Cottam Solar Project

Environmental Statement Chapter 5:
Alternatives and Design Evolution

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Cottam
SOLAR PROJECT

Contents

Issue Sheet

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DCO Submission

Environmental Statement Chapter 5: Alternatives and Design Evolution

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5 Alternatives and Design Evolution

5.1 Introduction

5.1.1 This chapter of the Environmental Statement (ES) describes the consideration of alternatives and design evolution in relation to the Scheme. It has been prepared by Lanpro Planning Consultants and is supported by **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1].**

5.2 Legislation, Policy and Advice Notes

5.2.1 Schedule 4 (2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 5-1) (EIA Regulations) requires *"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"* to be presented in the ES.

5.2.2 National Policy Statement (NPS) EN-1 (Ref 5-2) paragraph 4.4.1 states that '*as in any planning case, the relevance or otherwise to the decision-making process of the existence (or alleged existence) of alternatives to a proposed development is in the first instance a matter of law, detailed guidance on which falls outside the scope of this NPS*'. The NPS confirms that from a policy perspective there is no general requirement to consider alternatives, or to establish whether a development represents the best option. However, in paragraph 4.4.2 of NPS EN-1 it is noted:

a. *"applicants are obliged to include in their ES, as a matter of fact, information about the main alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility;*

b. *in some circumstances there are specific legislative requirements, notably under the Habitats Directive, for the IPC1 to consider alternatives. These should also be identified in the ES by the applicant; and*

c. *in some circumstances, the relevant energy NPSs may impose a policy requirement to consider alternatives (as this NPS does in Sections 5.3, 5.7 and 5.9)"*

5.2.3 Adopted NPS EN-5 includes the following relevant policies on alternatives at paragraphs 2.2.3 – 2.2.4:

5.2.4 *"Applicants should bear in mind that the connection between the initiating and terminating points of a proposed new electricity line need not go via the most direct route. Indeed, engineering, environmental, and community constraints may make this infeasible or unsuitable.*

5.2.5 *There will usually be a degree of flexibility in the location of the development's associated substations, and applicants should consider carefully their placement in the local landscape. In particular, the applicant should consider such characteristics as the local*

topography and/or the possibilities for screening of the infrastructure. (See Section 2.11 below and Section 5.10 in EN-1.)"

5.2.6 *Draft NPS EN-3* sets out at paragraph 2.48 the factors that a likely to influence the key considerations involved in the siting of a solar farm These include irradiance and site topography, proximity of a site to dwellings, capacity of a site, grid connection, agriculture land classification and land type and accessibility.

5.2.7 The Planning Inspectorate's (PINS) Advice Note 7 sets out that PINS considers that a good ES is one that, amongst other things: *"explains the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment".*

5.2.8 In light of the above, a description of the alternatives considered by the Applicant, in arriving at the Scheme which is in the form as submitted in the DCO application, is necessary.

5.2.9 There are also other specific legislative requirements and policy circumstances which require the consideration of alternatives. These include a requirement under the Habitats Directive, as transposed into UK law by the Conservation of Habitats and Species Regulations 2017, and also in relation to avoiding significant harm to biodiversity and geological conservation interests; flood risk; and development within nationally designated landscapes set out in sections 5.3, 5.7 and 5.9 of NPS EN1. (Notwithstanding this, the Scheme has considered these factors and is not considered to give rise to any impacts in respect of the Habitats Directive; nor is it situated within a national landscape designation).

5.2.10 Paragraph 4.4.3 of EN-1 states *"where there is a policy or legal requirement to consider alternatives the applicant should describe the alternatives considered in compliance with these requirements".* Paragraph 4.4.3 goes on to set out the principles that should guide the decision maker when considering the weight that should be given to alternatives. These principles are:

- *" the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner;*
- *the IPC 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 and climate change benefits) in the same timescale as the proposed development*
- *where (as in the case of renewables) legislation imposes a specific quantitative target for particular technologies or (as in the case of nuclear) there is reason to suppose that the number of sites suitable for deployment of a technology on the scale and within the period of time envisaged by the relevant NPSs is constrained, the IPC should not reject 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

- *alternatives not among the main alternatives studied by the applicant (as reflected in the ES) should only be considered to the extent that the IPC thinks they are both important and relevant to its decision;*
- *as the IPC must decide an application in accordance with the relevant NPS (subject to the exceptions set out in the Planning Act 2008), if the IPC concludes that a decision to grant consent to a hypothetical alternative proposal would not be in accordance with the policies set out in the relevant NPS, the existence of that alternative is unlikely to be important and relevant to the IPC's decision;*
- *alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the IPC's decision;*
- *alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the IPC's decision; and*
- *it is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made to the IPC in respect of it (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives 50 Overarching National Policy Statement for Energy (EN-1) which are particularly relevant). Therefore where an alternative is first put forward by a third party after an application has been made, the IPC may place the onus on the person proposing the alternative to provide the evidence for its suitability as such and the IPC should not necessarily expect the applicant to have assessed it."*

5.2.11 Draft NPS EN-1 further adds that *"only alternatives that can meet the objectives of the proposed development need be considered".*

5.2.12 Taking into consideration the policy and legal requirements as well as the iterative approach to the design to date, the following alternatives have been considered for the Scheme and are discussed in this chapter:

- Alternative sites;
- Alternative technologies;
- Alternative design/layouts; and
- Alternative cable route corridors.

5.2.13 A 'no development' scenario as an alternative to the Scheme has not been considered further. This is because 'no development' is not considered to be a reasonable alternative to the Scheme as it would not deliver the additional electricity generation and energy storage proposed. NPS EN-1 at paragraph 4.4.3 states *"alternative proposals which mean the necessary development could not proceed can be*

excluded on the grounds that they are not important and relevant to the [Secretary of State's] decision."

5.2.14 A 'smaller development' as an alternative to the Scheme has also not been considered further, as NPS EN-1 at paragraph 4.4.3 states that the decision maker: *"...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 and climate change benefits) in the same timescale as the proposed development"*. A smaller scheme would not deliver the same generation capacity or energy security and climate change benefit as the Scheme, and as such would not represent a reasonable alternative. A **Statement of Need [EN010133/APP/C7.11]** has been submitted with the DCO Application which addresses the need for the large scale solar assets.

5.3 Stakeholder engagement

5.3.1 The Applicant has carried out an EIA Scoping exercise (EIA Scoping Opinion received March 2022 **[EN010133/APP/C6.3.2.2]**, and statutory consultation in accordance with the Planning Act 2008 which is described in detail in the Consultation Report submitted as part of the DCO application **[EN010133/APP/C5.1]**.

5.3.2 **Table 5.1** summarises the matters raised in relation to alternatives at the EIA Scoping and statutory consultation stage.

Table 5.1 Summary of Matters Raised in Relation to Alternatives at the EIA Scoping and Statutory Consultation Stage

Consultee	Main matter raised	How the matter has been addressed
EIA Scoping Stage: Bassetlaw District Council	It is encouraging that the ES will contain a chapter that will consider alternative sites. This overall section of the EIA Scoping Report however is thin in detail as to what the alternative sites will be. Given that the site for the main development has already been selected, it would have been preferable if some consideration had already been given to this.	This Chapter of the ES has been prepared in response to this. **Section 5.5** sets out how alternative sites have been considered.
EIA Scoping Stage: Lincolnshire County Council	In this section consideration needs to be given to looking at the benefits of keeping the land, subject of this project, in agricultural use and the impact on food production in the region. Schedule 4 (2) of the EIA Regulations states that an ES	This Chapter of the ES has been prepared in accordance with the EIA Regulations. In addition, Chapter 19 of the ES, **Soils and Agriculture [EN010133/APP/C6.19]** considers

Consultee	Main matter raised	How the matter has been addressed
	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'. In the context of agricultural land impacts 'location', 'size' and 'scale' are key factors which, in the Council's opinion, suggest that applying a relatively narrow search area (reflecting the equivalent cable connection distance) for the assessment of alternative sites is likely to be significantly narrow, skewing the site selection process artificially in favour of the application site. A county-level alternative assessment area should be applied which as a minimum should consider scope for connection into the National Grid at the locations proposed by the registered NSIP solar projects, and with specific consideration of agricultural land impacts. Without prejudice to that higher level alternative assessment, the regulations also require an indication of the main reasons for selecting the chosen option. In this case this this should include alternative site layout/s (and reduced MW generating capacity as necessary) to reflect	the impacts of the Scheme on agricultural land.

Consultee	Main matter raised	How the matter has been addressed
	the location of known Best and Most Versatile (BMV) land within the site.	
EIA Scoping Stage: Natural England	Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, sets out the information that should be included in an Environmental Statement (ES) to assess impacts on the natural environment. This includes: .....An assessment of alternatives and clear reasoning as to why the preferred option has been chosen.....	This Chapter of the ES has been prepared in accordance with the EIA Regulations (as opposed to the Town and Country Planning (Environmental Impact Assessment) Regulations 2017).
S42 Statutory Consultee: Bassetlaw District Council	It is encouraging that the ES will contain a chapter that will consider alternative sites. Given that the site for the main development has already been selected, it would have been preferable if some consideration had already been given to this. This is especially important as by the time the proposal proceeds to submission, there is essentially no scope for alterations. That being said, it is promising that the broad methodology has been set out for establishing the selected site. The most preferable option would be for the chapter within the ES to fully justify why other potential sites were less preferable on balance.	The Applicant has followed a step by step site selection process which confirms the location of the Scheme is suitable for a large scale solar farm. Details of the process are set out in **Appendix 5.1: Site Selection Assessment** of this ES **[EN010133/APP/C6.3.5.1].** and include consideration of alternative sites.
S42 Statutory Consultee: West Lindsey District Council	It is noted that an assessment of commercial rooftops was undertaken (5.2.10) and a high level review of lower grade agricultural land (5.2.11). These should be detailed in order that the site selection can be properly understood. For instance, as noted above, it would appear that	An assessment of commercial rooftops in the host authorities of West Lindsey and Bassetlaw Districts identified no rooftops or combined premises of an adequate area to facilitate a large-scale solar project or provide a viable network of sites. See **Appendix 5.1: Site**

