BEACON FEN ENERGY PARK

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Chapter 2 – Proposed Development
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The Planning Act 2008
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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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2.1 Introduction

2.1.1 Beacon Fen Energy Park Ltd (the Applicant) is bringing forward proposals for a new solar and battery storage park on land approximately 6.5 km northeast of Sleaford and 2.5 km north of Heckington, Lincolnshire. The proposals comprise of above ground solar PV and battery energy storage system (BESS) infrastructure connected by a cable route of around 13 km length to Bicker Fen substation.

2.1.2 The project has an anticipated generation capacity of around 400 megawatts (MW), which is enough clean energy to power over 130,000 UK homes. The proposals include the construction of the necessary infrastructure to export the electricity generated into the national grid.

2.1.3 It is planned this would be via an underground connection running cross-country to an existing connection point at the existing nearby Bicker Fen 400kV substation. There would be no need to develop a new National Grid substation, however, there may be a need to carry out upgrade and extension works to Bicker Fen substation. These are the same works that are included in the nearby Heckington Fen Solar Park DCO. The same work package will be included in the DCO for the Proposed Development to ensure that, subject to consents, whichever solar project is first to be constructed will have the relevant powers to carry out the works.

2.1.4 The Proposed Development will include an on-site BESS. This will provide an important balancing service for the National Grid and allow the electricity generated by the panels to be stored on site at times when grid demand is low, then exported at times of higher demand. The Proposed Development is expected to be operational for approximately 40 years after which it would be safely decommissioned and the Solar Array Area returned to agricultural use.

2.1.5 The Proposed Development will also include a new road access to facilitate construction of the cable route corridor. In the wider area, small junction improvements may be required, or at passing places and haul roads crossing points of public highway, as well as localised widening to facilitate abnormal load access.

2.1.6 As Beacon Fen Energy Park would produce over 50MW of electricity, it is classed as a Nationally Significant Infrastructure Project (NSIP) and, therefore, a Development Consent Order (DCO) must be applied for before the Proposed Development can be built.

2.1.7 The primary components of Beacon Fen Energy Park are solar arrays; inverters; transformers; Battery Energy Storage System (BESS) infrastructure; firewater storage tanks; substation; onsite cabling; fencing; and a cable corridor and connection works.

2.1.8 The Proposed Development comprises, in brief:

Solar Array Area

- Solar PV panels and modular ground-mounting structures. The height of the panels considered will be up to 4.5m, with individual panels anticipated to be up to 2.5m long and up to 1.5m wide. The proposal is for a fixed (i.e., static) panel orientation, facing due south.
- Supporting infrastructure – inverters, combiner boxes, transformers – converting the direct current to alternating current and stepping up the voltage so it can be exported to the National Grid.
- A 600MW battery energy storage system (BESS) adjacent to the onsite (Solar Array Area) substation so electricity generated or imported can be stored and then released into the National Grid when it is needed most. The BESS containers and switch rooms are anticipated to be up to 12.5m x 3m in size, with a height of up to 4.5m.
- Onsite low voltage cabling connecting solar PV modules and BESS to inverters, and inverters to the onsite transformers.
- Onsite cabling between PV modules and inverters anticipated to be above ground level, placed along row of racks fixed to mounting structure, placed underground, between racks and inverter. All other onsite cabling to be underground where possible.
- Higher voltage cables required between transformers and switchgear and from switchgear to the substations.
- A single onsite substation compound of up to 250m x 160m and a height of up to 13m. Substation expected to include a control building (office / welfare) up to 20m x 20m and height of up to 6m and a 33kV switchroom.
- Fencing up to 3m tall built of post and wire, and a security fence to be up to 2.4m (+1m electrical), with security measures including pole mounted internal facing closed circuit television (CCTV) anticipated to be approximately 5m high around the Solar Array Area. Acoustic fence (if required) up to 4m.
- During construction, temporary construction compounds will be required, as well as temporary roadways, to enable access to all the land within the energy park boundary.
- Earthworks to form suitable development platform for the substation and BESS.
- Water supply and drainage infrastructure including up to four firewater storage tanks with a total capacity of 240m3.
- Landscaping and biodiversity enhancement areas around the Solar Array Area perimeter and within the Solar Array Area to provide visual amenity, reduce landscape impacts, and provide net gains for biodiversity.

