

Byers Gill Solar
EN010139

6.2.3 Environmental Statement

Chapter 3 Alternatives and Design Iteration

Planning Act 2008

APFP Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms
and Procedure) Regulations 2009

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3. Alternatives and design iteration

3.1. Introduction

- 3.1.1. This chapter of the Environmental Statement (ES) provides a summary of alternative options that have been considered for Byers Gill Solar (the Proposed Development) from initial site selection and throughout the design development process. It summarises how an assessment of alternatives has been undertaken and identifies the factors that have informed the design of the Proposed Development.

3.2. Legislative and policy context

- 3.2.1. The consideration of alternatives has been undertaken within the context of legislative requirements and the national policy context for nationally significant energy projects.

- 3.2.2. Regulation 14(2)(d) of the EIA Regulations states that the ES must include:

“a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.”

- 3.2.3. Paragraph 2 of Schedule 4 to the EIA Regulations further states that the following information must be included in the ES:

“A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects”.

- 3.2.4. The Overarching National Policy Statement for Energy (NPS EN-1) states at paragraph 4.3.9:

“As in any planning case, the relevance or otherwise to the decision making process of the existence (or alleged existence) of alternatives to the proposed development is, in the first instance, a matter of law. This NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective. Although there are specific requirements in relation to compulsory acquisition and habitats sites, the NPS does not change requirements in relation to compulsory acquisition and habitats sites.”

- 3.2.5. It confirms that there is no general requirement within the NPS to consider alternatives, or to establish that the Proposed Development represents the best option. NPS EN-1 does however identify in paragraph 4.3.10 and 4.3.22 the need to comply with any policy or legal requirement to consider alternatives, including those relating to the preparation of an ES or specific legislative requirements under the Habitats Directive.

- 3.2.6. This chapter has been prepared in compliance with the requirements of the EIA Regulations to provide a description of the reasonable alternatives studied by RWE (the Applicant). In complying with the EIA Regulations, this chapter is also in accordance with NPS EN-1.

3.3. Need for the Proposed Development

- 3.3.1. The need for the Proposed Development is built upon its contribution to the delivery of national policy targets for decarbonisation, including meeting Net Zero targets, energy security and ensuring affordability of energy supply.
- 3.3.2. The National Policy Statements (NPS) were established against legal obligations made as part of the Climate Change Act 2008, as amended by the 2050 Target Amendment Order 2019, for the UK to meet Net Zero Greenhouse Gas (GHG) emissions by 2050. The NPS set out a case for the need and urgency of new energy infrastructure, to support government policy on sustainable development.
- 3.3.3. On 17 January 2024, the revised energy NPS were designated. NPS EN-1 identifies at paragraph 4.2.4 that there is a critical national priority (CNP) for the provision of nationally significant low carbon infrastructure. As such, it is considered that there is clear expression in relevant national policy of a needs case which supports the delivery of the Proposed Development.
- 3.3.4. The Energy Security Strategy [4] produced by the UK Government in April 2022 announced the intent to increase solar capacity in the UK from 14GW to 70GW by 2035. The publication of the Powering Up Britain strategy [5] in March 2023 has reaffirmed the UK Government approach to solar development, announcing a commitment to quintuple solar power by 2035. In addition, the Energy White Paper: Powering our Net Zero Future [6] outlined the need to ‘build back greener’ following the impact of Coronavirus, addressing the inter-generational challenge of climate change. The White Paper identifies the UK Government’s aim for a fully decarbonised, reliable and low-cost power system by 2050.
- 3.3.5. In addition to national policy targets, Darlington Borough Council and Durham County Council declared a climate emergency in 2019, whilst Stockton-on-Tees Borough Council has set out its aims to be net zero for greenhouse gas emissions by 2032 in its Environmental Sustainability and Carbon Reduction Strategy 2022-2032.
- 3.3.6. The Proposed Development would provide enough low-carbon energy to meet the equivalent annual needs of over 70,000 homes. It would therefore make a meaningful contribution to local and national climate commitments, responding to an established need for increased solar capacity and a decarbonised energy system.
- 3.3.7. A detailed account of the need for the Proposed Development is provided in the Planning Statement (Document Reference 7.1).