Consultee	Main matter raised	How the matter has been addressed
	development is still being proposed on best and most versatile agricultural land?	**Selection Assessment** of this ES **[EN010133/APP/C6.3.5.1].** Chapter 19 **Soils and Agriculture [EN010133/APP/C6.19]** (and associated Appendices) of the ES provides detailed assessments of agricultural land grading for the Scheme. **Table 5.6-5.9** below detail the design evolution that has led to the majority of BMV land being removed from the Scheme. The finalised Scheme contains only 4.1% Best and Most Versatile land and clear justification for why these small areas remain within the Scheme is set out at **Tables 5.6 - 5.9.**
S42 Statutory Consultee: West Lindsey District Council	It is recognised that the site layout is still evolving (paragraph 5.4) – design iterations should be set out in the ES, and how known parameters have influenced the design (for instance – the location of known high grade ALC land).	See **Tables 5.6-5.9** relating to design iterations for the Sites.
S42 Statutory Consultee: Lincolnshire Police	Land selected should aim to avoid affecting the visual aspect of landscapes, maintain the natural beauty and should be predominantly flat, well screened by hedges, tree lines, etc. and not cause undue impact to nearby domestic properties or roads. (BRE. Planning guidance for the large-scale ground mounted solar PV systems)	The Applicant has followed a step by step site selection process which confirms the location of the Scheme is suitable for a large scale solar farm. This has included the avoidance of sensitive landscape and environmental designations in confirming site suitability and consideration of alternative sites. Details of the process are set out in **Appendix 5.1: Site Selection Assessment** of this ES **[EN010133/APP/C6.3.5.1].**
S42 Statutory Consultee: Fillingham Parish Council	The assessment of rooftop solar as a viable alternative is particularly weak:	The Applicant does not consider that multiple smaller rooftop sites are a reasonable alternative to the Scheme. The site selection process and the reasons for discounting rooftop solar are set out in

Consultee	Main matter raised	How the matter has been addressed
	The developer has limited the search area and pre-determined the approximate size There are only around 3% of the UK's households with solar panels on the rooftops, and no figures readily available for commercial warehousing. There has been no assessment to explore the extent to which the Government's policy objectives could be pursued through a combination of new mandatory planning requirements and retro-fit. The PIER provides insufficient evidence to conclude that a large-scale solar deployment could be facilitated in combination across premises using rooftops.	**Appendix 5.1: Site Selection Assessment** of this Environmental Statement **EN010133/APP/C6.3.5.1].** This explains the rationale behind the chosen search area**.** The **Statement of Need [EN010133/APP/C7.11]** explains that large single solar assets bring carbon savings and economic benefits in line with government policy, versus developing combinations of smaller independent schemes. Larger singular schemes attract some cost efficiencies as a result of their increased scale, for example unit procurement costs, or annual maintenance costs. Such efficiencies of scale are less apparent in smaller schemes. Small scale solar typically connects to the lower voltage distribution networks rather than the centralised network (connecting to the national grid - the high voltage transmission system). This means that the Scheme would maximise the supply of low-carbon power across the widest possible geography, which would not be the case with smaller schemes.
S42 Statutory Consultee: Fillingham Parish Council	The developer appears to have commenced the concept from two fixed points: - Having been notified of grid capacity at West Burton, Cottam and High Marnham, no other options appear to have been explored (e.g. other coal closure sites at Fiddler's Ferry, Eggborough, Ferrybridge, Didcot, West Thurrock, Aberthaw, Drakelow, Kingsnorth, Ironbridge	Options to use the coal closure plants listed have not been examined because grid capacity has not been identified in these areas. Decommissioning of coal fired power stations does not automatically equal available grid connection capacity at these locations, often due to the fact that grid connection offers may already have been offered to others. It would not be reasonable nor proportionate for the Applicant to

Consultee	Main matter raised	How the matter has been addressed
	for example). A broader range of sites could have provided an opportunity to use more brown-field options or to mitigate the impact by disaggregation of the project scale across different areas. - The developer also seems to have commenced from a position of absolutely maximising grid connection capacity as a limiting factor – thereby pre-determining the approximate size (land use) for the proposed scheme. In this way the developer has severely limited their consideration of alternative proposals.	have to assess alternative locations throughout the country to this level of detail. NPS EN1 requires that the consideration of alternatives to comply with policy requirements should be carried out in a proportionate manner. It also states that *"alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the IPC's decision".* Smaller development' as an alternative to the Scheme does not need to be considered , because NPS EN-1 at paragraph 4.4.3 states that the decision maker: *"...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 and climate change benefits) in the same timescale as the proposed development".* A smaller scheme would not deliver the same generation capacity or energy security and climate change benefit as the Scheme, and as such would not represent a reasonable alternative. The **Statement of Need** submitted with the DCO Application **[EN010133/APP/C7.11]** explains the need for large scale solar assets.
S42 Statutory Consultee: Fillingham Parish Council	Existence of alternatives to the proposed development is beyond NPS1 – it is "in the first instance, a matter of law". This is understood to mean that it is mandatory to explore alternatives. Applicants	This Chapter of the ES has been prepared in accordance with the EIA Regulations and builds on the preliminary information set out in the PEIR.

Consultee	Main matter raised	How the matter has been addressed
	are obliged to include in their Environmental Statement information about the main alternatives they have studied. In the PIER, the exploration of alternatives is very limited, leading to a very narrow consideration of alternatives that fulfil the developer's pre-determined geographic and scale decisions.	NPS EN-1 states: *"Applicants are obliged to include in their ES, as a matter of fact, information about the main alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility."* This Chapter supported by **Appendix 5.1: Site Selection Assessment** of the ES **[EN010133/APP/C6.3.5.1]** undertakes this exercise in accordance with the above requirements.
S42 Statutory Consultee: Fillingham Parish Council	The implied conclusion is that, in the fight for available brownfield sites, the economics of solar energy are outweighed by all other development options – e.g. housing, commercial. Given the Government's clear direction that solar should be placed on previously developed land, the developer has simply shifted the "battle ground" to agricultural land, where it would appear that the economics of solar outweigh the economics of farming (which is perhaps more indicative of a problem with the economics of farming).	The **Statement of Need** submitted with the DCO Application **[EN010133/APP/C7.11]** explains the reasons for the Scheme being large scale solar generation. It is not considered that small scale generation is an alternative to this, rather it complements it. A search for suitable brownfield land has been undertaken as part of **Appendix 5.1: Site Selection Assessment** of the ES **[EN010133/APP/C6.3.5.1].** As explained at paragraph 5.2.6 above, draft NPS EN-3 sets out the factors that are likely to influence the key considerations involved in the siting of a solar farm These include irradiance and site topography, proximity of a site to dwellings, capacity of a site, grid connection, agriculture land classification and land type and accessibility. These factors have been considered in the Site Selection Assessment and no suitable brownfield sites were

Consultee	Main matter raised	How the matter has been addressed
		identified when all these factors have been taken into account.
S42 Statutory Consultee: Fillingham Parish Council	Given the very low energy density of solar, the scheme needs a colossal amount of land. Proposing to have sought a brownfield site of the size necessary, in an area that is predominantly agricultural is disingenuous. I would no more expect to find space available for agriculture in the centre of London than brownfield space in farmland. The situation is falsely created by not having broadened the potential range of grid connections (see above). It is striking that, despite proposing two schemes, at over 5000 acres, the developer does not appear to have included any brown field sites in its schemes, demonstrating a clear disregard for planning guidance.	A search for brownfield land has been undertaken as part of **Appendix 5.1: Site Selection Assessment** of the ES **[EN010133/APP/C6.3.5.1].** The site was chosen to support the grid connection offer made at Cottam Power Station. Therefore, brownfield sites were assessed within the 20km Search Area identified in the Site Selection Assessment but ultimately did not meet the size or locational requirements of the Scheme as detailed at **Table 2.2: PDL Sites from Brownfield Registers of Bassetlaw and West Lindsey (Appendix 5.1: Site Selection Assessment** of the ES **[EN010133/APP/C6.3.5.1])**
S42 Statutory Consultee: Stow Parish Council	We understand it is Government policy that solar panels should not be located on land that is 3a or 3b. We are, therefore, surprised at the inclusion of productive agricultural land, some of which we believe to be 3a, when we desperately need a food strategy and land available to grow food for the nation.	National planning policy seeks to minimise impact on BMV land. It also seeks to guide development away from BMV land where possible, except where its use is justified by other sustainability considerations. National policy also requires the use of BMV land to be justified. NPS EN-1 paragraph 5.10.8 and Draft NPS EN-1 paragraph 5.11.8 state: *"Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where*

Consultee	Main matter raised	How the matter has been addressed
		this would be inconsistent with other sustainability considerations" NPS EN-1 paragraph 5.10.15 and Draft NPS EN-1 paragraph 5.11.14 state that the decision maker: *"should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification"* and that little weight should be given to the loss of poorer quality agricultural land (in grades 3b, 4 and 5). Draft NPS EN-3 provides clarification and guidance on how policies relating to BMV agricultural land should be interpreted for solar NSIP schemes. It clarifies at paragraph 2.48.15 that the development of solar arrays on BMV agricultural land is not prohibited and that given the scale of NSIP solar projects, the use of some agricultural land is likely. At paragraph 2.48.13 it also sets out that *"land type should not be a predominating factor in determining the suitability of the site location"*. **Chapter 19 Soils and Agriculture [EN010133/APP/C6.19]** (and associated Appendices) of the ES provides detailed assessments of agricultural land grading for the Site. **Tables 5.6 – 5.9** below detail the design evolution that has led to the majority of BMV land being removed from the Scheme. The finalised Scheme contains only 4.1% Best and Most Versatile land and clear justification for why these small areas remain within the Scheme is set out within the tables.

Consultee	Main matter raised	How the matter has been addressed
Residents' comments - pre application consultations	6 respondents suggested using RAF Scampton as an alternative site. 64 respondents suggested using non site specific brownfield land during pre-application consultation.	RAF Scampton is located within the 20km search area and has therefore been assessed within **Appendix 5.1: Site Selection Assessment** of the ES **[EN010133/APP/C6.3.5.1].** The site was discounted within the Site Selection Assessment, primarily because it is still operational and the Applicant notes that West Lindsey District Council has submitted an expression of interest in acquiring the site for redevelopment. The site is allocated as an "opportunity area" in the Draft Local Plan. The Applicant therefore considered that this site would not be available for solar development. An assessment of brownfield sites is also included within the above.

5.4 Need for the Scheme

5.4.1 The case for the need for the Scheme is centred on its significant contribution to the three important national policy aims of decarbonisation, which are:

- Net Zero and the importance of deploying zero-carbon generation assets at scale.
- Security of supply (geographically and technologically diverse supplies).
- Affordability.

5.4.2 The **Statement of Need [EN010106/APP/7.1]** accompanying the DCO application sets out a detailed compelling case for why the Scheme is urgently required at the location and scale proposed.

5.5 Alternative Sites

5.5.1 The selection of the Scheme's location has followed a systematic step-by-step process. This process and confirmation of its suitability when considered against potential alternative sites is summarised in the following sections and set out in detail in **Appendix 5.1: Site Selection Assessment** of this ES **[EN010133/APP/C6.3.5.1]**.

Stage 1 – Identification of the Area of Search

5.5.2 Irradiation (sunlight) levels and topography are key factors when determining the location of solar development. Solar developments are currently found across the UK; however, their efficiency is determined by the levels of irradiation at their location. The whole of England is well located geographically for solar gains. The Applicant had no restrictions on where developments should be, located in relation to irradiation levels.

5.5.3 The preference is for a flat site or a site with a southerly aspect. If a site with another aspect is pursued there is likely to be a need to increase the overall development footprint as there would be an operational need to increase the distance between arrays to avoid overshadowing.

