase of the construction works at the Site and relevant standards and guidance will be



adhered to, to further mitigate noise generation. This will be set out in the CEMP. Measures will include regular maintenance of machinery to control noise emissions, adhering to the restriction of operating hours imposed by the local authority; and ensuring engines are turned off when possible. Vibrations generated by earthworks may have a short-term impact however this is not considered to be significant owing to the distance between the ESRs and Proposed Development, and construction only lasting for short periods at any one location.

- 6.6.5 Based on the current worst-case layout, operational noise levels are predicted to exceed background levels at ESRs located closest to the Proposed Development due to the noise from the running of the BESS, transformers and inverters, resulting in a significant effect.
- 6.6.6 To minimise the potential levels of noise generated by the operational phase, additional mitigation can be implemented including changes to equipment position, sourcing 'silenced' equipment, placement of noise barriers or use of alternative equipment such as string inverters. Work and additional modelling is currently being undertaken in order to identify suitable mitigation measures and the optimum design layout in order to reduce potential noise effects.

## **6.7 Water Resources and Flood Risk**

- 6.7.1 An assessment has been undertaken to identify the likely significant effects on water resources at the Site and surrounding area caused by the Proposed Development, based on the findings of a desk and field based studies.
- 6.7.2 The Site lies within the South Forty Foot Drain Surface water catchment and within the Black Sluice Internal Drainage Board (IDB) area. There are a number of Main Rivers, Ordinary Watercourses, and IDB drains within the Site. The bedrock geology is not considered to be a groundwater resource. Parts of the Site are at risk of flooding. There are 22 licensed surface water abstraction locations downstream of the Site.
- 6.7.3 The construction and decommissioning phases are considered to be the phases of the Proposed Development when water resources are most at risk. This is due to the various activities that are a risk to water quality due to ground disturbance and contamination from introduced sources (e.g. sediments and oil / fuel), amongst other potential impacts.
- 6.7.4 With regards to flood risk, where present, field underdrainage may act as a preferential drainage pathway and, if disrupted or disconnected by construction activities, may lead to localised groundwater flooding.
- 6.7.5 The Proposed Development will be undertaken in-line with current guidance and codes of best practice to mitigate adverse impacts during the phases of development including measures such as limiting the potential for disturbance or contamination of water resources and avoidance of sensitive areas and flood zones where possible. A CEMP will be produced to incorporate the principles of good practice, legislation, regulations and guidance as well as detailed mitigation measures including the secure storage of all fuels, oils and other polluting substances; avoiding damage or disruption to field underdrainage if encountered; and constructing all new and upgraded access tracks with a suitable camber and permeable surface to reduce flood risk.

- 6.7.6 Mitigation of effects upon surface water flows and flood risk would be achieved through design of a suitable surface water drainage scheme for the Proposed Development, which takes into account the projected future impacts of climate change on extreme weather and precipitation. The drainage proposals would ensure that the existing greenfield rate of surface water runoff discharged to the adjacent watercourses is maintained and (in the long-term) can take into account and accommodate climatic changes.
- 6.7.7 With appropriate mitigation in place, the scale of potential effects on the water environment were assessed as no greater than minor and as such these effects are considered not significant.

## 6.8 Climate Change

- 6.8.1 An assessment has been undertaken to identify the likely significant effects the Proposed Development will have on climate change (e.g. greenhouse gas (GHG) emissions) as well as mitigation measures and resilience against the projected changes in future climate.
- 6.8.2 The impact the Proposed Development will have on climate change comprises the GHG emissions from the processes associated with solar farms and battery storage developments including raw material extraction, module manufacture and plant construction.
- 6.8.3 The term embodied carbon refers to the GHG emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials. Based on current estimates of the embodied carbon per unit of installed electrical capacity of a solar farm, the estimated embodied carbon within the Proposed Development over its life cycle is 746,603 tCO<sub>2e</sub><sup>1</sup>, resulting in a moderate effect that is significant during the construction phase.
- 6.8.4 However, based on the annual operational emissions savings arising from the generation of renewable energy in contrast with the future baseline, the carbon payback time will be only 3.74 years. The emissions savings from using solar for electricity generation instead of using natural gas, which it is intended to displace on the national grid, over the lifetime of the project is approximately 9,070,400 tCO<sub>2e</sub>. This is considered to be a significant beneficial effect, which, overall, will mitigate the significant impacts of GHG emissions during construction.
- 6.8.5 To further mitigate the impact of the Proposed Development on climate change associated with the embodied carbon, approaches to reduce emissions are recommended to be adopted that would be beneficial such as sourcing materials locally where possible to reduce transport; using more efficient, modern construction vehicles and equipment where available; and reusing materials, minimising waste and recycling where possible.
- 6.8.6 With regards to the Proposed Development's resilience to climate change, the consequence of climatic impacts on the solar farm is low based on the sensitivity of the receptors to various climatic factors.