3.4. Stakeholder engagement

- 3.4.1. The design iteration of the Proposed Development has been informed in part by regular engagement undertaken with relevant statutory consultees, affected landowners and local stakeholders, as summarised in ES Chapter 1 Introduction (Document Reference 6.2.1). This has included a series of collaborative design workshops, focused technical meetings with statutory bodies, meetings with landowners and local people in response to requests.
- 3.4.2. Feedback on the design of the Proposed Development was sought through statutory consultation carried out between 5 May 2023 and 16 June 2023. The Consultation Report (Document Reference 5.1) provides a detailed account of the feedback received in response to statutory consultation and how the Applicant had due regard to the matters raised. It also reports on the design changes that were implemented as a result of the feedback.
- 3.4.3. The Applicant has continued to engage with relevant stakeholders in finalising the design and assessment of the Proposed Development ahead of the submission of the DCO application.

3.5. Approach to alternatives

Scope of assessment

- 3.5.1. This chapter seeks to describe the alternatives studied in developing the siting and design of the Proposed Development, taking into account the requirements of the EIA Regulations and the policy position of the NPS. This chapter first provides a detailed account of how the Applicant initially selected the site for the Proposed Development, taking into consideration the specific characteristics of solar farm development and the potential effects on the environment. It then provides an account of the various alternatives considered in the design iteration of the Proposed Development, which includes:
- Site layout.
 - Cable routes.
 - Solar technologies.
 - Substation.
 - Energy storage facilities and other supporting infrastructure.
- 3.5.2. An important factor when considering alternatives for the Proposed Development is the land acquisition strategy proposed by the applicant, which seeks to deliver the majority of the Proposed Development through voluntary agreement. All land required for the Proposed Development, except for the cable routes, is to be delivered through voluntary agreements which are already secured. It is intended that the preferred cable route would also be delivered through voluntary agreement. However as set out in the

Statement of Reasons (Document Reference 4.1), compulsory acquisition powers are being sought for temporary acquisition and permanent rights over land comprising the off-road cable routes. This is to ensure that the preferred cable route can be delivered, given that not all voluntary agreements have been secured at the time of the DCO application. An on-road cable route option is also included in the Order Limits, should voluntary agreement or compulsory acquisition powers not be achieved. The applicant will not be seeking compulsory acquisition powers for works in the highway.

3.5.3. The scope of reasonable alternatives assessed by the Applicant is therefore limited to those which could be deliverable in accordance with the land acquisition strategy outlined above (i.e. no compulsory acquisition of land required for panel areas)

3.5.4. A 'no development' alternative would not provide the additional electricity generation that would be delivered by the Proposed Development and has therefore not been considered further.

3.6. Site selection

3.6.1. The location of the Proposed Development was selected through a staged process to ensure that a site could be identified which would be suitable for solar energy generation and feasible to deliver, whilst avoiding and minimising the potential for harm to the environment and communities.

3.6.2. The key stages for site selection were:

1. Identifying the search corridor.
2. Consideration of environmental and planning constraints.
3. Land assembly.
4. Initial identification of panel areas.

3.6.3. The activities undertaken at each stage are summarised in turn below.

Stage 1: Identifying the search corridor

3.6.4. In order to focus the site selection process, an initial search corridor had to be defined. RWE identified optimal locations for solar farms of a nationally significant scale based on two key factors: the irradiance and yield; and the availability of grid connection capacity.

Irradiance and yield

3.6.5. Solar irradiance refers to the amount of energy from the sun that reaches the surface of the earth and is measured by the amount of sunlight received per square metre per second (Wh/m²). The amount of solar irradiance impacts on the potential yield of a solar farm, affecting the amount of sunlight falling on the PV modules to be converted to energy. The irradiance and subsequent yield of an area is influenced by factors such as its location, climate/weather patterns, altitude and topography. Whilst there are

clearly significant differences in such factors globally, there are also national variations leading to some areas of the UK being more suited to solar energy than others.

- 3.6.6. The north-east region has suitable levels of irradiance to gain a viable yield from current solar panel technology. For this reason, the north-east region was identified as a potential location for solar development by RWE.

Grid connection capacity

- 3.6.7. In order for the Proposed Development to be feasible, it requires a connection to the national grid through which the energy it generates would be delivered and would contribute to the national energy supply. Engagement with the relevant Distribution Network Operator (DNO) Northern Power Grid (NPG) identified that connection capacity was available from the Norton Substation, located to the north-west of Stockton-on-Tees. A connection agreement has been secured with NPG for the generation of 180 MW of electricity.
- 3.6.8. The grid connection capacity has informed both the site location and the overall size of the Proposed Development, as it has been sized for the availability of this connection capacity. In doing so, it seeks to ensure that the delivery of solar energy can be provided to the national grid when the construction of the solar farm is complete.
- 3.6.9. Having established the agreed grid connection for the Proposed Development, a search corridor of 6km was applied around the Norton substation in order to identify potential sites for the solar farm. This corridor was defined by the extent to which a solar farm of the proposed scale could be viable when taking into account the distance from the grid connection and subsequent cost of underground cable. After further considering the scale of the project, this area was extended to 12km. This search corridor enabled the site selection process to progress onto Stage 2.