5.5.4 A viable grid connection is an essential material consideration for proceeding with a development and is instrumental in defining the search area. During discussions with National Grid in 2019, the Applicant was notified of grid capacity at West Burton, Cottam, and High Marnham Power Stations. This capacity was available at these locations due to the closures of the coal fired elements of those sites. Due to the immediate availability of these Points of Connection (POCs), the Applicant did not consider any further alternative grid connection points. Through further discussion with National Grid on the Cottam POC, National Grid advised at that stage that a connection at Cottam would be preferred over connection at High Marnham because fewer upgrade works to National Grid's transmissions assets would be required at the POC and it would therefore be more straightforward, quicker to deliver and more economical. The Applicant therefore made a grid connection application to National Grid for connection at Cottam Power Station and an offer was made by National Grid for 600MW.

5.5.5 IGP also made an application for a grid connection at West Burton Power Station for 480MW and as noted in the ES, this is the subject of a separate DCO application, including its associated land parcels.

5.5.6 As the grid connection offer was not site-specific, the Applicant proceeded to look at sites that could accommodate a solar project to support the grid capacity available at Cottam. A land area of approximately 75ha of solar panels (100ha including landscaping and ecology mitigation land) is required to provide an NSIP solar scheme with a generating capacity of 50MW. For a grid connection of 600MW, a site size of approximately 1,300 ha (excluding cable route) was needed. The Applicant generally seeks to find a site which is around 10% larger than is needed for the grid connection offer. This principle applies to solar projects within a generating capacity of under 50MW and NSIP scale solar projects. This larger site size allows flexibility for the accommodation of additional mitigation measures and other constraints that may become known through the design development process. It was considered that it would be highly unlikely that a single site of this size would be available within sufficient proximity to the Cottam POC.

5.5.7 As shown in **Figure 1, Annex D** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]** Cottam Power Station is identified as a location which has the available capacity for a large scale solar farm. It is also within sufficient proximity of lower grade agricultural land and land which is available to construct a large scale solar farm. Cottam POC was therefore deemed to be a suitable location to be the POC for a large scale solar farm. This initial feasibility exercise narrowed down the area of search to the vicinity of Cottam for the location of the Scheme.

5.5.8 In addition to the broad considerations set out above, an initial search area was identified at a 5km radius from the POC, however this was later expanded with the clear preference of identifying land as close to the POC as possible, the search area was enlarged incrementally until suitable options were found within a 20km radius which is considered by the Applicant to be a viable cable connection distance for a solar project of this scale.

Stage 2 – Exclusion of Planning, Environmental and Spatial Constraints

Stage 2 of the **Site Selection Assessment [EN010133/APP/C6.3.5.1]** has included the mapping of planning, environmental and spatial constraints which have been identified through a review of relevant national planning policies. The constrained areas have been excluded from the area of search identified at Stage 1 and are therefore not considered as suitable locations for the Scheme. The following spatial constraints have been mapped and excluded from further consideration. **Table 2.1** below sets out the constraints that were mapped and considered.

Table 5.2: Planning and Environmental Constraints Considerations

Consideration	Discussion
Agricultural Land Classification and Land type	Planning policy seeks to minimise impacts on the best and most versatile agricultural land (defined as grades 1, 2 and 3a) and preferably use land that is not classified as best and most versatile (grades 3b, 4 and 5) and where possible utilise previously developed land, brownfield land, contaminated land or industrial land (see **Table 2.2: PDL Sites from Brownfield Registers of Bassetlaw and West Lindsey (Appendix 5.1: Site Selection Assessment** of the ES **[EN010133/APP/C6.3.5.1]** for previously developed land sites considered).
Designated international and national ecological and geological sites	The following designations were identified and any land covered by these designations was excluded: Sites of Special Scientific Importance (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA), SPA protection buffer, Ramsar sites and National Nature Reserves (NNR)
Nationally designated landscapes	The presence of any areas of Outstanding Natural Beauty or National Parks were considered and excluded from the area of search.

Proximity to sensitive human receptors	Consideration was given to the proximity of nearby sensitive human receptors which include residential dwellings, populated areas/villages.

5.5.9 Following the initial assessment of the 5km search area using the above constraints, it became clear that sites outside of this area would need to be assessed as insufficient land was available. As noted above, the Applicant's preference is for the land to be as close to the POC as possible, so the search area was enlarged incrementally until suitable options were found within a 20km radius.

Agricultural Land Classifications

5.5.10 Planning policy seeks to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land that is not classified as best and most versatile (grades 3b, 4 and 5).

5.5.11 Solar farms are temporary structures and unlike most built development and other renewable energy proposals (such as energy from waste plants) they do not constitute significant permanent development resulting in the permanent loss of agricultural land. Nevertheless, the site selection process has sought to exclude land that the best available data identifies as being within an agricultural land classification category that is, or includes, best and most versatile land.

5.5.12 At stage 2 of the site selection assessment the sources that were relied upon were data from the Natural England Agricultural Land Classification (ALC). The Natural England maps do not differentiate between grades 3a and 3b. Therefore, at Stage 2 all land in Grades 1, 2 and 3 was excluded and the focus was on trying to identify suitable sites within areas of Grade 4, 5 or unclassified land outside of other identified planning and environmental constraints.

Stage 3 – Identifying Potential Solar Development Areas

5.5.13 Stage 3 of the assessment then applied key operational criteria for large scale solar development - site size and land assembly; and site topography to further refine the unconstrained areas identified at Stage 2.

5.5.14 Large areas of land are required for large scale solar development as they have less vegetation to be removed for easy installation of the solar infrastructure. This also reduces the amount of buffering required for tree root protection, avoidance of shading compared to small fields and can reduce the solar development's impact on vegetation such as hedgerows and trees.

5.5.15 The Applicant's analysis regarding the minimum area for large scale solar to be economically viable identified a threshold of at least 40ha of contiguous land for an individual site. This is the minimum site size threshold considered by the Applicant to be viable (based upon the balance of costs of connecting infrastructure between individual sites and electricity losses from the multiple connection cabling

necessary) to form part of a network of sites, making up an NSIP scale scheme, in close proximity covering an area of approximately 1300ha. This is the land area (excluding cable route) considered to be required to support the 600MW grid capacity available at Cottam POC.

5.5.16 Individual site size and development area thresholds were identified by the Applicant following economic analysis of the MW output per hectare, taking into consideration infrastructure costs and the need for land to provide appropriate environmental mitigation. This resulted in a site threshold of 40 ha being applied. A smaller development area results in higher unit costs and an assessment was made as to the maximum cost and therefore minimum site area threshold that would be viable for the Scheme to hit the target financial metrics. Topographical constraints were also identified and mapped with all land with a 3% or less gradient, which is considered to be very flat and optimal for solar generation, being considered as potential solar development areas.

5.5.17 **Figure 5, Annex D** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]** illustrates the unconstrained land identified from the mapping at Stage 2 with a slope gradient of 3% or less.

5.5.18 The use of previously developed (brownfield) land, commercial rooftops and alternative locations proposed by consultees through the statutory consultation stage (as discussed above) were also considered. No brownfield land or commercial rooftops that meet the minimum individual site size threshold or the area of approximately 1300ha required for a network of sites in close proximity for the whole Scheme were identified within the 20km search area. **Figure 4, Annex D** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]** shows the brownfield land locations considered.

5.5.19 No commercial rooftops or combined premises of an adequate area to facilitate a large-scale solar project or provide a viable network of sites in close proximity covering an area of approximately 1300ha were identified.

5.5.20 Individual commercial rooftops do not meet the minimum 40 ha site threshold as described above. This is the minimum viable site size threshold (based upon the balance of costs of connecting infrastructure between individual sites and electricity losses from the multiple connection cabling necessary) to form part of a network of sites in close proximity.

5.5.21 The number of commercial rooftops required would mean multiple land ownerships and the legal complexities and costs involved in combining multiple sites of this nature is not viable.

5.5.22 The government has promoted financial incentives to encourage home owners to install solar PV systems, so rooftop solar is clearly desirable both on residential and commercial premises. However, this is not considered as an alternative to the Development. Commercial premises and houses are both consumers and generators of electricity, and therefore do not help provide low carbon and

renewable alternatives to conventional sources of electricity production at grid scale. In essence, roof-mounted solar panels should be deployed in addition to large scale solar farms, rather than instead of them.

5.5.23 There is a clear and urgent need for further renewable energy capacity, and this will likely include more distributed generation across the electricity distribution network, however the Scheme presents a single, large-scale generating asset which addresses the project aims of delivering clean, cheap electricity to the consumer whilst making a significant contribution to the fulfilment of the UK's legally binding climate change commitments. More, smaller-scale solar PV developments therefore are indeed required, however they do not represent an alternative to the Development. Larger scale solar projects provide increased decarbonisation benefits and commercial benefits to consumers as set out at **section 10.4** of the **Statement of Need [EN010133/APP/C7.11]**.

Stage 4 – Evaluation of Potential Solar Development Areas (PDAs)

5.5.24 Stage 4 then assessed the five potential development areas (PDAs) which were identified in Stage 3. The PDAs are shown on **Figure 8, Annex D** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]**. Constraints are presented on **Figures 9-13**.

5.5.25 Each PDA was evaluated against planning, environmental and other operational assessment indicators which were derived from national and local planning and environmental policy objectives and the operational requirements of the Scheme (see **Annexes B** and **C** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]**.

5.5.26 The indicators included biodiversity, landscape and visual amenity, cultural heritage, flood risk, land use, access for construction, as well as operational factors related to deliverability such as grid connection feasibility, topography and shading to consider the suitability of these areas for large scale solar development.

5.5.27 Ultimately, following the evaluation stage, none of the PDA's on Grade 4 and 5 agricultural land and unclassified land proved suitable for development due to significant constraints being identified. These constraints include land use, ecological and landscape factors and are detailed at paragraphs 3.2.8 – 3.2.28 of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]** and within Annex E of the same document.

5.5.28 The assessment then proceeded to consider potential areas of Grade 3 Agricultural land as set out at Stage 5 below.

Stage 5 – Widening the Search to consider Grade 3 agricultural land

5.5.29 Following the discounting of the PDA's on Grade 4 and 5 agricultural land and unclassified land, the site search focused on the areas of Grade 3 agricultural land within the search area. Residual Grade 3 areas were identified following the

exclusion of the same high-level constraints previously considered for the Grade 4,5 and unclassified land at stages 2 and 3 above.

5.5.30 Other proposed solar NSIP projects located on Grade 3 land within the 20km search area were discounted from further assessment because they were not available to accommodate the Scheme. These include West Burton Solar Project; Gate Burton Energy Park; and Tillbridge Solar. IGP is the developer progressing West Burton; Gate Burton and Tillbridge are separate developers. At the time of site selection not all the proposed solar NSIPs were in the public domain, however, they were already subject to early work, discussions and agreement with landowners and therefore the land areas were not identified as potentially available land through enquiries with land agents.