- Areas of reinforced ground or hardstanding adjoining the BESS for occasional laydown activities or for emergency usage.

Cable Route Corridor

- Cable route connection between the Solar Array Area and the existing Bicker Fen 400kV Substation, constructed through trenched methods and, where required, trenchless methods (e.g. for crossings of existing features) such as horizontal direct drilling. The working width will include mobile equipment and soil stores.

- During construction, temporary construction compounds will be required every 1-3 km approximately, as well as temporary roadways, to enable access to all land.

- Extension of Bicker Fen substation and establishment of a new bay (including air insulated and gas insulated switchgear and electrical apparatus, circuit breakers, bus bars, sealing end compound, control building) and associated equipment and cabling in order to connect to the National Grid network (if not previously constructed and commissioned under planning powers being sought by works 6A-6C of the Heckington Fen Draft DCO).

- Reinstatement planting around the Cable Route Corridor perimeter to provide visual amenity, reduce landscape impacts, and provide net gains for biodiversity.

Access Route Corridor

- Access road to facilitate construction of the Solar Array Area via a bespoke access from the A17.

- Reinstatement planting around the Access Route Corridor perimeter to provide visual amenity, reduce landscape impacts, and provide net gains for biodiversity.

And in any or all of the above areas:

- Access tracks of 3.5m to 7m width for construction access and routine maintenance when operational.

- Boundary treatments.

- Landscaping and reinstatement planting and biodiversity net gain related habitats.

- Flood resilience measures.

2.1.9 This chapter provides a description of the Site and its surroundings and the Proposed Development, including the current parameters upon which the technical assessments are based.

2.2 The Site and Surroundings

2.2.1 The Site is located east of Sleaford in Lincolnshire and comprises the Solar Array Area, Cable Route Corridor and Access Route Corridor (each as described in more detail below and as illustrated on Figures 1.1 – 1.3).

Solar Array Area

2.2.2 The Solar Array Area is approximately 517ha in size and located to the north of Heckington, centred at the National Grid Reference (NGR) 514682 347825. The Solar Array Area is located wholly within the administrative areas of NKDC and LCC.

2.2.3 The Solar Array Area predominantly comprises agricultural land in arable use, divided by ditches with sparse tree cover that is limited to small woodland blocks and scattered hedgerow trees. A small reservoir is located in the south-west of the Solar Array Area.

2.2.4 The Solar Array Area is bound to the south, west and north by local highways, and bound to the east by the Car Dyke. Public Right of Way (PRoW) Ewer/12/1 extends across the north-eastern corner of the Site, close to the northern Site boundary. There are no other PRoW within the Solar Array Area.

2.2.5 There is a single residential property located adjacent to the north-east of the Solar Array Area, which is currently excluded from the Site boundary. There are a number of individual properties in the surrounding area, and nearby villages to the Solar Array Area 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

2.2.6 The Cable Route Corridor is approximately 900 ha in size and extends c. 13km south-east from the Solar Array Area to Bicker Fen substation, at NGR TF 19684 38599. The Cable Route Corridor is located wholly within the administrative area of LCC. The majority of the Cable Route Corridor is located within the administrative area of NKDC, however the southern section is located within BBC's administrative area[1].

2.2.7 The Cable Route Corridor has been set conservatively to allow sufficient flexibility in locating the cable route (see Section 2.12). The extent of the Cable Route Corridor is currently being refined, informed by results from environmental surveys and consultation feedback.

[1] At the time of Scoping, a section of the cable route search area was located within the administrative area of South Holland District Council ('SHDC'). Since refinement of the cable route (see Chapter 3) there is no longer any part of the Site within SHDC's administrative area.