Stage 2: Consideration of environmental and planning constraints

- 3.6.10. A constraints mapping exercise was undertaken in order to assess potential locations for siting the Proposed Development within the search corridor. This was undertaken using Geographic Information Systems (GIS) software and the analysis reviewed the following constraints within the search corridor:
- Brownfield land register (previously developed land)
 - Agricultural Land Classification
 - Ecological designations:
 - Biosphere Reserves
 - Environmentally Sensitive Areas (ESAs)
 - National Nature Reserves
 - Local Nature Reserves (LNRs)
 - Local Wildlife Sites (LWSs)

- Nature Improvement Areas (NIAs)
- Proposed Ramsar sites
- Ramsar sites
- Royal Society for Protection of Birds (RSPB) reserves
- Sites of Special Scientific Interest (SSSI)
- Special Areas of Conservation (SAC)
- Special Protection Area (SPA)
- National and Community Forest
- Flood Zones
- Cultural Heritage:
 - Registered Battlefields
 - Conservation areas
 - Country Parks
 - Heritage at Risk
 - Listed Buildings
 - Registered Parks and Gardens
 - Roman Roads and Antiquity Lines
 - Scheduled Monuments
 - World Heritage Sites
- Landscape designations:
 - Greenbelt
 - Area of Outstanding Natural Beauty (AONB)
 - Countryside and Rights of Way Act 2000 Designations
 - National Parks
- Public Rights of Way (PRoW)

3.6.11. ES Figure 3.1 Sequential Analysis Assessment Plan (Document Reference 6.3.1) depicts these constraints and illustrates this process¹. In considering the mapped constraints, the Applicant made a high-level judgement on the potential environmental effects of the Proposed Development, taking into account the Applicant's previous experience and values as a responsible developer. Factors such as the spatial extent of constraints in relation to the area of search and the feasibility of deliverable environmental mitigation were considered by the Applicant as part of this evaluation. Table 3-1 summarises how the consideration of key constraints outlined above is reflected in the subsequent stage of land assembly.

¹ A map of environmental constraints in relation to the final determined Order Limits is provided in ES Figure 2.9 Environmental Constraints Plan (Document Reference 6.3.2.9).

Table 3-1 Summary of Stage 2 output reflected in land assembly

Stage 2 Constraint	Relationship to Order Limits
Brownfield land register	No suitable brownfield land within search corridor.
Agricultural land classification	6.1% of land in the Order Limits is best and most versatile land (BMV). At the time of site selection, it was known that all areas proposed were Grade 3 or above Agricultural Land Classification.
Ecological designations	There are no ecologically designated sites within the Order Limits.
Flood zones	The majority of the Order Limits are Flood Zone 1. Two small areas adjacent to Little Stainton Beck and Bishopton Beck are in Flood Zone 3. The cable route crosses Flood Zone 3 in two locations associated with Bishopton Beck.
Cultural heritage	There is one Conservation Area (Bishopton) within the Order Limits by virtue of the on-road cable route, with Listed Buildings in the Conservation Area adjacent to this part of the Order Limits. One Scheduled Monument is immediately adjacent to the Order Limits, also related to a cable route.
Landscape designations	There are no landscape designations within the Order Limits.
Public rights of way	In total 38 sections of footpaths or bridleway are within the Order Limits, however only 22 sections are impacted by the Proposed Development.

Stage 3: Land assembly

- 3.6.12. Through the analysis undertaken in Stage 2, the Applicant had identified a refined boundary of land parcels that could be suited to solar development as depicted in ES Figure 3.1 (Document Reference 6.3.1). The Applicant began engagement with relevant landowners to receive expressions of interest. From the outset, the Applicant has sought to deliver the Proposed Development via landowner agreement rather than requiring compulsory acquisition. RWE approached landowners with a sufficient area of land for panel areas, mitigation and enhancement to enter into an option agreement. This was successfully achieved, enabling the potential panel areas of the Proposed Development to be defined under Stage 4 of the site selection process.