5.5.31 Land agents were contacted regarding potentially willing landowners within the area. The availability of willing landowners is an important consideration because it is typical for the land to be leased rather than permanently acquired due to solar farms consisting of temporary structures. It is desirable to compile a site in as few land ownerships as possible to minimizes project complexities (including engineering, design and mitigation measures), legal complexities and project costs. For this reason and due to the land take required for the Scheme, land agents used their professional knowledge to provide details of potentially willing landowners with large scale landholdings within the 20km search area.

5.5.32 These were assessed against the same detailed range of planning, environmental and operational considerations used to assess the Stage 4 PDAs. Other areas of Grade 3 land within the 20km search area either did not have willing land owners (sometimes due to early progression of other NSIP projects), were in smaller land ownerships which would add to project complexity (including engineering, design and mitigation measures) and cost, or were shown to be subject to a range of constraints when the planning and environmental considerations were mapped over the land agent enquiry areas. They were not, therefore, investigated any further.

Results of Assessment

5.5.33 The results of the assessment for each of the five PDAs identified on Grade 4 and 5 agricultural land and unclassified land are shown at **Annex E: Table 1** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]**. Their performance against a range of planning, environmental and operational criteria is shown relative to the Scheme's location. These sites were discounted as unsuitable following this process because they scored poorly in the assessment. Potential sites on Grade 3 agricultural land were then considered.

5.5.34 **Annex E: Table 2** of **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]** shows the results of the assessment of each PDA identified on Grade 3 land against the same planning, environmental and operational criteria. It also includes the Scheme which was identified at this stage as part of the Grade 3 land assessment. Four PDA's are described and evaluated

alongside the Scheme. Three of the PDAs performed worse than the Scheme location and one (Site 9) performed equally well. Site 9 is immediately adjacent to High Marnham Power Station where a grid connection was not offered by National Grid at the time of the site selection process as it was considered to be less favourable due to required upgrade works. This POC is likely to be the most sensible and cost effective POC for Site 9 in the future. These sites were therefore discounted in favour of the Scheme's location.

5.5.35 The specific Scheme Sites were chosen following the RAG assessment work (which considered a range of planning, environmental and operational criteria) and through discussion with the landowners regarding areas of their land holdings that they were prepared to allow solar development on. The Sites are within four land ownerships, and this small number of landowners is advantageous in terms of minimising project complexity, legal complexity and cost. The landowners' ongoing operational requirements for farming and other diversified uses within their land holdings meant that not all the land was suitable, or available, for solar development. The combined factors of constraints assessment and landowner requirements influenced the choice and configuration of the Scheme Site within the landholdings.

5.5.36 Detailed ALC surveys and environmental surveys were then undertaken to validate the RAG assessments and help to refine the chosen Site areas further. Following detailed ALC assessment (see ES Appendix 19.1 Agriculture Baseline Report **[EN010133/APP/C.6.3.19.1],** the initial red line boundary of the Scheme was reduced to ensure that the majority of the Sites, some 95.9%, are located on agricultural land that is not classified as best and most versatile.

5.5.37 The Applicant worked closely with the landowners in relation to BMV land to be included and excluded from the Order Limits, alongside the ALC survey. The Applicant has sought to exclude Grade 2 and 3a land from the Scheme so far as is practicable, and to keep good quality land in agricultural use. In terms of the specific areas of BMV land (4.1% of the scheme) that are retained within the Scheme, these are justified by factors related to their location and context within the Scheme, the wider landholdings, and in relation to adjacent and surrounding land.

5.5.38 Details of specific changes made to the Scheme to reduce the amount of BMV land to a minimum following the detailed ALC assessments and discussion with farmers are set out in **Table 5.9** below.

5.5.39 The **Site Selection Assessment [EN010133/APP/C6.3.5.1]** explains at paragraph that it was not proportionate to consider in detail every piece of unconstrained Grade 3 agricultural land within the 20km search identified through the site selection process due to the amount of land involved. Instead, for the reasons set out above, the focus was on the large-scale landownerships which were identified by agents as having potentially willing landowners.

5.5.40 Details of all the constraints researched during the site selection process were, nevertheless, mapped over the whole of the 20km search area as shown on **Figure**

23, Annex D of **Site Selection Assessment [EN010133/APP/C6.3.5.1]** to sense check the chosen location for the Scheme. This shows that there are few extensive areas of Grade 3 land outside of the land already considered, that are constraint free. The general area east of Gainsborough and west of the Lincoln Cliff where the Scheme is located, is clearly less constrained in terms of flood risk, gradient, the density of settlements, heritage assets, landscape and ecology designations than other parts of the 20km search area. The location of a number of other NSIP scale solar projects within this area illustrates this. **Figure 23 Annex D** shows that there are no other parts of the 20km search area that would provide a more suitable location for the siting of a 1300 ha solar project taking into account these constraints.

Summary

5.5.41 The Site Selection process took a sequential approach to the consideration of potential sites in terms of agricultural land classification. **The Site Selection Assessment [EN010133/APP/C6.3.5.1]** details the five stage process that the Applicants undertook in order to select the location of the Scheme and this process is summarised at Section 6.3 above. It explains that following identification of the 20km radius search area, all land in Grades 1, 2 and 3 was excluded from the search and the focus was first on trying to identify suitable sites within areas of Grade 4, 5 or unclassified land outside of other identified planning and environmental constraints. Five potential sites within this area were initially identified but were later discounted following further detailed assessment of constraints. Only then, did the assessment consider potential areas of Grade 3 agricultural land. The location of the Scheme was ultimately chosen following a RAG assessment of a further four sites within the Grade 3 land.

5.5.42 The land maximises the utilisation of low grade, non best and most versatile (BMV) agricultural land with 95.9% of the land being classified as non BMV land. In terms of the specific areas of the 4.1% BMV land that are included within the Scheme, these are justified by particular factors related to their location and context within the Scheme, the wider landholding, and in relation to adjacent and surrounding land. **Table 5.9: Stage 4 – Design Updates up to DCO Submission (August-November 2022)** below sets out the changes made to the Scheme following detailed ALC assessment and provides the detailed justification for retaining small areas of BMV land and an explanation as to why others were removed. The reasons why small areas are retained is generally because they form small parts of larger fields of lower grade land and it would not be practical to remove these from the Scheme from a Site layout perspective, or to continue to farm them as small, isolated land parcels surrounded by the Scheme. Where BMV land formed the whole or majority of fields that could continue to be viably farmed, they were removed from the Scheme.

5.5.43 The land for the Scheme has been demonstrated to perform better than 8 of the assessed PDAs and equal to the remaining one following the site selection process. There are no more suitable locations for the Scheme within the Search Area.

5.5.44 The Scheme is located predominantly within Lincolnshire, an optimal region within the UK to locate a large scale solar farm. This is due to good irradiation levels and suitable topography, which is predominantly made up of and characterised by large flat open land. In addition, the decommissioning of large coal fired power stations within the region has led to the availability of significant grid capacity at available and accessible connection points. As such, the selection of the Sites as the preferred locations for the Scheme can be summarised by the points below:

- The land maximises the utilisation of low grade, non best and most versatile (BMV) agricultural land with 95.9% of the land being classified as non BMV land. This is not the case for the other Site 6-9 PDAs which have not been subjected to detailed ALC assessment and may contain greater proportions of BMV.
- The land is not located within internationally and nationally designated biodiversity sites and can avoid direct impact on locally designated biodiversity sites;
- The land is not located within or close to Areas of Outstanding Natural Beauty or designated areas of local landscape value;
- The land can avoid direct physical impact on designated heritage assets;
- The land is predominantly within Environment Agency flood zone 1 and is therefore at a low risk of flooding;
- The land has good transport access for construction and operational maintenance, with good links to the strategic road network (the A15, A46, M180) via the A1500, A631, and B1205.
- The land is of a suitable size and has excellent topographical characteristics which meet the requirements of the Scheme to generate 600MW of electricity and be able to store it; and
- There is available capacity for the Scheme to connect to the NETS at Cottam Power Station that can be completed within a reasonable timeframe and cost;
- The Sites are within four land ownerships, and this small number of landowners is advantageous in terms of minimising project complexity, legal complexity and cost.
- 95.9The land has limited land use conflicts with respect to local development plan allocations and displacement of existing businesses.

5.5.45 There are no obviously more suitable locations for the Scheme within the Search Area.

5.6 Alternative Technologies

5.6.1 Alternative types of low-carbon forms of electricity generation for utilising the existing Cottam Power Station POC capacity were not considered by the Applicant, who is a solar PV and energy storage developer. However, notwithstanding this, it is

not considered that the Order limits would be suitable for other forms of renewable generation at the same scale as the Scheme.

5.6.2 Tidal power, offshore wind and hydroelectric storage were not possible due to the location of the POC which is located approximately 70km from the coast and within an area of low, flat topography. The Lincolnshire Wolds AONB lies between the POC and the Lincolnshire coast making overhead lines prohibitive through this sensitive area and underground cabling costly over the required distance.

5.6.3 The Order Limits are not considered suitable for onshore wind due to the significant visual impacts that this type of development would have in this low lying area including from distant views from higher land to the east (Lincoln Cliff) where turbines would be visible in views towards the horizon. It is not expected that the Order limits would have been able to host an economically viable and successful onshore wind farm without causing significantly greater environmental consequences than the Scheme.

5.6.4 Nuclear power was not considered as an alternative because of the high cost of electricity and the lengthy planning and development timeframe; circa 20 years, that such a project would involve. The Scheme will be able to start generating electricity much more quickly with a grid connection anticipated in 2029.

5.6.5 It is therefore considered that solar PV is the best renewable generating solution for the Order limits.

Solar Technology

5.6.6 As described in Chapter 4: Development Description, the parameters of the Application will maintain some degree of design flexibility under the Rochdale Envelope to allow the latest technology to be utilised at the time of construction. Notwithstanding this, several technological design options have been considered and preferred options taken forward taking into consideration environmental effects and the Scheme's objectives and need for optimal functionality.

5.6.7 As described in Schedule 1 of the draft **DCO [EN010133/APP/C3.1]**, and Chapter 4: Scheme Description **[EN010133/APP/C6.2.4]**, the design elements have been placed within discrete Work Numbers. These are:

Work Nos.1A-1D — ground mounted solar photovoltaic generating station with a gross electrical output capacity of over 50 megawatts

Work No.2— an energy storage facility (sometimes referred to as a 'BESS')

Work No.3—an alternative energy storage facility (BESS) to Work No. 2

Work No.4— works in connection with onsite substations

Work No.5— works to the existing National Grid Cottam Power Station 400kV substation site to facilitate connection of the Scheme to the National Grid

Work No.6— works in connection with electrical cabling

Work No.7— works including:

(i) fencing, gates, boundary treatment and other means of enclosure;

(ii) works for the provision of security and monitoring measures including CCTV columns, lighting columns and lighting, cameras, weather stations, communication infrastructure, and perimeter fencing;

(iii) landscaping and biodiversity mitigation and enhancement measures including planting;

(iv) improvement, maintenance and use of existing private tracks;

(v) laying down of internal access tracks, ramps, means of access and footpaths;

(vi) temporary footpath diversions;

(vii) earthworks;

(viii) sustainable drainage system ponds, runoff outfalls, general drainage and irrigation infrastructure and improvements or extensions to existing drainage and irrigation systems;

(ix) electricity and telecommunications connections; and

(x) secondary temporary construction laydown areas.