2.2.8 Land use within the Cable Route Corridor is predominantly agricultural. As for the Solar Array Area, tree cover is sparse and is generally limited to small woodland blocks and scattered hedgerow trees.

2.2.9 Where the Cable Route Corridor extends south from the Solar Array Area it is located c. 1.1km east of Heckington at the closest point. There are a number of individual properties located immediately adjacent to the Site boundary, on Littleworth Drove and Star Fen Road where they transect the Site. Other nearby villages and hamlets to the Cable Route Corridor, not already listed above against the Solar Array Area, 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 Bridge c. 1.86km to the 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.

2.2.10 A number of 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, intersects the mid-section of the Corridor. There are a number of PRoW within the Cable Route Corridor, including one alongside the South Forty Foot Drain which also crosses the Cable Route Corridor.

Access Route Corridor

2.2.11 The Access Route Corridor is approximately 125 ha in size and extends c. 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.

2.2.12 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.

2.2.13 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.

2.2.14 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.

2.2.15 Asgarby Road crosses the Access Route Corridor and there four PRoW within the Access Route Corridor.

Environmental Designations

2.2.16 The Site is located within a Nitrate Vulnerable Zone. There are no other statutory environmental designations within the Site.

2.2.17 The north-east of the Solar Array Area and the mid- and southern section of the Cable Route Corridor are located within Flood Zones 2 and 3. Further information is provided within Chapter 11 Water Resources.

2.2.18 There are a number of statutory historic designations, including Scheduled Monuments and Listed Buildings, within the nearby villages and hamlets. Further information is provided within Chapter 8 Cultural Heritage.

2.3 Design Evolution

2.3.1 EIA is an iterative process, based on on-going environmental assessments and consultation with statutory and non-statutory consultees. At this stage, and as set out where relevant below, a number of elements of the design of the Proposed Development remain to be confirmed. For such instances, use of design parameters has been incorporated into the preliminary assessment to present a likely worst-case assessment of the potential environmental effects. This is in accordance with the Rochdale Envelope Approach which is supported by Advice Note 9[2] (see Chapter 4 for further details).

2.3.2 The design parameters within this PEIR were based on a maximum extents layout in order to ensure a conservative 'worst-case' preliminary assessment of the likely significant effects of the Proposed Development. This layout is illustrated at Figure 1.4.

2.3.3 Whilst this 'worst-case' layout has informed the assessment in the PEIR and the reporting of the impacts in each of the topic chapters, the Applicant has also considered and presented an alternative 'Indicative Mitigation Layout' (Figure 1.5) to illustrate the key proposed environmental mitigation measures identified at this preliminary stage, including ecological, landscape and visual mitigation and enhancements avoidance of areas of archaeological potential and buffers to residential properties.

2.3.4 In addition to the above, the Cable Route Corridor, as considered within this PEIR, has been set conservatively to allow sufficient flexibility in locating the cable route. The extent of the Cable Route Corridor is currently being refined, informed by results from environmental surveys and consultation feedback. The latest refinements to the Cable Route Corridor are presented on Figure 3.4.

2.3.5 It is the Applicant's intention to continue to develop the Indicative Mitigation Layout and refine the Cable Route Corridor, taking account of ongoing environmental assessment work and consultation feedback, to form the basis of the proposed DCO Application and the Environmental Statement submitted in support of the same.

[2] Planning Inspectorate Advice Note 9: Rochdale Envelope (July 2018; Version 3)

2.4 Design Parameters

2.4.1 The primary components of the Proposed Development are:

- Solar Arrays;
- Inverters;
- Transformers;
- Battery Energy Storage System (BESS);
- Substation;
- Onsite Cabling;
- Fencing;
- Water supply and drainage infrastructure; and
- Cable Corridor.