Stage 4: Initial identification of panel areas

- 3.6.13. Stage 2 and Stage 3 of the site selection process established that within the search corridor, there was sufficient available land, secured via agreement, located outside of major environmental and planning constraints. This was considered to fulfil the requirement to deliver a viable solar farm and the process progressed to developing an initial layout design for the Proposed Development.
- 3.6.14. Initially, all land subject agreement was proposed for use as a PV panel area. This initial design confirmed that there was the required land to meet the capacity of the available grid connection.

- 3.6.15. Having established this, an exercise was undertaken to refine the location of the panel areas. This design iteration sought to introduce setbacks from communities and landowner properties, as well as adjust panel configuration to account for local topography and utility searches. Setbacks introduced at this stage included those to reduce the proximity of panels to Great Stainton village, Bishopton village, properties at Downland Farm, Coatham Mundeville Conservation area and Brafferton. This resulted in a second iteration of the design.
- 3.6.16. Having established this layout, the potential location of substations was considered and an initial option selected, as detailed further in section 3.8. Following the substation selection process, options for cable routes were considered. Easements for the 33kv and 132kv cable routes were sought and are being negotiated with relevant landowners and Highway Authorities. Further information on the consideration of cable route options is provided in section 3.9.
- 3.6.17. Having concluded Stage 4 of the site selection process, the Applicant had identified a red line boundary and a site layout comprising of panel areas and potential cable route options, taking account of high-level environmental constraints, and detailed consideration of the impacts of elements of the scheme on specific receptors in the local environment. This design was the basis for undertaking further environmental and technical assessment ahead of undertaking an EIA Scoping Report.

3.7. Alternative site layouts

Amendments prior to EIA Scoping report

- 3.7.1. Environmental surveys and assessment commenced in early 2022. However, ongoing negotiations regarding voluntary land agreements resulted in some areas of land being removed from the scheme and new areas being added in. The key changes comprised:
- removal of a large panel area to the south of the site,
 - the addition of land to the north-west of the site (Panel Area A)
 - the addition of land to Panel Area B
 - the addition and removal of small areas of land in Panel Area C
- 3.7.2. These changes resulted in a new design iteration which became the basis for the Scoping Report and initial environmental assessment. Figure 1.2 and Figure 2.2 of ES Appendix 4.1 EIA Scoping Report (Document Reference 6.4.4.1) depict this design.

Design iteration: EIA Scoping to Preliminary Environmental Information Report (PEIR)

- 3.7.3. Following the submission of the Scoping Report in October 2022, the Applicant undertook targeted engagement through a collaborative design process in early November 2022. Feedback from this engagement was then taken into account through

a design iteration process ahead of undertaking further environmental assessment and preparation of the PEIR.

- 3.7.4. Over 100 consultees from technical, political and interest groups and organisations were invited to three collaborative design workshops. The purpose of these workshops was to identify and review potential changes to the design of the Proposed Development that could be implemented to reduce or avoid effects on the environment and the community. Opportunities to provide enhancement or community benefits were also identified. These potential design changes were informed by the results of environmental surveys and ongoing environmental assessment, as well as the suggestions and feedback from the engagement activities (both through the co-design sessions and direct engagement with statutory consultees). The design workshops reviewed potential changes to the design from a multi-disciplinary perspective, in which views were sought on each change to ensure it would not result in unintended harmful effects to other aspects of the environment and that it would be feasible in terms of deliverability (cost and likely landowner agreement).
- 3.7.5. As a result of this design iteration process, a revised layout and an initial landscape and environmental masterplan of the Proposed Development was produced. This design has formed the basis of the PEIR and the statutory pre-application consultation carried out between 5 May 2023 and 16 June 2023. It was published in Figures 2.1 – 2.11 of the PEIR.
- 3.7.6. Whilst not exhaustive, a list of the key changes made to the layout is provided below:
- Buffers applied to key environmental receptors as identified through surveys and environmental assessment:
 - 30m buffer to badger setts.
 - 5m buffer to trees with potential for bats.
 - 15m buffer applied to ancient and veteran trees, as well as root protection area for all other trees.
 - 8m buffer applied to watercourses and flood zone.
 - Increased set-back around Little Stainton Beck.
 - Removal of panels in response to initial landscape and visual assessment to reduce impacts on identified receptors. These reductions were implemented in Panel Area A, Panel Area C, Panel Area E and Panel Area F.
 - Re-routing of PRowS across the site to mitigate potential visual impacts or to provide improvement to existing routes and user experience.
 - Infilling of panel areas where appropriate (i.e. in locations where PRow relocated)
- 3.7.7. Additionally, a minor amendment to the red line boundary was made at this stage to bring the Norton Substation into the Proposed Development boundary.

