



BEACON FEN ENERGY PARK

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Chapter 3 – Alternatives & Design Evolution
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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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3. Alternatives & Design Evolution

3.1 Introduction

- 3.1.1 This chapter of the PEIR describes the consideration of alternatives in relation to the Proposed Development, including the evolution of the design of the Proposed Development to date.
- 3.1.2 The below information is preliminary at this stage as EIA is an iterative process. The development design is still evolving and will incorporate feedback from ongoing environmental assessments and consultation. Further explanation of the alternatives considered will be provided within the ES.

3.2 Requirement to Report on Alternatives Considered

- 3.2.1 Paragraph 2 of Schedule 4 of the EIA Regulations requires that an ES must include *“A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects”*.
- 3.2.2 Paragraph 4.3.9 of emerging NPS EN-1¹ states *“This NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective.”* and goes on to state at Paragraph 4.3.10 that *“The applicant must provide information proportionate to the scale of the project, ensuring the information is sufficient to meet the requirements of the EIA Regulations.”*
- 3.2.3 Paragraphs 4.3.23 and 4.3.24 of emerging NPS EN-1 state:
“The Secretary of State should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security, climate change, and other environmental benefits) in the same timescale as the proposed development.
The Secretary of State should not refuse an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and it should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals.”
- 3.2.4 Paragraphs 3.2.3 and 3.2.4 of emerging NPS EN-1 add that:
“It is not the role of the planning system to deliver specific amounts or limit any form of infrastructure covered by this NPS. It is for industry to propose new energy infrastructure projects that they assess to be viable within the strategic

¹ Overarching National Policy Statement for Energy (EN-1), Department for Energy Security & Net Zero, November 2023

framework set by government. This is the nature of a market-based energy system. (...)”

“It is not the government’s intention in presenting any of the figures or targets in this NPS to propose limits on any new infrastructure that can be consented in accordance with the energy NPSs. A large number of consented projects can help deliver an affordable electricity system, by driving competition and reducing costs within and amongst different technology and infrastructure types. Consenting new projects also enables projects utilising more advanced technology and greater efficiency to come forward. (...) It is not the role of the planning system to compare the costs of individual developments or technology types.”

3.2.5 As such, whilst the EIA Regulations require a description of alternatives to be included within the ES, as set out above, these must be proportionate and relevant to the Proposed Development. There is no general or overarching policy requirement to consider alternative sites or compare the costs of individual developments or technology types; nor can an application be refused based on the grounds that another site exists that is also suitable for development.

3.2.6 On this basis, the alternatives being considered for the Proposed Development, within the context of the EIA, are as follows:

- 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.

3.2.7 Topic-specific consideration of alternatives, and corresponding policy and guidance, is set out within the relevant technical chapters.

3.3 No Development Scenario

3.3.1 The objectives of the Proposed Development are to generate (and have available to dispatch from battery storage) around 400 MW to 600MW of low-carbon electricity for an anticipated operational period of 40 years, with commercial operations commencing at or very soon after the connection date(s) provided by National Grid, in order to contribute to meeting the UK’s urgent need for significant amounts of new low-carbon electricity generation infrastructure as established in NPS EN-1. As such, the No Development Scenario is not a reasonable alternative for consideration as it will not contribute to the UK’s Net Zero target.

3.4 Site Selection

3.4.1 The site selection process used to determine the location of Beacon Fen Energy Park and confirm the Site’s suitability is set out below. An Alternative

Site Assessment will accompany the final DCO application, demonstrating the appropriateness of the Site relative to reasonable alternatives.

3.4.2 The Applicant's process of site selection comprised of a three-stage process, summarised as follows:

- 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 EN-3² 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.

3.4.3 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.

3.5 Design Evolution – Site Extents

3.5.1 As summarised in Chapter 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. The following section provides further details the evolution of the Site design.

Removal of Beacon Fen South

3.5.2 At the stage of Scoping and the Early (Non-Statutory) Consultation, the Proposed Development also included a second solar panel array area, which was planned for land southwest of Helpringham and Burton Pedwardine. This area was referred to as Beacon Fen South (BFS), and the current Solar Array Area was referred to as Beacon Fen North (BFN).

3.5.3 BFS was located partially within the area identified by Anglian Water for the proposed Lincolnshire reservoir. Following continued engagement with Anglian Water and the increased maturity in the design and timing for their project, the Applicant elected to refine the Proposed Development by removing BFS, so avoiding any continued overlap with the proposed Anglian Water reservoir project. This is because interaction with the proposed Anglian Water Lincolnshire reservoir could have meant delays to the overall delivery of the project. The Proposed Development could commence construction in

² National Policy Statement for Renewable Energy Infrastructure (EN-3), Department for Energy Security & Net Zero, November 2023

2026; however, due to its scale and nature, the proposed reservoir’s DCO application will not be determined by then and the residual uncertainty would result in delays to Beacon Fen Energy Park as a whole.