Work No.8— temporary construction and decommissioning laydown areas

Work No.9— works to facilitate access to Work Nos.1 to 8 and 10 to 11

Work No.10— works to create and maintain habitat management areas,

Work No.11— creation of a new permissive footpath from Stow village to Stow Pastures

5.6.8 There are many alternative types of technology available for consideration when designing a solar farm, and technology is constantly evolving and changing such that it is expected that other alternatives may become available during the Application process and prior to construction. Therefore, there is a need for flexibility and this ES takes a 'Rochdale Envelope' approach to the assessment. Each chapter in the ES assesses the realistic 'worst case' scenario for the environmental topic.

5.6.9 The text below sets out the design elements and alternatives considered throughout the design process relative to Work Numbers 1 to 3, which are the ground mounted solar photovoltaic generating station and energy storage facility. There were few substantial technological alternatives considered for Work Numbers 4-11, other than the potential for an overhead line instead of a buried POC route and minor iterations of the design for supporting infrastructure.

Ground mounted solar photovoltaic generating station No.1A-1D

5.6.10 Work No. 1A-1D comprises elements such as solar modules fitted to mounting structures, DC electrical cabling, conversion units including inverters, transformers, switchgear, and monitoring and control systems. To maintain flexibility in the

assessment and within the Application, both tracker and fixed panels have been considered within the ES, as have either standalone transformers, inverters and switchgear or integrated conversion units. These allow for changes in technology and efficiencies.

Table 5.3 Solar Farm Works Areas 1A-1D

Design Element	Configuration	Alternatives Considered
Solar PV panels	Mono- or bifacial panels	The application allows for use of single (mono) facing or bifacial panels, with the latter being typically slightly more transparent and with the ability to absorb sunlight on the underside of the panel. It was not considered that this option would affect the EIA as the maximum design scenarios for both are equivalent (see **Section 4.3** of **ES Chapter 4:Scheme Description) [EN010133/APP/6.2.4]** for further detail of assessment process and the Rochdale Envelope)
	Colour of panels	The solar PV modules are likely to be either black or dark blue. This will be fixed during detailed design. It was not considered that this option would affect the EIA as the maximum design scenarios for both are equivalent (see **Section 4.3** of **ES Chapter 4:Scheme Description) [EN010133/APP/6.2.4]** for further detail of the assessment process and the Rochdale Envelope)
Solar PV modules	Angle of panels	Flexibility for either tracker or fixed panels has been built into the EIA. Trackers incline to the east or west up to a maximum inclination of 60 degrees from horizontal. Fixed panels slope towards the south at a fixed slope of 15 to 35 degrees from horizontal.
	Orientation	Flexibility for either tracker or fixed panels has been built into the EIA. The tracking solar PV modules would be aligned in north-south rows The fixed solar PV modules would be aligned in east-west rows.

Design Element	Configuration	Alternatives Considered
	Height	Flexibility for either tracker or fixed panels has been built into the EIA. The maximum height of the highest part of the tracking solar PV modules at its greatest inclination will be 4.5m. The maximum height of the highest part of the tracking solar PV modules when horizontal will be 2.5m. The maximum height of the highest part of the fixed solar PV modules will be 3.5m.
	Foundations	Foundations are most likely to be galvanised steel poles driven into the ground. These will either be piles rammed into a pre-drilled hole, or a pillar attaching to a steel ground screw. Foundations in areas of archaeological interest where archaeology is to remain in situ will be concrete feet onto which the mounting structures will be affixed. Concrete feet will be set directly on the topsoil with no excavation.
Conversion Units	Standalone transformers, inverters and switchgear or integrated conversion units	Consideration of conversion units consisting of standalone transformers, inverters and switchgear, or of integrated containerised conversion units have been considered. The DCO application is retaining the flexibility to consider both options prior to construction of the Scheme due to anticipated technical advances.

Energy Storage Facility (or 'BESS') – Work No 2.or 3

5.6.11 Energy storage is a rapidly evolving technology and improvements to factors such as cost, efficiency, duration, and safety are expected between the time of submission and construction. The Application therefore seeks to keep the technological possibilities open so far as reasonable.

Table 5.4 BESS – Work No 2

Design Element	Configuration	Alternatives Considered
Type of energy storage technology: battery storage with DC coupling (decentralised) or AC coupling (centralised)	Centralised BESS	The installation of a centralised AC-coupled BESS has been selected due to the consideration that a single location for the BESS allows for structural planting to provide landscape and visual screening and enhancement measures, avoiding the introduction of large units throughout the Order limits (decentralised) which would be more unsightly and more difficult to screen.
BESS compound	Scale	In anticipation of advances in technology, flexibility for either Option A – (t Work No 2) or Option B (Work No 3) of battery storage has been considered in the EIA and included in the DCO Application. The maximum footprint of the Option A compound is up to 6.5ha or 15.2ha for Option B. In the event that the smaller area is built out, solar panels will be constructed on the remaining area.
	Height	Double stacking of battery containers was considered to reduce land area but was discounted on the basis that it would have a greater visual impact.
	Monitoring and Control System	The monitoring and control system will be housed either in an adapted container or built from glass reinforced plastic (GRP). The system will be within the same container or room as the HVAC or in its own container or control room. It was not considered that this option would affect the EIA as the maximum design scenarios for both are equivalent (see **Section 4.3** of **ES Chapter 4:Scheme Description) [EN010133/APP/6.2.4]** for further detail of the assessment process and the Rochdale Envelope)
Fire suppression	Water Storage	Water will be required to be stored on site in close proximity to the energy storage systems. This water will be stored in either above ground tanks or open water bodies. EIA assessed on

Design Element	Configuration	Alternatives Considered
		the basis of worst case scenario tanks. It was not considered that this option would affect the EIA as the maximum design scenario of above ground tanks has been assessed in the ES (see **Section 4.3** of **ES Chapter 4:Scheme Description) [EN010133/APP/6.2.4]** for further detail of the assessment process and the Rochdale Envelope)
	Integrated fire suppression location	Fire suppression systems will be integrated into the design of each BESS container and will be located either within or outside the BESS container. If located outside, the suppression systems will either be decentralised and located at each container or centralised. It was not considered that this option would affect the EIA as the differences between each design scenario are minimal (see **Section 4.3** of **ES Chapter 4:Scheme Description) [EN010133/APP/6.2.4]** for further detail of the assessment process and the Rochdale Envelope)
Cabling	Above or below ground	Cabling between battery containers and battery stations will be above ground in cable trays or laid in an underground trench. It was not considered that this option would affect the EIA.

5.7 Alternative Layouts for Solar Panel Areas

Layout Parameters and Considerations

5.7.1 The layout of the solar panel areas has been informed by the matters set out in **Table 5.5**. below. These considerations were implemented as blanket parameters across the development site to ensure consistency of approach. Parameters such as offset distances were informed by the technical consultant team based on their professional judgement and previous experiences. Once applied, the remaining site area was designated the "developable area" for the solar array, inverters, substation, and access roads. Security fencing was able to be placed along the parameter

boundary. Areas between the fencing and the development site boundary were made available for ecology and landscape mitigation or enhancement.

Table 5.5: Design Parameters for Site Panel Areas

Criteria	Consideration	Parameters
Planning, policy and legislation	Planning applications and allocations	Avoidance of any land subject to pending planning applications and site allocations.
Technical and engineering requirements	Access	Accessibility by vehicle to all field parcels for maintenance access Accessibility by vehicle to all inverters Accessibility by vehicle to site substation
	Electrical Design	Conversion units will be required on each Site at a maximum rate of one conversion unit per 2.5 MW of peak solar energy generation.
Environmental constraints	Landscape and Visual	Proximity of residential properties – minimum 50m offset to curtilage boundary Identification of key visual receptors and key views
	Ecology and Biodiversity	Avoidance of national ecological designations Proximity to local ecological designations and sensitive ecological receptor – minimum 20m offset to designated area Proximity to major watercourses – minimum 20m offset Proximity to minor watercourses and ditches – minimum 8m offset Proximity to badger setts – minimum 30m offset Proximity to GCN sites – minimum 50m offset Proximity to trees with low, medium or high bat roost potential – minimum 8m, 12m, 20m offset
	Hydrology, Flood Risk, and Drainage	Avoidance of flood storage areas Avoidance of areas of surface water flooding greater than 1m depth
	Mineral Resources	Avoid creating an obstruction to the future exploitation of mineral resources subject to minerals resource safeguarding.
	Cultural Heritage	Avoidance of national cultural heritage designations

Criteria	Consideration	Parameters
		Areas of significant archaeology to be avoided Areas of moderate archaeology to be limited to restricted loading and non-penetrative foundations Context of cultural heritage assets to be considered
	Transport and Access	Sensitivity of watercourse crossings for construction traffic Consideration of existing access points and local highway network Accessibility by vehicle to all field parcels for maintenance access Accessibility by vehicle to all inverters Accessibility by vehicle to site substation
	Glint and Glare	Consideration of panel backtracking or additional mitigation to screen glint and glare
	Agricultural Land Classification	Consider avoidance of best and most versatile land
	Telecommunications, Utilities, and Television Receptors	Avoidance of underground utilities – subject to easement widths Avoidance of overhead power lines – subject to easement widths, 15m minimum to pylons
Land use and ownership constraints		Seeking to use land in the same ownership for each site to minimise project and legal complexities. Where possible reducing interaction on rail network, strategic road infrastructure, utilities and other infrastructure.

Main Design Iteration for the Solar Array Sites

5.7.2 Prior to determining the proposed Order Limits, there were several stages of design evolution, during which the original area of the Scheme was refined. That process of design evolution has been informed by ongoing environmental assessments, engineering and design considerations, as well as engagement with stakeholders.

Stage 1 – Non-Statutory Consultation November-December 2021

5.7.3 The initial phases of the Scheme design were developed through Applicant and landowner parameters, set against desk-based assessment work to determine outline design objectives and identify areas of required preliminary investigation.

5.7.4 The primary site selection stage was undertaken by the Applicant following the establishment of the grid connection offer at Cottam Power Station. The sites selected were chosen following the site selection process set out in **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1]** on the basis that they were a suitable proximity to the point of connection, avoided relevant planning, heritage and ecological designations, areas with greater than 3% gradient and areas known to be of Grade 1 and 2 Agricultural land according to Natural England mapping. The Site Selection Assessment explains that potential Grade 4, 5 and unclassified land within the Search Area was discounted through the site assessment process as it was assessed to be unsuitable for a large scale solar scheme.

5.7.5 Cable routes were selected on the basis of using the shortest possible routes avoiding relevant planning, heritage and ecological designations and with a large amount of optionality available.