- 3.7.8. These changes were made in response to further technical assessment, stakeholder feedback and ongoing engagement, as outlined above.

Design iteration: PEIR to ES and DCO Application

Overview

- 3.7.9. The design of the Proposed Development submitted for development consent includes a number of changes made since the PEIR and statutory consultation. The design development since May 2023, resulting in the final DCO application design, has been informed by three key factors: statutory consultation feedback (including targeted consultation); landowner engagement; and further technical assessment.
- 3.7.10. In total, the Applicant received approximately 375 responses to the statutory consultation held between 5 May 2023 and 16 June 2023. The feedback was analysed thoroughly and any matters raised relating to the design of the Proposed Development were identified and logged for consideration. This included direct requests from respondents to change specific aspects of the design, as well as broader comments which may indirectly relate to the design and layout (i.e. general concerns about scale or visual impact). A targeted consultation was held between 10 November 2023 and 11 December 2023, which as detailed in the Consultation Report, sought feedback from land interests in relation to design changes impacting their land; new land interests; persons with a subsoil interest; and relevant prescribed consultees. In total, 13 responses to this exercise were received. A detailed account of the statutory consultation feedback and the response to the matters raised is provided in the Consultation Report (Document Reference 5.1).
- 3.7.11. In addition to statutory consultation, the Applicant continued to engage with local landowners regarding voluntary agreements for land to be used for the Proposed Development. The overall land take was also reviewed to ensure only that only the land necessary to deliver the Proposed Development was to be included. As a result, some parcels of land were removed from the red line boundary on which the PEIR was based and a smaller extent of land was defined as the Order Limits.
- 3.7.12. Finally, the Applicant continued to progress technical assessment of the Proposed Development, both in relation to EIA and its potential effects on the environment and in relation to its operational function through modelling and viability testing. The technical assessment remained iterative throughout the preparation of the DCO Application, with regular reviews of any potential design changes arising as an outcome of such assessment.
- 3.7.13. Where relevant, the Applicant continued to engage with consultees on matters relating to design and technical assessment, as reflected in topic-specific ES Chapters (Chapters 5 to 13) (Document Reference 6.2.5 to 6.2.13).

Summary of design changes between PEIR and DCO application

3.7.14. The key design changes made to the Proposed Development between PEIR publication and DCO application are summarised in the table below.

Table 3-2 Summary of design changes between PEIR and DCO application

Design change	Reason
Reduction in maximum proposed solar PV panel height from 4.35m to 3.5m	To address concerns raised regarding scale and visual impact of the Proposed Development.
Selection of fixed-only solar PV panels	As the result of further technical modelling and design development by the Applicant, taking into account concerns raised regarding scale and visual impact of the Proposed Development given that the alternative of tracking PV panels would have a maximum height of 4.35m.
Increased set-back of panels in Panel Area B and Panel Area F further away from residential properties and settlements	To address concerns raised through statutory consultation regarding proximity to residential properties and settlements. This includes individual properties adjacent to Panel Area B and increased set-backs from Mill Lane, Bishopton village and Bishopton primary school.
Relocation of BESS further from residential receptors	To address concerns raised through statutory consultation regarding potential for impacts to residential receptors through noise, and of fire safety concerns.
Removal of land parcels (proposed for use as panel areas) in Panel Area C and Panel Area D.	Applicant had not secured voluntary land agreement and it was determined that the Proposed Development would remain viable without the parcels, whilst addressing concerns raised during consultation regarding overall scale of the panel areas.
Relocation of access tracks at Panel Area A, Panel Area B, Panel Area C and Panel Area D, including revisions to Order Limits as necessary.	Accesses were reviewed and amended based on updated technical information regarding construction and operational needs, and taking into account feedback received at statutory consultation. In particular, concerns raised by local residents regarding the proposed use of existing access through Brafferton village were a determining factor for changes to Panel Area A access.
Expansion of cable route in Panel Area D to utilise on-road route.	Land agreement not reached for off-road route.
Reduction in Order Limits in Panel Area F where land no longer required and through further engagement with landowner	Further technical assessment and design development of ecology mitigation determined the precise quantum of land required, enabling the remainder to be released from the Order Limits.