2.4.2 The parameters that have been set for each of the above components and other relevant matters are set out in Table 2.1. The assessments within this PEIR are based upon these parameters. Wherever flexibility is maintained in the design parameters, the maximum extent has been used to ensure the likely worst-case impacts are reported in this PEIR.

Table 2.1 – PEIR Design Parameters

COMPONENT / MATTER	PARAMETER
Solar Arrays	• Maximum height of arrays: 4.5m • Maximum panel dimensions: 2.5m long and 1.5m wide • Panel orientation: Fixed / static, facing due south and tilt angled 10° to 45° from horizontal. • Module frame to be built from anodised aluminium or steel. • Tables will be supported by galvanized steel poles, driven approximately 1m to 2.5m into the ground.
Inverters	• Type: String **or** Central, dependent on worst case for the relevant environmental assessment. ○ A single string inverter unit could be utilised for every 10 to 12 (array) strings, with the string inverters small enough to be mounted underneath the modules. ○ The central inverters are larger and require their own electrical cabinet enclosures, but there would be fewer required. Central inverters would be located at regular intervals amongst the PV arrays, occupying an area (anticipated to be approximately 12m x 3m and up to 3.5m in height) that would be reliant upon the intervals. ○ Two options for the central inverters, if to be used, are currently being considered: ○ Outdoor equipment: Placing the equipment (i.e., inverter, transformer and switchgear) outdoors and independent from each other, with an approximate footprint of up to $80m^2$ and a

COMPONENT / MATTER	PARAMETER
	height of up to 3.5m. ○ Indoor (i.e. enclosed) equipment: Placing the equipment within a purpose built enclosure similar to a 40-foot ISO High Cube Container, with an approximate footprint of up to 80 m^2 and a maximum height of up to 3.5m.
Transformers	• MV Transformer (800v up to 33kv) ○ Weight: c. 18 tonnes (central inverter plus the transformer). ○ Footprint: 'Outdoor' = transformer footprint of up to 4m x 3.5m and height of up to 3.5m; or 'Indoor' = installed within a cabin with a footprint of up to 7m x 4m and height of up to 3.5m. • 4 x HV Transformer (33kv up to 400kv) ○ Weight: 160 tonnes. ○ Footprint: up to 15m x 9.5m and height of up to 10.5m. • Main Unit transport size: L x W x H: 8.35m x 3.885m x 4.625m.
Battery Energy Storage System (BESS)	• Batteries to be placed within individual enclosures, arranged regularly within a compound with vehicular access available to each unit. Final number dependent upon power capacity and duration of energy storage. • BESS container dimensions approximately up to 12.5m x 3m, with a height of up to 4.5m. • Total size and distribution of BESS across Site reliant on grid conditions at the time of construction design and environmental considerations . • AC coupled single compound.
Firewater Storage Tank(s)	• Aerial rigid water tanks, total 240m^3 capacity. ○ Two 120m^3 tanks **or** four 60m^3 tanks ○ Maximum dimensions: 3m diameter, 3.5m height including support and 18m length.
Substation	• Substation(s) expected to include control building (office / welfare) and a 33kV switchroom. Control building footprint up to 20m x 20m and height of up to 6m. • Footprint: A single onsite substation compound would have footprint of up to 250m x 160m and a height of up to 13m.
Onsite Cabling	• Low voltage electrical cabling required to connect PV modules and BESS to inverters (typically via 1.0/1.5kV DC cables), and inverters to the onsite transformers (typically via 0.4/1kV AC cables). ○ Dimension of cable trenches: up to 1.2m in width and between 0.8m and 1.4m in depth (in limited locations, the depths can be increased to 2.5m or over to account for local anomalies).