5.7.6 During this phase, on-site options for the locations of substations and energy storage area were explored in tandem with the non-statutory consultation using a desk-based approach. The proposed locations of these pieces of on-site infrastructure were at an early stage during the Stage 1 Consultation and as such were not included in the consultation materials that were published for the Consultation.

5.7.7 For field numbering please refer to field numbering plans at **Figures 3.1 – 3.3** of Chapter 3 of the ES **[EN010133/APP/C6.2.3].**

Table 5.6: Stage 1 – Non-Statutory Consultation (November-December 2021)

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
Site Selection Assessment Early feasibility work including site identification and the consideration of constraints and opportunities.	ALL SITES Three Principal Sites covering approximately 1270ha (Sites only). Cottam 1 – 894ha Cottam 2 – 132ha Cottam 3a and 3b – 244 ha	Scheme design initially developed through Applicant and landowner parameters (see Table 5.5), set against desk-based assessment work to determine outline design objectives and identify areas of required preliminary investigation. The sites were selected on the basis of the site selection process set out in **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1].** The selection criteria ensured that they are a suitable proximity to the point of connection, avoid specific planning, heritage and ecological designations, land with a gradient greater than 3%, extensive areas of high flood depth and areas known to be Grade 1 and 2 agricultural land according to Natural England mapping. The Site Selection Assessment explains that potential Grade 4,5 and unclassified land within the Search Area was discounted through the site assessment process as it was assessed to be unsuitable for a large scale solar scheme. On-site options for the locations of substations and battery storage area were explored in tandem with the non-statutory consultation using a desk-based approach.

Stage 2 – EIA Scoping January 2022

5.7.1 At this stage, the outline design of the Scheme published at non-statutory consultation was presented alongside desk-based and initial field assessments of the proposed Scheme.

5.7.2 Internally, a maximum capacity layout was produced to help the project team identify where predicted areas of key concern, or of anticipated minimal impacts were going to be on the Scheme. These findings were then presented to PINS and the notified statutory bodies to comment on the scope of assessment required for the proposals through the submission of the EIA Scoping Request.

Table 5.7: Stage 2 – EIA Scoping and Ongoing Consultation (January-May 2022)

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
EIA SCOPING		
Desk-based and initial field assessments of the proposed Scheme including preliminary minerals resource assessment undertaken.	ALL SITES Three Principal Sites covering approximately 1270ha (sites only). Cottam 1 – 894ha Cottam 2 – 132ha Cottam 3a and 3b – 244ha Drawing Ref: Fig 3.1 Site Plans (see C6.3.2.1 ES Appendix 2.1 EIA Scoping Report)	A maximum capacity layout based on up to 1,270ha of developable area was produced to help the project team identify where predicted areas of key concern, or of anticipated minimal impacts were going to be on the Scheme e.g issues such as noise, LVIA, ecology and flood risk. These findings were then presented to PINS and the notified statutory bodies to comment on the scope of assessment required for the proposals through the submission of the EIA Scoping Request. The main 400kV substation on Cottam 1 had two preferred areas to be located, at either G1-3 or F3-6. Three options for cable crossing of River Trent were identified: 1) Between Gate Burton and Knaith, 2) North of Marton to Littleborough, 3) Between Trent Port and Torksey Viaduct to north or south of Cottam Power Station.

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
VERSION 1 SITE LAYOUT PLANS		
Feedback from Planning Inspectorate Statutory body consultation from EIA Scoping Non-statutory consultee feedback Ongoing stakeholder engagement Ongoing focussed consultation with residents Environmental surveys	ALL SITES	A full solar PV layout across the whole Scheme area was produced CO1-3 based on consultation, initial survey data, and the implementation of key parameters. Aimed as a capacity maximisation study. Key constraints regarding ecological, flooding, and landscape comments were used to inform development parameters. Consultation with parish councils and statutory bodies helped to identify areas of greatest impact that can be revised, redefined within the DCO, or mitigated.
	Cottam 1 894ha	Additional offsetting starting at a minimum of 20m from the River Till due to flood risk and its designation as major watercourse. Offsets from telecoms and utilities have been confirmed with utility providers, and have been introduced across the entirety of the Scheme. This has impacted the layout of fields D7, D16-D20, D23, D26, D29, E4 and G1.
	Cottam 2 132ha	A full solar PV layout across the whole Site area was produced based on consultation, initial survey data, and the implementation of key parameters. No changes were made to Cottam 2 field layouts.
	Cottam 3a 244ha (3a and 3b)	A full solar PV layout across the whole Site area was produced based on consultation, initial survey data, and the implementation of key parameters. No changes were made to Cottam 3a field layouts.

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
	Cottam 3b	A full solar PV layout across the whole Site area was produced based on consultation, initial survey data, and the implementation of key parameters. No changes were made to Cottam 3b field layouts.

Stage 3 – Preliminary Environmental Information Report (PEIR)/Statutory Consultation June-July 2022

5.7.1 Following feedback from the Planning Inspectorate and statutory consultees during the EIA Scoping stage, the design of the scheme evolved in tandem with further desk-based and field assessments. Consultation with neighbouring residential properties was undertaken during this period to determine any direct impacts and suitable mitigation measures. The preliminary designs produced during February to April 2022, along with the Preliminary Environmental Information Report, were presented to the public and statutory consultees for statutory consultation in June-July 2022.

Table 5.8: Stage 3 – PEIR and Statutory Consultation (June-July 2022)

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
Feedback from statutory consultees through EIA Scoping process Environmental surveys including landscape and visual, ecology, heritage, noise, transport,	ALL SITES	Implementation of key parameters to regularise the solar array across the Sites by providing buffers for hydrological features e.g. ditches, drains and ponds, ecological features, utilities and telecoms. Areas of flood depth of more than 0.9m were avoided entirely, with only non-vulnerable infrastructure to be located within areas of shallower than 0.9m flooding. Offsets from important roads and railways were introduced to reduce potential glint and glare impacts or provide space to allow for mitigation measures to be installed.

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
agriculture and soils, and other topics forming the PEIR e.g. Mapping of minerals safeguarding areas and areas of search Feedback from landowners. Ongoing focussed consultation with residents Applicant's internal design process.		Introduction of a minimum 50m setoff from the curtilage boundaries of residential properties. Amendments to ecology offsets to hedgerows and trees were embedded in the design parameters following onsite detailed ecology surveys. Access tracks and strategy reformulated following detailed environmental surveys including removal where possible from ecology offset areas. Across the three Sites, noise barriers were introduced around conversion units where potential impacts on residential amenity were found through detailed assessment work. Checks to ensure the majority of the land within the Sites is located outside any minerals safeguarding areas. Only small areas of land within the Sites are subject to sand and gravel safeguarding. This includes 50ha at Cottam 1; 25ha at Cottam 2; 1.5ha at Cottam 3a and 4ha at Cottam 3b. The scheme has a lifespan of 40 years and due to the Scheme being decommissioned at the end of its operational life, any minerals would not be permanently sterilised and would be available to exploit if required at a future date. The siting of the Scheme substations was provided in compliance with the location provisionally determined through a desk-based "RAG" rating, taking into account technical constraints and electrical design requirements (See **Section 5.8**). Where field areas were removed from solar panel siting, ecological and landscape mitigation measures were drafted to compensate for loss of habitat (such as for skylarks) elsewhere on the site, and for views into the site from sensitive receptors to be mitigated.

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
		Agricultural Land Classification Reports for the Sites prepared for PEIR confirmed the site contained only 8.3% Best and Most Versatile (BMV) land.
	Cottam 1 894ha	Field numbers A3, B1, and D19 were removed to address residential amenity concerns. Fields D1, D7 (west end), D8, and E3 were removed at the request of Stow Parish Council and F1, F2, and F7 were removed upon request by Stow Parish Council on behalf of the residents of the hamlet of Normanby by Stow. The removed fields in Site F were also due to be removed as a result of archaeological interest in the Normanby by Stow mediaeval village. The proposed solar arrays were removed from C28, F1, F2 and F7 due to results of geophysical surveys which indicated areas of unmitigable archaeological interest. Noise barriers around electrical infrastructure points (conversion units, substations, batteries) have been introduced to mitigate impacts on residential properties. Two options for energy storage were presented: • Option A – located in the centre of field G1 • Option B – location as option A plus two small areas in G2 and G3
	Cottam 2 132ha	Separation buffers to the encircled residences at Corringham Grange and The Cottage were combined to provide a clear corridor without panels. This in turn was used to develop the landscape and ecology mitigation strategy. In fields H5 and H8, where existing ecologically significant habitats were surveyed, buffer areas were extended to provide space for protective and enhancing planting and groundcover.
	Cottam 3a	132kV overhead power lines required substantial offsetting for access easements to be enforced.

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
	244ha (3a and 3b)	The outcome of ecological assessments of trees along the eastern boundary was the requirement for offsets to be maintained at 20m. Areas of panels were removed in K12 and K18 for the siting of turtle dove mitigation, and to reduce landscape impacts from the B1205.
	Cottam 3b	A 15m minimum offset was provided from the Public Right of Way traversing the Site.

Stage 4 – DCO Submission October 2022

5.7.2 Stage 4 of the design process took into account the feedback received during the statutory consultation, including feedback from members of the public, statutory consultees and landowners. The development of the Environmental Impact Assessment has also informed the design, as mitigation requirements for hydrology, landscape, ecology and other environmental topics were fed back into the overall Scheme design. A final review of the scheme to minimise the amount of BMV agricultural land was also undertaken prior to submission. The changes are set out in the table below. The development of the design through Stage 4 has culminated in the design masterplan included in the DCO Application.

5.7.3 Where field reference numbers are used, refer to the Field Numbering Plans in Appendix 3.2 of the ES **[EN010133APP/C6.3.3.2]**.

Table 5.9: Stage 4 – Design Updates up to DCO Submission (August-November 2022)

Consultation, Surveys, and Design Influence	Site Area	Design Evolution
Statutory consultation feedback Final design feedback from landowners	ALL SITES The Scheme comprises 4 combined Sites connected by a series of Cable Route	On all sites, the buffer zones to ecological receptors, watercourses, and utilities were remodelled and regularised following completion of baseline surveys, and updated information from key service providers.