3.7.15. Proposed mitigation and enhancement measures were developed in more detail following the above design changes and are reflected in the landscape design proposed under the DCO application.

Design Approach Document: design principles and parameters

3.7.16. There are some aspects of the Proposed Development which are required to remain flexible into the detailed design and construction phases, following the grant of development consent. As set out in ES Chapter 4 Approach to EIA (Document Reference 6.2.4), this flexibility has been accounted for in the EIA process through

application of the Rochdale Envelope and the use of design principles and specified parameters for the Proposed Development. The Design Approach Document (DAD) (Document Reference 7.2) defines the design principles and parameters which will be secured through requirement 3 of the DCO. This will ensure that any changes or further development of the design of the Proposed Development remains within the parameters assessed within this ES, and delivers a high quality development in accordance with those principles.

3.8. Substation siting alternatives

- 3.8.1. An on-site substation is required for the Proposed Development to connect the panel areas to the distribution and transmission networks. It also contains other electrical equipment such as transformers, switchgear and metering equipment.
- 3.8.2. Options for the location of the substation were assessed following the second design iteration, determining the initial panel area layout. Four options for locating the substation were initially identified and a comparative exercise undertaken considering landowner consent, technical feasibility / cost, and environmental constraints. These options were:
- Option 1: to the west of Panel Area D.
 - Option 2: to the north of Panel Area C.
 - Option 3: to the east of Panel Area D.
 - Option 4: the south-west of Panel Area E.
- 3.8.3. Option 2 was considered the most favourable given its lesser impact on heritage assets and lesser proximity to settlements, as well as the existing screening opportunities. These planning and environmental factors were considered to outweigh the comparative drawbacks relating to the cost (most expensive) and technical elements of the location (furthest from Norton substation) as well as the environmental impacts associated with a longer cable route.

3.9. Cable route alternatives

Principles of cable route selection

- 3.9.1. There are two types of higher voltage cable required for the Proposed Development: 33kV cables which connect the Panel Areas to the on-site substation, and 132kV cables which connect the on-site substation to the National Grid Norton substation.
- 3.9.2. There are three main options for the routing of cables in solar farm development:
1. All cables installed along existing road routes ('on-road' routes).
 2. All cables installed on greenfield land ('off-road' routes).
 3. A hybrid approach with cables utilising both greenfield land and existing road routes.

- 3.9.3. As a starting principle for determining cable routes, the Applicant's first preference is to avoid impacts to local communities that may be derived from utilising routes along existing roads, such as disruption to local access during the works. Avoiding routes along existing roads also has engineering and cost benefits. In comparison, it is considered that the potential for environmental impacts from using off-road routes is low considering the limited area of land required and the short-term nature of construction, with any agricultural land affected able to be returned to agriculture post-construction. Therefore, it is the Applicant's preference to avoid on-road cable routes where feasible.

Cable route options at PEIR

- 3.9.4. In developing the Proposed Development design ahead of statutory consultation, the Applicant engaged with local landowners to identify potential easements on greenfield land for cable routes.
- 3.9.5. Through this process, a network of 33kV and 132kV cable routes utilising both on-road and off-road options were identified and included in the Proposed Development at the time of PEIR publication in May 2023. At public consultation, respondents were asked via a dedicated question in the feedback form for any comments regarding the potential cable routes.
- 3.9.6. It was stated in the consultation documents that where off-road options had been identified, assessment was ongoing to understand the likely effects of them on the environment and any mitigation possible to reduce these effects. It was also stated that the key driver in deciding whether the cable routes are to be on-road would be land agreements, and it was recognised that avoiding the road is likely to have better outcomes for some environmental topics.

Cable route options at DCO application

- 3.9.7. At the time of publication of the PEIR in May 2023, it was anticipated that the cable routes would be refined to a single 33kV network and a single 132kV cable route for the DCO application. However, negotiations with landowners to secure the necessary land rights via agreement for off-road cable routes (the preferred option) are ongoing at the time of submission. Consequently, there is a need to retain flexibility in options in order to ensure the deliverability of the Proposed Development and the Order Limits includes land for both on-road and off-road routes. The final routing of the underground cables will be determined post-consent and approved via requirement 3 of the draft DCO (Document Reference 3.1).
- 3.9.8. As set out in section 3.5, the Applicant is seeking powers of temporary possession with compulsory acquisition powers for permanent rights to accommodate the preferred option of an off-road cable route, should voluntary agreement not be reached. The on-road route is also included in the Order Limits as an alternative. No powers of compulsory acquisition or temporary possession would be required for the on-road cable within publicly adopted highways.