COMPONENT / MATTER	PARAMETER
	• Higher voltage cables (typically 33kV) required between transformers and switchgear and from switchgear to the substations. ○ Dimension of cable trenches: up to 1.2m in width and up to 1.4m in depth (in limited locations, the depths can be increased to 2.5m or over to account for local anomalies). • Higher voltage cables to share trenches with lower voltage cables on the same route, where possible. • Onsite cabling between PV modules and inverters anticipated to be above ground level, placed along row of racks fixed to mounting structure, placed underground, between racks and inverter. All other onsite cabling to be underground wherever possible. • Data cables to be installed to allow monitoring during, operation.

Fencing	• Perimeter fence to be up to 3m tall post and wire, deer fencing.
	• Acoustic fencing around BESS (if required) up to 4m.
	• Security fence to be up to 2.4 m (+1m electrical)
	  ○ Security fencing installed around substations compounds and other infrastructure / compounds.
	  ○ 0.35m concrete beam below ground.
	• Mounted internal-facing closed circuit television (CCTV) systems to be deployed around perimeter of the operational areas of the Site; anticipated to be 5m high.

Cable Corridor	• Underground cabling is adopted standard and proposed option. • Cable route is c. 13km in length (from Site to Bicker Fen) • Working width during construction: 30 – 40m • Trench dimensions: 2m x 2m excavated for each cable.
Construction Traffic	• Current worst case during peak construction period = up to 60 Heavy Goods Vehicle (HGV) deliveries per day and up to 40 Light Goods Vehicle (LGV) deliveries vehicle movements based upon a 24 to 36-month construction programme.
Access	• Access during construction be provided via a bespoke access route from the A17. • It is not yet confirmed whether the access route will be removed following construction or remain in place during operation, however it has been assumed within this PEIR that it will be removed in order to capture the potential effects of removal.

COMPONENT / MATTER	PARAMETER
Phasing	• DCO application submitted in 2024 and DCO consent in 2025. • Construction: commence 2026/27 and last for 24 to 36 months. • Operation: 40 years. • Decommissioning: anticipated to last for 12 to 24 months, although this PEIR has considered timescales of up to 36 months where relevant as a worst case, after which Site to be returned to former use. ○ During decommissioning, all PV modules, mounting structure, cabling, inverters and transformers (majority) to be removed from Site and recycled or disposed of in accordance with prevailing legislation, good practice and market conditions at that time. ○ Cables buried below 1m may be left in situ. This PEIR has considered removal of cables where that is considered the worst-case scenario.
Layout	See Figure 1.4 for full extents (worst-case) layout considered within the PEIR.

2.4.3 The components of the Proposed Development and their design parameters set out above are described further within the following sections.

2.5 Solar Arrays

2.5.1 Solar PV modules convert sunlight into electrical current (as direct current (DC)) by absorbing the sun’s energy and generating a flow of electricity.

Figure 2.1 Solar panels with south facing configuration.

2.5.2 The height of the arrays considered within the PEIR is up to 4.5m above ground level. The individual panels are anticipated to be up to 2.5m long and up to 1.5m wide and consist of a series of PV cells beneath a layer of toughened glass. PV technology is developing rapidly, and alternatives may be available at the time of construction. However, it is considered that the above parameters allow for a realistic and robust assessment of potential environmental effects.

2.5.3 Each module would have a DC generating capacity of between 600 and 800 watts (W) or more depending upon any advances in solar PV technology at the time of construction.

2.5.4 The number of PV panels that would be used in the Proposed Development is not yet known. Various factors will help to inform the number and arrangement, and it is likely that some flexibility will be required to accommodate future technological developments.

2.5.5 The modules are to be fixed to a mounting structure in groups, known as ‘strings’. Each string of modules will be mounted on a metal framing system, known as ‘tables’. The module frame is anticipated to be built from anodised aluminium or steel for durability. The tables are usually supported by galvanized steel poles, driven approximately 1m to 2.5m into the ground. Various factors are currently being considered that will help to inform the number and arrangement of modules in each string, with design flexibility adopted to accommodate future technological developments.

2.5.6 The proposal is for a fixed (i.e., static) panel orientation. The modules will face due south (i.e., 180° azimuth), which is commonly seen on existing UK solar farms, and angled 10° to 45° from horizontal.