- 3.5.4 The main reason for the removal of BFS is this potential delay to the overall delivery of the Proposed Development, which will contribute significantly to the urgent need for renewable energy to fully decarbonise the UK’s electricity system by 2035. However, in accordance with the EIA Regulations, a comparison of the environmental effects of the two alternatives is set out below.
- 3.5.5 Both BFN and BFS are of a similar current land use (agricultural land primarily in arable production) and it is not considered that the likely significant effects associated with each would vary significantly. Neither site contains any relevant statutory environmental designations, however, there is a Scheduled Monument adjacent to BFS.
- 3.5.6 The combined option of BFN and BFS would result in a greater scale of development and the geographical extent of potential effects would be greater.
- 3.5.7 In addition, the cable route required to connect both BFN and BFS to Bicker Fen substation would potentially result in greater environmental effects than the currently proposed Cable Route Corridor due to the higher number of sensitive receptors in closer proximity to the route (see Section 3.6 below).
- 3.5.8 On this basis, it is considered that the current Proposed Development, excluding BFS, is likely to result in fewer environmental effects than the alternative option of developing both BFN & BFS in combination. A back-check was conducted at the time of removing BFS to confirm that BFN is suitable, in isolation, to meet the original project objectives. The current Proposed Development still delivers on the objectives of delivering between 400-600MW of solar and BESS.
- 3.5.9 A check was conducted at the time of removing BFS as to whether the addition of new areas of land for a further solar array would better meet the project objectives and would allow moderately higher levels of generation (closer to 600MW) but incorporating these would not achieve the connection date element of the project objectives outlined above, and were therefore not taken forward.

Cable Route Corridor

- 3.5.10 The Applicant has undertaken a number of rounds of review to date in order to identify the most suitable cable route for the Proposed Development. A summary of this process to date is set out within Table 3.1 below.

Table 3.1 – Identification of Cable Route Corridor

STAGE	COMMENTARY
Cable Route Constraints Analysis February & March 2023	A combination of desktop studies and site walkovers were undertaken in order to identify key environmental constraints in relation to the potential cable route search area, comprising land between BFN, BFS and Bicker Fen substation.

STAGE	COMMENTARY
<p>Cable Route Identification for EIA Scoping March 2023</p>	<p>This stage involved reviewing the environmental constraints that had been mapped, in addition to other matters including planning, land use and access.</p> <p>Key areas of consideration included ensuring the search area covered sufficient land to enable sensitive receptors identified during the EIA to be avoided, and excluding high sensitivity receptors including a Scheduled Monument.</p> <p>The output of this stage was the Cable Route Search Area included within the Scoping Report.</p>
<p>Cable Route Refinement May 2023</p>	<p>Following submission of the Scoping Report further refinement took place. Environmental, land and planning constraints were mapped within the Cable Route Search Area and reviewed by the Applicant’s project team, including the designers, in order to start identifying potential cable routes within the Search Area. This included consideration of which routes could avoid key environmental constraints including Local Wildlife Sites and archaeological records and other heritage receptors, alongside other matters such as consideration of railway crossings, access requirements and other planning proposals.</p> <p>The output of this stage was the identification of potential routes, around which a corridor could be identified for consideration within the PEIR.</p>
<p>Cable Route Reappraisal following Removal of Beacon Fen South July 2023</p>	<p>Following the removal of BFS the previously identified search area was revisited, in order to identify if a more direct route would be more suitable now that a connection to BFS was no longer required. Subsequently the following options were reviewed (see Figure 3.1):</p> <ul style="list-style-type: none"> • Option 1: Direct connection, east of Heckington; • Option 2: Connection to the east of Heckington, aligning with Heckington Fen and other planned developments; and • Option 3: Connection within the original search area, to the west and south of Heckington and north of Helpringham. <p>Option 2 was discounted due to its proximity to a number of sensitive archaeological receptors that are likely of high importance, including a Scheduled Monument (a prehistoric settlement which may extend beyond the designation), a HER for a Roman Saltern, Romano-British Farmsteads, and the Anglo-Saxon trading centre. In addition its greater scale would increase the geographical extent of potential effects and the number of receptors affected.</p> <p>Option 3 was discounted due to its scale and proximity to</p>

STAGE	COMMENTARY
	<p>sensitive receptors including archaeological records, Local Wildlife Sites (LWS), and the villages of Burton Pedwardine, Great Hale, Little Hale and Helpringham.</p> <p>Option 1 is the shortest route, therefore reducing the scale and geographical extent of potential environmental effects. This option avoids the archaeological receptors to the east, close to Option 2, whilst also reducing the number of residential receptors in close proximity to the route.</p> <p>Heckington Fen Solar Park, a DCO application submitted to PINS in February 2023, is proposing additional works to Bicker Fen Substation. These works were reviewed in the context of the Proposed Development and it was determined that Option 1 would not be interrupted by the Heckington Fen Works.</p> <p>During this stage it was also determined that the cable would be underground.</p> <p>The output of this stage was the identification of the Cable Route Corridor, based upon Option 1 and considered within this PEIR.</p>

3.5.11 The Cable Route Corridor considered within this PEIR is currently being refined (involving, in general, narrowed in width and with more information on crossings and construction proposals) through ongoing environmental surveys and assessment. The latest proposed reductions to the cable corridor are included at Figure 3.4 in order to inform consultation.