3.9.9. The main factors behind the preference for off-road cable routes are listed below and considered in turn in the remainder of this section:

- a. Length and routing of cable
- b. Cost and programme
- c. Construction impacts
- d. Consultation feedback

a) Length and routing of cable

3.9.10. The preferred option of an off-road cable route provides a more direct routing between panel areas and from the on-site substation to the national grid via Norton substation. An on-road cable route would be approximately 3km longer than an off-road route. It would also require the removal and replacement of 2160m³ / Kilometre tonnes of highway materials. The requirement for these additional materials would increase the cost of the Proposed Development, as well as have a greater comparative environmental effect in relation to materials and waste.

b) Cost and programme

3.9.11. The cost of an on-road cable route is approximately 50% more than an off-road solution.

3.9.12. An on-road route would also take at least 10 days per kilometre to construct, compared to 3 days/km for an off-road route. This is due to the different methodologies for an on-road and off-road cable installation. An on-road cable would be installed via a trench and backfill method, in which a trench is excavated into the road verge, the cable is laid and then the trench is backfilled. The off-road cable route would be installed via a cable plough, which makes a much narrower cut into the earth, lays the cable and backfills the cut in one operation. In doing so, it is much quicker, less invasive and reduces health and safety risks associated with trenching.

3.9.13. The slower methodology required for on-road cable installation increases the risk to meeting the construction programme and anticipated grid connection dates for the solar farm to deliver renewable energy.

c) Construction impacts

3.9.14. In relation to environmental effects, the implications of an on-road or off-road cable vary by topic as to which might be viewed as preferable. For example, the potential for effects to biodiversity, agricultural land and archaeology is higher for off-road routes, whilst the potential for effects relating to hedges and arboriculture, visual effects in Bishopton and transport and access are higher for on-road routes. Subsequently, strictly from an EIA perspective, the matter of cable route options may be considered a balance. However, it is considered that the potential adverse effects of on-road routes would be more directly experienced by the local community, with greater

impact to their wellbeing. These impacts also reflect concerns raised during engagement and consultation, considered further in point d) below.

- 3.9.15. As reported in ES Chapter 7 Landscape and Visual (Document Reference 6.2.7), significant effects would arise on the character of Bishopton village during construction if the on-road cable route is used, due to excavation and cable installation works along the main road through the village. This would bring construction activity into the valued historic core of the village, combined with close views of construction activity from Mill Lane and the recreation ground. In comparison, no significant effects would arise should the off-road cable route (the preferred option) be used in this location.
- 3.9.16. As reported in ES Chapter 12 Traffic and Transport (Document Reference 6.2.12), the on-road cable route would, by virtue of being located on the road, have greater impacts during construction as it would require traffic management to be implemented, which could include temporary lane closures or diversions. In order to install the cables, the Applicant estimates that there would be at least approximately 160 days where traffic would be stopped up in a minimum of one direction.
- 3.9.17. The location of the Proposed Development is predominantly rural with narrow local roads and limited alternative access options in some areas, creating the potential for substantial disruption and inconvenience which could be avoided almost entirely via an off-road solution. Additionally, the on-road cable route option includes sections that are in close proximity to residential dwellings. Whilst temporary noise impacts and other construction impacts would be managed in line with the measures outlined in the Outline Construction Environmental Management Plan (CEMP) (Document Reference 6.4.2.6), the potential for effects would be greatly reduced by the use of off-road cable routes which are located further away from settlements.
- 3.9.18. The preferred off-road cable route is therefore considered to present less construction impact and disruption to the local community, and is considered preferable on this basis compared to the largely temporary effects that may arise through off-road installation.

d) Consultation feedback

- 3.9.19. The desire to avoid the potential for disruption to local communities via cable route construction is reflected in feedback received in response to statutory consultation. The Consultation Report (Document Reference 5.1) identifies that a key theme of responses to Question 5 of the feedback form, which asked specifically about cable route options, was concerns about construction impacts. In particular, respondents expressed their concern or objection over potential road closures or diversions, as well as the potential impact of road works on the Bishopton village Conservation Area. The use of the preferred off-road cable route would help to substantially address the concerns raised by the local communities and reduce such impacts.