2.6 Inverters

2.6.1 Inverters convert the direct current (DC) produced by the solar PV modules into alternating current (AC) which is used by the National Grid.

Figure 2.2 Typical String Inverter (image reproduced courtesy of Huawei)

2.6.2 It is anticipated that either a string inverter or central inverters would be used, onsite. Within this PEIR each environmental assessment considers the option which represents the worst-case scenario, relevant to the topic under consideration.

2.6.3 A single string inverter unit could be utilised for every 10 to 16 (array) strings, with the string inverters small enough to be mounted underneath the modules.

2.6.4 The central inverters are larger and require their own electrical cabinet enclosures, but there would be fewer required. Central inverters would be located at regular intervals amongst the PV arrays, occupying an area (anticipated to be approximately 12m x 3m and up to 3.5m in height) that would be reliant upon the intervals.

2.6.5 Two options for the central inverters, if to be used, are currently being considered.

- The first option is for outdoor equipment. This would entail placing the equipment (i.e., inverter, transformer and switchgear) outdoors and independent from each other, with an approximate footprint of up to 80m2 and a height of up to 3.5m.
- The second option is for is for indoor (i.e. enclosed) equipment. This would entail placing the equipment within a purpose built enclosure similar to a 40-foot ISO High Cube Container, with an approximate footprint of up to 80 m2 and a maximum height of up to 3.5m.

2.7 Transformers

2.7.1 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 PV modules to support the string inverters.

2.7.2 Similar to the inverters, two options are currently being considered for the transformers; one outdoor and one indoor. The outdoor transformers would have a footprint of up to 4m x 3.5m and a height of up to 3.5m. The indoor (i.e., installed within a cabin with indoor switchgear) transformers would have a footprint of up to 7m x 4m and with a height of up to 3.5m. The cabins would likely be located at regular intervals across the Site.

Figure 2.3 Typical transformer cabin (including switchgear) (Image reproduced courtesy of Selma)

2.8 Battery Energy Storage System

2.8.1 The Proposed Development will include an associated 600MW battery energy storage system (BESS). BESS is used to store electricity as chemical energy during periods of surplus electricity generation by the solar PV modules and export it to the grid during periods when electricity demand exceeds generation.

2.8.2 Batteries will be placed within individual enclosures arranged regularly within a compound with vehicular access available to each unit. The precise number will depend upon the level of power capacity and duration of energy storage that the Proposed Development will require. An element of flexibility in approach is, therefore, adopted at this stage as technology, business models and relevant policy all evolve.

2.8.3 The location of the BESS, transformers and dedicated switchgear is determined in part by the BESS being AC-coupled; thereby requiring that they be housed within compounds (rather than distributed around the site next to central inverters).

2.8.4 The dimensions of the BESS containers (and switch rooms) are anticipated to be approximately up to 12.5m x 3m, with a height of up to 4.5m.

Fire Safety

2.8.5 Thermal runaway can arise if a malfunction occurs with certain types of batteries such as lithium ion. These risks are managed by multiple layers of protection, such as remote detection and repairing of faults, monitoring and cooling systems designed to regulate temperatures to within safe parameters. Battery manufacturers undertake extensive testing and analysis to assess fire risk, and the Proposed Development will adhere to all manufacturer safety recommendations.

2.8.6 An Outline Battery Storage Safety Management Plan is currently being prepared for the Proposed Development and will be included as part of the DCO application, which is considering the following measures:

- Adequate supplies of water at Site;
- Installation of systems to detect and suppress fire;
- Adequate separation and ground covering between battery stations to ensure that an isolated fire would not spread and lead to a major incident;
- Roads of adequate width and construction to allow easy access;
- Two routes to the BESS allowing an alternative access where required;
- Visual warning system; and
- Maintenance of vegetation to prevent wildfire risk.