3.5.12 It is anticipated that the cable corridor will be further refined prior to submission of the ES. The ES will set out, further to Table 3.1 above, additional works undertaken in relation to identification of the cable route.

3.6 Design Evolution – Layout & Technologies

3.6.1 Set out below is a summary of the alternatives considered at this stage in relation to design and layout of the Proposed Development.

Assessment of Alternative Technologies

3.6.2 As described in Chapter 2 Proposed Development, a degree of flexibility has been maintained regarding a number of design parameters 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. Ongoing consideration of several design options such as the use of string inverters or central inverters also enables initial environmental assessments to inform design parameters with regards to their potential environmental effects.

3.6.3 Nonetheless, 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

3.6.4 In addition to the removal of BFS, Table 3.2 sets out other components and matters in relation to the design of the Proposed Development that have been considered to date, and those that are still currently under consideration. Table 3.2 is focused upon the Solar Array Area, with further information of cable route options provided within Section 3.5 above.

3.6.5 The ES will provide further detail on the evolution of the design and layout of the Proposed Development.

Table 3.2 – Design Alternatives (at PEIR stage)

COMPONENT / MATTER	ALTERNATIVES CONSIDERED
<p>CONSIDERED TO DATE</p> <p>Site Layout (Substation & BESS)</p>	<p>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 (see Figure 3.2).</p> <p>The two options were reviewed in relation to their respective likely environment effects, based on the data available at the time of the review (July 2023). This review is summarised below.</p> <p>There is no discernible difference between the two options in relation to Access, Air Quality, Cultural Heritage, Ecology, Climate Change, Ground Conditions, Flood Risk and Socio-Economics. For potential Visual impacts, Option 1 would have greater screening provided by the surrounding Solar Arrays, however it is considered that both could be screened by Year 15 through mitigation planting.</p> <p>Option 1 has benefits in relation to the following aspects of the environment:</p> <ul style="list-style-type: none"> • Soils - Option 1 would likely be sited in Subgrade 3a and 3b land; however, Option 2 would likely be sited in both Grade 2, Subgrade 3a and 3b land. Therefore Option 2 would result in a loss of both higher value agricultural land. • Noise - For Option 1, the closest receptor is located 880m away (at Ewerby Thorpe) and, for Option 2, the closest receptors are located 575m away (at Howell) and 860m away (at Westmorland Farm). As there is little in the way of terrain to shield the receptors and the

COMPONENT / MATTER	ALTERNATIVES CONSIDERED
	<p>background levels are likely to be similar, Option 1 is likely to result in few noise impacts.</p> <ul style="list-style-type: none"> • Arboriculture - Option 1 has no trees bordering the option footprint and only hedgerows on two sides, whereas Option 2 is surrounded by hedgerows and numerous trees, although it appears to have sufficient room to house the substation and protect the RPAs. <p>Option 2 has benefits in relation to the following aspects of the environment:</p> <ul style="list-style-type: none"> • Glint - Option 2 is slightly more preferable from a glint perspective as locating the substation to the south would help provide screening to the road that runs along the southern boundary. This is only a minor road that leads to Westmoreland Farm, however, so if Option 1 was chosen over Option 2, there is not a high risk to the safety of drivers; especially there is a thick hedgerow (screening) in place as along much of the route. • Water Resources - Option 1 would likely require horizontal directional drilling under Hodge Dyke, whereas Option 2 would not. <p>On the basis of the above, the Applicant has decided to progress Option 1 within the currently proposed layout as it is considered that there are fewer potentially significant effects associated with this Option. This is the layout option which has been considered within this PEIR.</p>
Access Routes	<p>In addition to utilisation of existing highways, the Applicant considered the construction of a bespoke access route to the Solar Array Area. The options for these included the following (see Figure 3.3):</p> <ul style="list-style-type: none"> • 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) <p>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.</p>

COMPONENT / MATTER	ALTERNATIVES CONSIDERED
	<p>Whilst Option 1 would utilise the cable route, thereby minimising the potential ground disturbance as a result of the Proposed Development, sensitive receptors along the route would be subject to intra-cumulative effects associated with both the installation of the cables and construction / usage of the access road.</p> <p>Option 2 was selected as the most appropriate for the Proposed Development and the PEIR has been based upon this.</p>
CURRENTLY UNDER CONSIDERATION	
Inverters	<p>It has not yet been fixed as to whether inverters will be String or Central. In summary, Central inverters are larger, however fewer of them will be required across the site.</p> <p>If Central inverters are progressed, then there two options for these: Outdoor or Indoor (enclosed) equipment. The size of both options is similar however they will appear visually different (i.e. Outdoor equipment will be visible, whilst Indoor equipment would be screened by the enclosure).</p>
Transformers	<p>As for the inverters, there are two options for the transformers: Outdoor or Indoor (enclosed) equipment. The size of both options is similar however they will appear visually different (i.e. Outdoor equipment will be visible, whilst Indoor equipment would be screened by the enclosure).</p>

BFEP Appendices