Development of the Environmental Impact Assessment Additional ALC Assessment. Conclusion of ongoing focussed consultation with residents	Corridors and accessed by a number of access points. The Scheme's Order Limits, which include all land falling within the DCO application, cover an area of 1,451.32 hectares (ha). The four combined sites minus the Cable Corridors, Means of Access and Cottam 1 permissive path total 1188.52ha. These are detailed below.	The solar array area has been designed to accommodate onsite substations, battery storage, temporary construction compounds, and any permanent supporting infrastructure. The results of further ALC surveys Cottam 1, 2 and 3a were received. This reconfirmed the original assessment results showing 8.3% BMV across the Scheme and supported the preliminary assessment set out in the PEIR. A further review of all BMV land within the Order Limits was undertaken and where practicable to do so such BMV land was removed from the Scheme. This has resulted in only 4.1% BMV being included within the final Scheme. Where BMV is retained, clear justification for this is provided below. A full landscaping and ecological mitigation design has been developed to supplement the design of the Scheme. These have been detailed and assessed in full in the **ES Chapter 8: Landscape and Visual Impact Assessment [EN010133/APP/C.6.2.8]** and **Chapter 9: Ecology and Biodiversity [EN010133/APP/C.6.2.9]** and their supporting technical appendices and figures, and in the associated **Outline Landscape and Ecological Management Plan [EN010133/APP/C7.3]**. On site, landscape planting was added to include low level planting such as native scrub and wildflower meadow planting. This has the triple purpose of providing biodiversity net gain, providing groundcover to let the soils underneath rest, and allowing for potential grazing options for optioned farm holdings.
	Cottam 1 812.1ha	The panel arrangement within the southern end of field A4 has been squared off to retain resident views from North Farm to the northeast. Fields C14, D24 and D25 have been removed from the Scheme as a result of landowner preference to reduce impacts on other estate operations. whilst C26 has been removed from the array area to provide habitat creation. Access between Fields C13 and C15 has been created through inclusion of the bridge next to Side Farm being included within the Scheme.

		Fields D1 and D4 were removed from the Scheme as the ALC survey results showed the whole field comprises BMV. Field D1 had previously been removed from the array area due to landscape impact, and D4 had been given to habitat creation due to high flood risk. Both field D1 and D4 remain well connected to the wider landholding and thus it is practical for agricultural use to be retained. A strip of D1 remains within the Scheme to form the proposed permissive footpath. This was the preferred location for the permissive footpath following landowner input and ecological assessment to minimise openings in hedgerows and the impact on BMV land is minimal. Fields D5 and D6 have been removed from the Scheme as the ALC survey showed that the majority of land within these fields comprises BMV land. Avoidance of the BMV land through layout redesign was found to be impractical due to the creation of an isolated area of the BMV land that could not continue to be farmed, and production of an inefficient configuration of solar panels. The entire fields were therefore removed apart from a strip along Fleets Lane to retain access to Fields D7-9. The impact of this on BMV land is minimal. Field D7 contains a small area (4.68ha) of Grade 2 BMV and has been retained within the Order Limits because it is not practical to continue farming this isolated parcel. Access to the whole field is currently taken from Fleets Lane to the west and removal of the BMV portion from the Scheme would mean no direct access to it for agricultural vehicles and equipment. It is not practical for it to be farmed as an isolated area of Grade 2 land. It has therefore been retained within the Scheme to be used for ecological mitigation purposes. The eastern edges of Fields D3 and D7 have been modified as a result of updated flood modelling from the River Till. Areas at highest risk of long-term flooding have therefore been excluded from the siting of panels and have been given over to wetland habitat ecological mitigation and enhancement.

		Field D14 has an additional buffer added as a result of the identification (by geophysical survey) and confirmation (through trial trenching) of archaeological remains associated with the Thorpe le Fallows mediaeval village. Fields E1, E2, and F3 have had further revisions to buffers along the River Till. Field E6 has been given over to be used for ground-nesting bird mitigation instead of panels due to flood risk potential, as identified by local consultation attendees. Fields E3 and E4 have been removed from the Scheme as they consist largely of BMV land. Only strips for the location of the permissive paths, cable routes, and access have been retained. The impact of these upon BMV land is minimal. Fields F4 and F5 are largely BMV land and were also removed from the Scheme except for access and cable routing along the south of F4. Fields E3, E4, F4 and F5 could continue to be farmed effectively as part of the wider land holding. Low lying areas of Fields F1, F2, and F3 have also been given over to wetland ecological mitigation and enhancement to form a significant area for biodiversity gain. Field G4 contains an isolated area of identified BMV (Grade 3a) encircled by Grade 3b land. As such, this is a limiting factor to the effective productivity of the entire field. Avoidance of the BMV would be impractical as the BMV land would be encircled by the solar array and result in an unviable isolated area of agricultural land. As such, Field G4 remains within the solar array.
	Cottam 2 132.66ha	The area between Corringham Grange and The Cottage in field H1 has been squared off to provide a more consistent panel-free corridor to improve residential amenity. Existing semi-permanent ponds or basins which are surrounded by the solar array area are proposed to be enhanced through enforcement of ecological buffers and through minor ecological interventions to promote biodiversity gain. Cottam 2 contains a strip of BMV land within the Order Limits along its north western boundary with Cottingham Beck, spanning part of 3 fields (H1, H3 and H6). These fields are currently farmed to the limitations of the Grade 3b land which forms the majority

		of these 3 fields. Removal of the BMV elements of these fields from the Scheme would result in impractical and unviable fragments of agricultural land. Therefore, the land has been retained within the Scheme.
	Cottam 3a 169.49ha	Changes made to the solar array sites have been driven by updated parameters being implemented specifically with regard to updated ecology buffers from trees and hedgerows, and the removal of isolated areas otherwise cut off because of utility crossings, such as in field K12 which has been changed to habitat creation. Existing vegetation along the railway line (northern boundary of Fields J1-3 and J5 will be enhanced by supplementary planting, whilst planting along the public right of way traversing the Site at Cottam 3b will be utilised to screen the majority of views. The eastern wooded belt is to be supplemented with additional planting to enhance bat roosting potential. Scrub planting is proposed to the north and south of the Blyton Park derby track, to reduce intervisibility without causing shadows on the proposed arrays. An ecological link is to be established along the K6-K7 field boundary, whilst the areas underneath the 132kV overhead power lines are to be planted with a wildflower seed and scrub mix. Any set-aside mix will be planted in fields K12 and the south eastern corner of K18 for turtle dove habitat provision. Field K1 is predominantly BMV land (Grade 3b with a small area of Grade 2) in the north eastern corner. This field is therefore farmed to the limitations of the Grade 3b land. Avoidance of the BMV land would result in an isolated and unviable fragment of agricultural land. As such, Field K1 is entirely retained within the Scheme. Field K2 comprises BMV in its entirety and has therefore been removed from the Scheme save for retained access and cable connectivity to Field K1. It can continue to be viably farmed. Field K15 has been removed from the Scheme as the majority of the field has been assessed to be BMV and can be viably farmed. Field K16 has been retained within the Scheme as less than 50% of this field is BMV land and it is not practical to remove just

		the BMV element from the Scheme and viably farm the remainder. Its retention contributes to providing a viable solar array layout.
	Cottam 3b 74.27ha	Changes to layout made to update ecology buffers, revised spacing requirements for glint and glare mitigation for the adjacent railway, and for planting along the Public Right of Way traversing the Site.

5.8 Alternative Substation Locations

5.8.1 The positioning of a substation within each of the Sites, and a main substation near to the point of connection, are requirements of the Scheme driven by electrical design. The considerations made by the Applicant and consultant team have been listed in **Table 5.10** below. Most of these considerations were implemented as blanket parameters across the development site to ensure consistency of approach, however site-specific requirements – led by the substation size – were also included. Parameters such as offset distances were informed by the technical consultant team based on their professional judgement and previous experiences. Once applied, a RAG assessment was undertaken at each of the sites to determine the most suitable areas within the developable area for the positioning of the substations.

Table 5.10: Design Parameters for Substation Location

Criteria	Consideration	Parameters
Planning, policy and legislation	Planning applications and allocations	Avoidance of any land subject to pending planning applications and site allocations.
	Neighbouring land use	Avoidance of location within 300m of residential properties
Technical and engineering requirements	Access	Accessibility by vehicle to site for maintenance and construction Accessibility by oversized loads to substation site
	Site Area	Large enough size to accommodate substation design (site specific)
	Electrical Design	Proximity to cable exit point – no more than 500m
Environmental constraints	Landscape and Visual	Identification of key visual receptors and key views
	Ecology and Biodiversity	Avoidance of national ecological designations Proximity to local ecological designations and sensitive ecological receptor Avoidance of onsite species-rich habitat
	Hydrology, Flood Risk, and Drainage	Avoidance of Flood Zone 2 or 3 Avoidance of areas of medium or higher surface water flooding risk
	Cultural Heritage	Avoidance of national cultural heritage designations Areas of significant archaeology to be avoided

Criteria	Consideration	Parameters
		Context of cultural heritage assets to be considered
	Agricultural Land Classification	Consider avoidance of best and most versatile land
	Telecommunications, Utilities, and Television Receptors	Avoidance of underground utilities – subject to easement widths Avoidance of overhead power lines – subject to easement widths
	Safety	Avoidance of location within 300m of residential properties
	Noise and Vibration	Avoidance of location within 300m of residential properties Allowance for noise mitigation where within 500m of residential properties
	Ground conditions	Avoidance of unstable ground Consideration of ground capacity for heavy infrastructure

5.8.2 The assessment of the substation locations using the above parameters was used for drafting the first iteration of the site layout plans. These were then amended further by site-specific constraints and recommendations from statutory consultees, key stakeholders, and members of the public.

Table 5.11: Design Iterations for the Substation Locations

Site Area	Stage	Key Design Considerations
Cottam 1	RAG Rating (Nov 2021)	Implementation of key parameters for 2.68ha 400kV/132kV air insulated substation F3-5, east of G1, G2 and G3 were identified as most suitable options.
	Version 1 site layout (Mar 2022)	Substation located in SE corner of G1. Due to its size and importance to the electrical design of the Scheme, the location of the Cottam 1 substation with regard to the cable routes was the driving design feature. Following landscape assessment and archaeological investigation works, field G1 was chosen as the best option for locating the substation because it has favourable conditions with regard to flooding, ecological

Site Area	Stage	Key Design Considerations
		designations, cultural heritage, and separation from existing utilities and residential amenity.
	V2 / PEIR site layout (Jun 2022)	Substation location unchanged Bunding is proposed for mitigation from noise and residences
	DCO Submission November 2022	Substation location unchanged.
Cottam 2	RAG Rating (Nov 2021)	Implementation of key parameters for 0.35ha 132kV/33kV air insulated substation Fields H4, H5 and H8 deemed most suitable options.
	Version 1 site layout (Mar 2022)	Implementation of key parameters Substation located in centre-north of H5 This location was chosen as the best option because although located centrally rather than at the cable exit point, it is the best compromise between electrical design and onsite constraints. Primarily, the substation is located more than 300m from the nearest residential dwelling, and is not located in an area of river or surface water flood risk. The alternative fields were closer to the cable exit point but were assessed to have greater impacts in terms of residential amenity and flood risk.
	V2 / PEIR site layout (Jun 2022)	Substation location unchanged
	DCO Submission November 2022	Substation location unchanged.
Cottam 3a	RAG Rating (Nov 2021)	Implementation of key parameters for 0.35ha 132kV/33kV air insulated substation Fields K4, K7, K10-12 and SW of K17 and K18 deemed most suitable options.
	Version 1 site layout (Mar 2022)	Implementation of key parameters Field K7 was chosen as the best option for locating the substation. The substation site location is a large area covering much of the south half of the Cottam 3a Site. To minimise visual impact, the substation is located in the

Site Area	Stage	Key Design Considerations
		northeast of K7. The other alternative fields were dismissed due to greater visual impacts.
	V2 / PEIR site layout (Jun 2022)	Substation location unchanged
	DCO Submission November 2022	Substation location unchanged.
Cottam 3b	RAG Rating (Nov 2021)	Implementation of key parameters for 0.35ha 132kV/33kV air insulated substation NW corner of field J4 deemed as most suitable due to visual impacts, accessibility, and away from areas of surface water flood risk in the south of J4. No other suitable options were identified.
	Version 1 site layout (Mar 2022)	Implementation of key parameters Substation location unchanged
	V2 / PEIR site layout (Jun 2022)	Parameters based design only No changes from V1 to V2/PEIR layout
	DCO Submission November 2022	Substation location unchanged. Cottam 3b required a separate substation due to its physical separation from Cottam 3a by the B1205 and Brigg Branch railway. The northwest corner of field J4 continued to be deemed most preferable in terms of minimising visual impact, accessibility and avoidance of surface water flood areas.