2.8.7 The above safety measures will be confirmed and considered within the ES as appropriate.

2.9 Substation

2.9.1 The onsite provisions required to export electricity from the Proposed Development to the National Grid include such electrical infrastructure as the transformers, switchgear and metering equipment. In addition, the substation(s) is expected to include a control building that would house office space and welfare facilities, as well as operational monitoring and maintenance equipment. The area of the control building is likely to have a footprint of up to 20m x 20m and a height of up to 6m.

2.9.2 At this stage, different design options are being explored; informed by ongoing investigations. Should a single onsite substation compound be chosen, it would have a footprint of up to 250m x 160m and a height of up to 13m.

2.10 Onsite Cabling

2.10.1 Low voltage onsite electrical cabling is required to connect the PV modules and BESS to the inverters (typically via 1.5/1.8kV cables), and the inverters to the onsite transformers (typically via 0.4/1kV cables). The dimension of the trenches for this cabling will vary depending upon the number of circuits they contain but would typically be up to 1.2m in width and between 0.8m to 1.4m in depth.

2.10.2 Higher voltage cables (typically 33kV) are required between the transformers and the switchgear and from switchgear to the substations. The dimensions of the trenches for this cabling will vary depending on the number of circuits they contain but are anticipated to be approximately up to 1.2m in width and up to 1.4m in depth.

2.10.3 In limited locations, for both low and higher voltage cables, the depths of the trenches can be increased to 2.5m or deeper to account for local anomalies.

2.10.4 Where possible, the higher voltage cables will share trenches with the lower voltage cables on the same route.

2.10.5 Onsite cabling between the PV modules and the inverters are anticipated to be above ground level, placed along a row of racks that are fixed to the mounting structure, before then being placed underground, between racks and in the inverter’s input. All other onsite cabling will be underground wherever possible.

2.10.6 Data cables will also be installed to allow monitoring during operation.

2.11 Fencing

2.11.1 The perimeter fence would likely comprise standard up to 3m tall post and wire, deer fencing, with up to 2.4m security fencing, plus 1m electrical fencing, installed around the substation compounds and, possibly, other infrastructure / compounds. Acoustic fencing, up to 4m tall, may be required around the BESS, subject to the results of the noise modelling work currently being undertaken.

2.11.2 Mounted internal-facing closed circuit television (CCTV) systems will likely be deployed around the perimeter of the operational areas of the Site; anticipated to be 5m high. The CCTV cameras would have fixed view sheds and will be aligned to face along the fence.

2.12 Cable Route & Connection

2.12.1 The Proposed Development will be connected to the National Grid via the existing substation located at Bicker Fen.

2.12.2 Initially, a broad cable route area was identified and the findings of desk-based studies and assessments have been used to narrow this down to the Cable Route Corridor considered within this PEIR (see Chapter 3 for further information). Onsite surveys are currently being undertaken and will inform a further narrowing of the corridor for consideration within the ES that will accompany the DCO application.

2.12.3 The use of underground cabling is the adopted standard for the solar industry and is the Applicant’s proposed option for the Proposed Development. This PEIR is based on the assumption that cabling will be underground.

2.12.4 Enabling works for the connection at Bicker Fen substation will include the following:

- Extension of Bicker Fen substation including two section breakers, one coupler bay, feeder bay and provision for the connection of the generation bay.
- Transposition of West Burton Circuit 1 to newly built substation section.
- Establishment of a new bay on the 400kV bars including busbar protection.
- Works in connection with the extension to the existing substation.

2.12.5 These works have minimal impact to the transmission network outside of Bicker Fen substation compound. However, the works within the substation compound will require the delivery of new equipment, groundworks to extend the site (including possible concrete pours for the base) and electrical works.

2.12.6 Further information on the enabling works for the connection is being developed and will be considered fully within the ES.

2.13 Construction Phase

2.13.1 The ES will provide further details of the proposed construction activities, their anticipated duration, along with an indicative programme of each phase of the works.