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<sup>1</sup> tCO<sub>2e</sub> stands for tonnes (t) of carbon dioxide (CO<sub>2</sub>) equivalent (e). "Carbon dioxide equivalent" is a standard unit for counting GHG emissions regardless of whether they're from carbon dioxide or another gas, such as methane.

- 6.8.7 The likelihood of the climatic impact on the Proposed Development occurring is low due to the embedded mitigation measures already considered within its design, including those associated with enhancing the resilience of the Proposed Development to increased temperature and rainfall that is expected to occur with climate change. Embedded mitigation measures include raising the panels above ground to allow for sufficient air flow beneath the mounted structures and reduce heat gain; and use of planting and vegetation to reduce surface water runoff.
- 6.8.8 The effect of various climatic impacts including snow and ice and extreme weather on the Proposed Development will be minor and unlikely.
- 6.8.9 Overall, with embedded mitigation in place, the Proposed Development is deemed to be resilient to climate change impacts.

## 6.9 Glint

- 6.9.1 An assessment has been undertaken, using modelling software, of the potential impacts of glint from the solar panels on receptors on the ground, including roads, railways and local dwellings, as well as glint effects on aircrafts operating in the surrounding area.
- 6.9.2 During construction, the impact of glint on all receptors is considered to be negligible or minor and not significant.
- 6.9.3 During operation, the effects will vary throughout the year as the sun reaches different heights in the sky and different weather conditions are observed. The impact of glint during operation is anticipated to be not significant due to current levels of screening.
- 6.9.4 During the decommissioning phase, the effects on all receptors are assessed as temporary, minor and not significant.
- 6.9.5 Mitigation to further reduce the effects of glint is ongoing for the Proposed Development through intelligent selection of design options undertaken alongside further consultation as part of the iterative design process.
- 6.9.6 Overall, with suitable mitigation, it is expected that all glint effects can be managed effectively and there will be no remaining effects.

## 6.10 Soils and Agricultural Land

- 6.10.1 An assessment has been undertaken to consider the likely significant effects of the Proposed Development on agricultural land (in terms of land lost from agricultural production) and soil resources (in terms of damage, degradation, and loss of soil resource) during the construction, operational and decommissioning phases of the Proposed Development.
- 6.10.2 Baseline data comprises a detailed Agricultural Land Classification (ALC) survey of the Solar Array Area and use of other desk-based information sources including Met Office (1989) Climatological Data for Agricultural Land Classification and Provisional Agricultural Land Classification Maps from Natural England.

- 6.10.3 The ALC survey has identified Grade 2 (very highly sensitive) agricultural land, Subgrade 3a (highly sensitive) agricultural land, and Subgrade 3b (medium sensitivity) agricultural land within the Solar Array Area. Provisional ALC data shows that the Cable Route Corridor, is comprised predominantly of Grade 2 agricultural land, with portions of Grade 1 and Grade 3; and the Access Route Corridor is comprised entirely of Grade 3 agricultural land.
- 6.10.4 The Proposed Development will occupy agricultural land and will result in a change in its agricultural potential over the lifespan of the project. Associated works such as the creation of access tracks, a substation, and BESS will have a more direct and potentially permanent impacts on the agricultural potential of the land. It is anticipated that no more than 20 ha of land within the Site will be lost as a result of the Proposed Development, however as it would not be possible to mitigate the loss of this land this effect is considered to be significant.
- 6.10.5 Adverse effects to the soil resources associated with the construction of the Proposed Development and loss or damage to soils are assessed as minor and not significant. The implementation of mitigation measures and a soil management plan (SMP) would ensure the quality of the soil resources that are impacted by the built infrastructure on site would be retained. By following best practice guidance and implementing a site-specific SMP, it is anticipated that the impacts would be minimal and that the Proposed Development will not result in a significant effect on soil resources.

## 6.11 Socio-Economics

- 6.11.1 An assessment has been undertaken of the likely significant effects of the Proposed Development on communities within the surrounding area of the Site. In particular, it considers the likely significant effects in terms of employment, local procurement, increased exposure to noise, air pollution and traffic, tourism, livelihoods, recreation, influx of workers, physical resettlement and wellbeing during the construction, operational and decommissioning phases of the Proposed Development.
- 6.11.2 The assessment was informed by publicly available data including Census data and ONS Labour Force Surveys, as well as two site visits intended to collect data on local livelihoods, services, tourist attractions and recreational facilities including Public Rights of Way.
- 6.11.3 The Proposed Development will result in beneficial effects in terms of employment and economic contribution, mostly during construction and operation. During construction, there will be a significant beneficial effect for employment generation in Boston Borough.
- 6.11.4 A Local Employment Plan will be created, which will include a monitoring programme covering local employment levels and positive upskilling impacts.