5.9 Alternative Cable Routes

5.9.1 The proposed Cable Route Corridor has been refined and reduced from that set out at earlier stages of the project. The guiding design parameters for definition of the cable corridors are set out in **Table 5.12** below.

Table 5.12: Design Parameters for Cable Route Corridors

Criteria	Consideration	Parameters
Planning, policy and legislation	Planning applications and allocations	Avoidance of any land subject to pending planning applications and site allocations.
	Minerals Resource Safeguarding	Avoid creating a future obstruction to the future exploitation of mineral resources subject to

Criteria	Consideration	Parameters
		minerals resource safeguarding Wherever possible, cable routes should follow existing infrastructure corridors such as roads, railways, drainage routes or existing pipelines or cable routes, or alternatively follow the edge of significant landscape features such as woods rather than directly crossing open fields.
Technical and engineering requirements	Electrical design	Seek to achieve the shortest route between Sites
Environmental constraints	Ecology and Biodiversity	Avoidance of national ecological designations Proximity to local ecological designations and sensitive ecological receptor Minimisation of crossings of major watercourses Consideration of particular constraints and requirements e.g. HDD drilling.
	Cultural Heritage	Avoidance of national cultural heritage designations
Land use and ownership constraints		Avoidance of residential properties and curtilage Affecting a minimum number of landowners. Where possible reducing interaction on rail network, strategic road infrastructure, utilities and other infrastructure.

5.9.2 The above key considerations for refining the Cable Route Corridor have been assessed through the various stages below to identify the final cable corridor.

5.9.3 Options for open trenching, moling, micro tunnelling and horizontal directional drilling (HDD) were explored for the watercourse crossings, with a technical preference for open trenching where possible, but HDD was eventually chosen as the best approach to minimise disturbance to habitat following further ecological survey work.

Table 5.13: Main Stages of Refinement for the Cable Route Corridor

Stage	Consultation and Surveys which influenced the Proposed Layout at this Stage	Key Design Considerations
Non-Statutory Consultation	Site Selection Assessment **Appendix 5.1: Site Selection**	Indicative cable routes were selected on the basis of using the shortest possible routes taking into

Stage	Consultation and Surveys which influenced the Proposed Layout at this Stage	Key Design Considerations
November-December 2021	**Assessment [EN010133/APP/C6.3.5.1].** Initial assessment of opportunities and constraints.	consideration environmental designations, but with a large amount of optionality available. This resulted in a wide cable corridor search area which included whole fields at this stage (2025ha) with multiple river crossing options.
EIA Scoping January 2022	Feedback from Planning Inspectorate Statutory body consultation from EIA Scoping Non-statutory consultee feedback Ongoing stakeholder engagement Ongoing focussed consultation with residents Desk-based and initial field assessments of the proposed Route including preliminary minerals resource assessment undertaken. Regular monthly meetings between the Applicant's technical consultants and Gate Burton applicants and technical consultants to consider a joint approach to the location, design and assessment of constraints within the Shared Cable Corridor. The Applicant and Gate Burton teams committed to a joint approach for assessment work within the Shared Cable Corridor. Ecological and archaeological survey work was shared jointly between the teams to assist in selection of routes.	Three options for cable crossing of River Trent were identified: 1) Between Gate Burton and Knaith, 2) North of Marton to Littleborough, 3) Between Trent Port and Torksey Viaduct to north or south of Cottam Power Station. Residential and business properties excluded from cable corridor search area.

Stage	Consultation and Surveys which influenced the Proposed Layout at this Stage	Key Design Considerations
Version 1 site layout (Mar 2022)	Ongoing focussed consultation with residents Statutory body consultation from EIA Scoping Ongoing stakeholder engagement Environmental surveys On going monthly meetings with Gate Burton team and joint survey work.	The cable corridor presented was based on the initial cable route options from EIA Scoping, modified only with respect to land ownership along the proposed route. Optionality remained a driving factor in retaining a wide cable route, as constraints and environmental assessments were only progressed to a preliminary stage. The cable routes presented therefore consist of entire fields, with any enclaved residential or business premises excluded from further investigation.
V2 / PEIR site layout (Jun 2022)	Non- Statutory consultee feedback Feedback from statutory consultees through EIA scoping process Environmental surveys including landscape and visual, ecology, heritage, noise, transport, and other topics forming the PEIR. Landowner feedback. Applicant's design process. Ongoing monthly meetings with Gate Burton team and joint survey work. Mapping of Minerals resource safeguarding and areas of search.	Intra-site cable routes were partially developed to demonstrate the Sites' interconnectivity. Cable route options for crossing the River Trent were reduced from three to a single preferred option between Trent Port and Torksey. The option to the north of Marton was removed due to significant heritage concerns regarding impacts on Roman artifacts associated with the Roman Road and nearby Segelocum Roman Town at Littleborough. The southernmost option was removed due to potential heritage concerns related to the Torksey Viking Camp, Torksey Viaduct, and due to ecological designations between Cottam Power Station and the River Trent opposite Torksey village. No changes were made to the provision of the Grid Connection Point at Cottam Power Station.
DCO Submission	Statutory consultation feedback Feedback from landowners	Landowners covered by the PEIR cable corridor were contacted to discuss their preferred route for

Stage	Consultation and Surveys which influenced the Proposed Layout at this Stage	Key Design Considerations
November 2022	Development of the Environmental Impact Assessment. This has assessed the anticipated 5 year sequential construction of the scheme, Gate Burton and West Burton Shared Cable Corridor. Technical input on construction of the cable route. On going monthly meetings with Gate Burton team and joint survey work. Focussed meetings between Applicant and Gate Burton ecological, heritage and Civils teams to refine the Shared Cable Corridor.	the cable crossing their land. These preferences were combined to form a continuous primary target route. This target route – predominantly 100m in width, was fully surveyed by geophysical surveys, ecological surveys, and landscape assessments to generate options within the target route. An optioneering workshop was undertaken to determine a final cable corridor of 50m in width over the majority of its length. Liaison with Gate Burton Civils Design Team further helped to refine the construction methodology and avoid constraints within the Shared Cable Corridor. Greater width is provided in specific locations where required for accesses and laydown areas and in the area where the route is shared with Gate Burton and West Burton NSIP projects and greater working width is required. The final route was determined through consideration of archaeological potential, avoidance of ecological features of significance, and limiting the number of hedgerow crossings required. Further consideration was given to ensure the cable route largely lay alongside existing infrastructure corridors or edges of significant landscape features. to minimise the impact on the future productivity and accessibility of agricultural land and mineral resources.

5.10 Summary and Conclusions

5.10.1 This chapter of the ES has described the consideration of alternatives and design evolution in relation to the Scheme. Alternative Sites have been considered and the selection of the Scheme's location has followed a systematic step-by-step process as set out in detail within **Appendix 5.1: Site Selection Assessment [EN010133/APP/C6.3.5.1].** This took a sequential approach to the consideration of potential sites in terms of agricultural land classification.

5.10.2 The land maximises the utilisation of low grade, non best and most versatile (BMV) agricultural land with 95.9% of the land being classified as non BMV land. In terms of the specific areas of the 4.1% BMV land that are included within the Scheme, these are justified by particular factors related to their location and context within the Scheme, the wider landholding, and in relation to adjacent and surrounding land. Detailed justification for retaining small areas of BMV land and an explanation as to why others were removed is provided within **Table 5.9: Stage 4 – Design Updates up to DCO Submission (August-November 2022).**

5.10.3 The land for the Scheme has been demonstrated to perform better than 8 of the assessed PDAs and equal to the remaining one following the site selection process. There are no obviously more suitable locations for the Scheme within the Search Area.

5.10.4 The Order limits would not be suitable for alternative forms of renewable generation at the same scale as the Scheme. Tidal power, offshore wind and hydroelectric storage were not possible due to the location of the POC which is located approximately 70km from the coast and due to other constraints associated with topography and visual impact. Nuclear power was not considered as an alternative because of the high cost of electricity and the lengthy planning and development timeframe; circa 20 years, that such a project would involve. The Scheme will be able to start generating electricity much more quickly with a grid connection anticipated in 2029.

5.10.5 Alternative layouts for the solar panel areas, alternative sub station locations and alternative cable routes have all been considered from the early scoping stages of the project through to submission of the DCO application. Matters raised by stakeholders in relation to alternatives at the EIA Scoping and Statutory Consultation Stages have helped to shape the development of the Scheme. This iterative design process, has resulted in the Scheme delivering good design and meeting the requirements of the NPSs and Draft NPSs in the context of efficiently delivering large scale renewable energy infrastructure. It also provides a new network of environmental features which deliver a range of ecosystem services, incorporating biodiversity, heritage, landscape and access.

5.11 References

Ref 5-1 HMSO (2017) The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Ref 5-2 Department of Energy and Climate Change (DECC), (2011) National Policy Statement for Energy (EN-1)

Ref 5-3 Her Majesty's Stationary Office (HMSO) (2008) Climate Change Act

Ref 5-4 HMSO (2009) The UK Low Carbon Transition Plan; Five Point Plan

Ref 5-5 6 Intergovernmental Panel on Climate Change (October 2018) 'Special Report on the impacts of global warming of 1.5°C above pre-industrial levels'

Ref 5-6 Committee on Climate Change (May 2019) Net-Zero: The UK's contribution to stopping global warming'

Ref 5-7 Committee on Climate Change (June 2020) Reducing UK emissions: Progress Report to Parliament.

Ref 5-8 National Grid, Future Energy Scenarios

Ref 5-9 DECC (2011) National Policy Statement for Renewable Energy Infrastructure (EN-3)

Ref 5-10 DECC (2011) National Policy Statement for Electricity Networks Infrastructure (EN-5)

Ref 5-11 Ministry of Housing, Communities & Local Government (2021). National Planning Policy Framework