2.13.2 Construction activities are anticipated to include:

- Site preparation including setting up access, compounds and security;
- Import of construction materials, plant and equipment to site;
- Diversion and installation of utilities as required;
- Upgrading of existing site tracks/access roads and construction of new tracks, including creation of bespoke access road;
- Marking out the location of infrastructure;
- Import of components to site;
- Erection of PV Mounting Structures;
- Mounting of PV Panels;
- Installation of electric cabling;
- Installation of Power Conversion Units (PCU);
- Installation of BESS;
- Construction of on-site Substation;
- Cable installation (including trenching);
- The establishment of mobilisation areas and running tracks;
- Stripping of topsoil in sections for the cable connection, sub-station and BESS area only;
- Trenching in sections;
- Appropriate storage and capping of soil;
- Appropriate construction drainage with pumping where necessary;
- Sectionalised approach of duct installation;
- Excavation and installation of jointing pits;
- Cable pulling;
- Testing and commissioning; and

- Site reinstatement and habitat creation.

Construction Traffic

2.13.3 All construction access will be confirmed as the design of the Proposed Development progresses, and in consultation with the relevant authorities. During the construction phase, one or more temporary construction compounds will be required, with temporary roadways to facilitate access to all land within the Site. The access tracks to be constructed onsite are anticipated to be 3.5m to 7m wide and comprised of compacted stone tracks with 1:2 gradient slopes on either side.

2.13.4 At this stage, it is anticipated that, typically during the construction period, there could be 49 Heavy Goods Vehicle (HGV) movements per day for plant and deliveries and 24 minibus movements associated with construction worker arrivals and departures. This is based upon a 24 to 36-month construction programme (see Section 2.14 below). Construction traffic predictions and routing will be confirmed and detailed within the ES.

2.13.5 Access during construction be provided via a bespoke access route from the A17 which will be located within the Access Route Corridor (as illustrated on Figure 1.3). It is not yet confirmed whether the access route will be removed following construction or remain in place during operation, however it has been assumed within this PEIR that it will be removed in order to capture the potential effects of removal.

2.13.6 Construction traffic predictions and routing will be confirmed and detailed within the ES.

2.14 Proposed Phasing

2.14.1 Following the anticipated submission of the DCO application in 2024 and subject to DCO consent then being granted in 2025, the subsequent phases of the Proposed Development would comprise construction, operation (plus maintenance) and eventual decommissioning. Indicative details regarding these three phases are outlined below.

Construction

2.14.2 It is anticipated that construction would commence in 2026/27 and last for a duration of approximately 24 to 36 months.

2.14.3 See Section 2.13 below for further details of construction.

Operation

2.14.4 Once operational, the Proposed Development will have an operational life of approximately 40 years.

2.14.5 There will be a requirement for periodic replacement of some or all of the elements of the Proposed Development. At this stage, the level of vehicle trips associated with component replacement (e.g. batteries and panels) is expected to be considerably lower than the level of vehicle trips generated during the peak construction phase (see Chapter 9 Access & Traffic for further details). For example, even in the instance that full panel replacement is required, this would be programmed in stages over a much longer period than the construction phase (when the panels will be installed more rapidly). This approach would maximise the number of panels which are kept 'live' at any given time and avoid compromising the electricity generating capacity of the Scheme. Otherwise, components would be replaced as and when required throughout the operational lifetime of the scheme (40-year period).

2.14.6 All replaced components will be recycled or disposed of in accordance with good practice and market conditions at that time.

Decommissioning

2.14.7 It is anticipated that decommissioning would be anticipated to take between approximately 12 and 24 months to complete, although this PEIR has considered timescales of up to 36 months where relevant as a worst case. Following decommissioning the Site would be returned to its former use.

2.14.8 As part of the decommissioning phase, all PV modules, mounting structure, inverters and transformers would be removed from Site and recycled or disposed of in accordance with good practice and market conditions at that time. Cabling would be removed where feasible, but in some circumstances may be left in situ.