Summary

3.9.20. The EIA has been undertaken on the basis of the flexibility sought in the DCO, to assess a both an on-road and off-road cable route option as shown on ES Figure 2.13 (Document Reference 6.3.2.13). This has been carried out to ensure that effects of all potential cable routes within the Order Limits are understood and where necessary, mitigated. The Applicant has stated a clear preference for an off-road cable route and is seeking compulsory acquisition powers to enable delivery of an off-road route, as the alternative of a wholly on-road route is considered unviable given its impacts regarding cost, programme, environmental effects and impacts to the local community. The final cable route would be agreed and approved post-consent via requirement 3 of the draft DCO (Document Reference 3.1).

3.10. Consideration of energy storage facilities and other supporting infrastructure

3.10.1. The Proposed Development would include a Battery Energy Storage System (BESS) to store surplus energy on site, as described in ES Chapter 2 The Proposed Development Document Reference 6.2.2). Other supporting infrastructure is also required such as fencing and gates; CCTV; lighting; access tracks; drainage; and, storage containers. The location of this infrastructure takes into account the following principles:

- Any supporting infrastructure with the potential to generate noise (such as BESS) are placed at least 300m from residential properties where possible.
- Lighting is not used at night.
- CCTV does not allow for views outside of panel areas.
- Access tracks are likely to be crushed gravel.
- Container structures for supporting infrastructure would be grey in colour.

3.10.2. As set out in section 3.7, in some instances the siting of BESS and access tracks has been further adjusted through the design in response to statutory consultation feedback.

3.10.3. The siting of BESS and access tracks was reviewed site-wide following statutory consultation, as part of the wider design development. This was driven in part by the decision to opt for fixed 3.5m solar PV panels with an east-west alignment, which required a reconsideration of the siting of BESS and access tracks to avoid design clashes. The review of this infrastructure was also undertaken following analysis of responses to statutory consultation, in which some concerns were raised regarding proximity of BESS to some residential receptors, due to concerns of noise or fire risk, and the suitability of some proposed access tracks, such as the use of an existing access through Brafferton village. The revised siting of these features of the Proposed Development was underpinned by further technical evaluation reported in this ES such

as noise modelling and a transport and traffic assessment, including reviewing feasibility of construction and operational traffic accesses.

- 3.10.4. The DAD (Document Reference 7.2) provides an overview of the design development process and key considerations which have influenced the siting and parameters of BESS and other supporting infrastructure, as well as the overall design approach to the Proposed Development. Design principles for the BESS and supporting infrastructure are specified within the DAD and secured through requirement 3 of the draft DCO (Document Reference 3.1), to ensure that they are reflected in the detailed design and eventual delivery of the Proposed Development.

3.11. Alternative solar technologies

- 3.11.1. At the time of publication of the PEIR in May 2023, the use of different solar technologies for the Proposed Development remained under review and consideration by the Applicant. The primary options under consideration were a fixed panel or a tracking panel system. In doing so, a worst-case scenario formed the basis of the preliminary assessment.
- 3.11.2. Following statutory consultation and further technical assessment, the Applicant has determined that a fixed solar panel system would be most appropriate for the Proposed Development. In making this design decision, the maximum height of panels has been reduced from 4.35m as proposed in the PEIR to a maximum of 3.5m. This change has been in direct response to concerns raised at statutory consultation regarding the scale of the Proposed Development with the use of such technology, in particular in relation to its potential visual effects.
- 3.11.3. Following the conclusion of statutory consultation, the Applicant undertook further technical, comparative evaluation of the fixed and tracker solar PV panel options to establish the most suitable design solution. This included careful consideration of the potential energy generation of the two options, informing overall viability of the Proposed Development, alongside the need to avoid and reduce adverse effects such as landscape and visual impacts. Recognising the concerns raised at statutory consultation with regard to the scale of the design presented at PEIR, the Applicant determined that a 3.5m fixed panel design would achieve the desired balance of reducing the potential for adverse environmental effects and maintaining operational viability, such that the Proposed Development can be successfully delivered.
- 3.11.4. As a result of the selection of fixed, 3.5m panels, the configuration of the Panel Areas has been revised from a North-South alignment to an East-West alignment, facing South.

3.12. Summary

- 3.12.1. In accordance with the EIA Regulations, this chapter has set out reasonable alternatives studied by the Applicant in both the site selection process and in the design iteration process carried out in preparing this DCO Application. It has set out the main reasons

for selecting the chosen option and how the effects of the development on the environment have been taken into account. This Chapter identifies how flexibility in the detailed design of the Proposed Development is secured through the DCO to ensure that any further design iteration remains in accordance with the designed design principles and parameters.

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