## 6.12 Air Quality

- 6.12.1 An assessment has been undertaken of the likely effects on sensitive receptors within the Site and surrounding area as a result of dust and air pollution generated during the construction phase; and emissions from

development-generated traffic during the construction and operational phases of the Proposed Development.

- 6.12.2 Twenty-three existing dust sensitive receptors (or groups of receptors) were identified within the Site, with five located in the Solar Array Area, twelve within the Cable Route Corridor and six within proximity to the Access Route Corridor. These areas are considered as locations where if not appropriately mitigated, the public may be exposed to pollutants generated by the construction and/or operational phases of the Proposed Development.
- 6.12.3 During the construction phase, site-specific mitigation (e.g. a best practice Dust Management Plan, to be included in the CEMP) would be implemented at the Site, including avoidance of activities that generate large amounts of dust during windy conditions and implementing a wheel washing system. With mitigation, the remaining impacts would be not significant.
- 6.12.4 As set out above, the increase in traffic as a result of the Proposed Development will be low. Therefore, no detailed analysis of this is required in relation to air quality as it falls below the relevant industry thresholds.

## 7. SUMMARY OF EFFECTS

### 7.1 Significant Effects

- 7.1.1 Each assessment has identified the potential environmental effects of the Proposed Development and recommended mitigation measures that could reduce or avoid these effects. With these mitigation measures in place, the remaining significant effects are summarised below in Table 7.1. Further information in relation to each of these is provided in Chapter 6 above.

**Table 1 Summary of Significant Effects**

TOPIC	SIGNIFICANT EFFECTS?
Landscape & Visuals	Yes (adverse)
Ecology	Yes (beneficial)
Cultural Heritage	Yes (adverse)
Access & Traffic	No
Noise & Vibration	Yes (adverse)
Water Resources & Flood Risk	No
Climate Change	Yes (adverse & beneficial)
Glint	No
Soils & Agricultural Land	Yes (adverse)
Socio-economic	Yes (beneficial)
Air Quality	No

### 7.2 Cumulative Effects

#### Intra-Cumulative Effects

- 7.2.1 At this preliminary stage, no significant intra-cumulative effects (i.e. combined effects on a single receptor, as a result of multiple environmental impacts) have been identified.

## Inter-Cumulative Effects

- 7.2.2 A number of schemes have been considered in order to identify whether they are likely to result in significant effects in combination with the Proposed Development. These in combination effects are referred to as inter-cumulative effects.
- 7.2.3 It is anticipated that there will be significant landscape effects during construction of the Proposed Development in combination with the potentially overlapping construction phases of Viking Link, Heckington Fen Solar Park and Vicarage Drove Solar Farm. This is due to all of these schemes requiring underground cable connection to the Beacon Fen Substation or being located close to the Substation such as Vicarage Drove Solar Farm or Little Hale Solar Farm.
- 7.2.4 There will also be some visual receptors located between South Forty Foot Drain, the A17 and villages of Bicker and Northorpe, that are likely to experience a greater level of cumulative visual effects in comparison to the effects identified in isolation for considered schemes, should the construction phase of these schemes overlap.
- 7.2.5 There is potential for cumulative impacts to buried archaeology during the construction period but this cannot be determined completely until all assessments have been completed. It is anticipated however that any impacts would be mitigated through archaeological recording and areas of preservation in-situ. The works also will provide a more thorough knowledge of the archaeological resource across Lincolnshire and create a more complete Historic Environment Record.
- 7.2.6 There is also potential for cumulative impacts to the built heritage resource during the operational phase of the Proposed Development, but this cannot be determined until all assessments have been completed. It is anticipated, however, that any impacts would be limited to assets within Heckington, Great and Little Hale.
- 7.2.7 With regards to soils and agricultural land, there are not considered to be any relevant cumulative effects on soil resources as the effects of soil loss are contained within the specific Site. Cumulative effects on agricultural land have also been considered. When considering the impact of all considered developments across the Lincolnshire, 2.09% of all the agricultural land is involved of which 0.97% is BMV land. Furthermore, the majority of this land loss is temporary and reversible, therefore providing appropriate guidance and mitigation measures are in place for these developments, the associated impact on agricultural land can be minimised and considered not significant.
- 7.2.8 A potential significant effect has been identified with regards to the impact of high demand for accommodation related to the influx of workers during construction of the considered schemes, based on a worst-case assumption of construction phases overlapping. However, with mitigation including the implementation of a Local Employment Plan, coordination of construction timescales with other developments and cooperation with NKDC if necessary, this effect can be reduced to not significant.

# BFEP Appendices

