WHITESTONE
solar farm

WHITESTONE SOLAR FARM

Volume 6: Environmental Statement

6.4 Chapter 4: Alternatives and Design Evolution

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Glossary

Term	Meaning
Cable Corridor Options	Options for corridors within which the high voltage cables would be constructed used up to Stage 3 for Statutory Consultation.
Cable Corridors	Cables within which the high voltage cables would be constructed.
Draft Environmental Statement	The Draft Environmental Statement which presented the preliminary environmental information relating to the Proposed Development. The Draft ES was prepared to present information for Statutory Consultation in accordance with EIA regulation.
Environmental Statement (ES)	The Environmental Statement which presents the environmental information relating to the Proposed Development. The ES has been prepared to present

Term	Meaning
	information for formal consultation in accordance with current EIA regulation.
Long Lane 400kV Substation	The new 400 kilovolt substation proposed on land immediately east of Long Lane, Brinsworth, S60 4JJ.
National Grid Brinsworth Substation	The existing 275 kilovolt substation at Brinsworth, located on Howarth Lane, Brinsworth, S60 5LW
Non-Statutory Consultation	The first round of consultation held from 18 November 2024 to 31 January 2025
Order Limits	Maximum extent of the Proposed Development comprising the Site and Cable Corridors.
Point of Connection	The new National Grid substation at Brinsworth (Long Lane 400kV Substation) where the Proposed Development would connect to the National Grid.
Stage 1	First design which was held prior to Non-Statutory Consultation.
Stage 2	The second design relating to updates made in March 2025 following feedback from Non-Statutory Consultation.
Stage 3	The third stage of design which was presented in the Draft ES to inform the Statutory Consultation.
Stage 4	The design of the Proposed Development submitted and assessed in the Application.
Statutory Consultation	The second round of public consultation held from 16 September 2025 to 28 October 2025.
The Applicant	Whitestone Net Zero Ltd.
The Application	The Application submitted to the Secretary of State for a Development Consent Order.
The Proposed Development	The proposed Whitestone Solar Farm.
The Site	The land planned to be used for solar PV array and associated infrastructure, BESS, substations, and landscaping and habitat enhancement. The Site is split into W1, W2, and W3.
Whitestone 1 (W1)	The northern parcels of the Whitestone Solar Farm.
Whitestone 2 (W2)	The middle parcels of the Whitestone Solar Farm.
Whitestone 3 (W3)	The southern parcels of the Whitestone Solar Farm.

Acronyms

Acronym	Meaning
ALC	Agricultural Land Classification
BESS	Battery Energy Storage Systems
BMV	Best and Most Versatile
CNP	Critical National Priority

Acronym	Meaning
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
NETS	National Electricity Transmission Systems
NGR	National Grid Reference
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PDL	Previously Developed Land
POC	Point of Connection
PRoW	Public Rights of Way
PV	Photovoltaic
RMBC	Rotherham Metropolitan Borough Council
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
W1	Whitestone 1
W2	Whitestone 2
W3	Whitestone 3

Units

Units	Meaning
GW	Gigawatts
km	Kilometres
kV	Kilovolts
m	Metres
MW	Megawatts

4 ALTERNATIVES AND DESIGN EVOLUTION

4.1 Introduction

4.1.1 This Chapter of the Environmental Statement (ES) has been prepared on behalf of Whitestone Net Zero Ltd (the Applicant) to outline the alternatives considered in relation to the Development Consent Order (DCO) Application for the construction, operation, maintenance, and decommissioning of Whitestone Solar Farm (the Proposed Development). This Chapter also describes the evolution of the design to date.

4.1.2 The extent of the Order Limits are shown in **ES Volume 3, Figure 3.1: Order Limits [EN0110020/APP/6.19]** and the Proposed Development is described in full in **ES Volume 1, Chapter 5: The Proposed Development [EN0110020/APP/6.5]** and shown spatially on the **Works Plans [EN0110020/APP/2.3]**.

4.1.3 This Chapter is supported by the following Figures in **ES Figures [EN0110020/APP/6.19]**:

- **Figure 3.1: Order Limits**
- **Figure 3.2: Site Referencing**
- **Figure 4.1: Constraints for Site Location**
- **Figure 4.2: 12km Search Area**; and
- **Figure 5.1: Illustrative Masterplan**

4.1.4 This Chapter is supported by the following Appendices in **ES Appendices [EN0110020/APP/6.20]**:

- **Appendix 2.1: EIA Scoping Report**
- **Appendix 4.1: Legislation, Policy, and Guidance**; and
- **Appendix 4.2: Design Evolution**.

4.1.5 This Chapter supports the information presented in and should be read alongside **Planning Statement Appendix 1– Site Selection Assessment [EN0110020/APP/5.4]**.

4.2 Legislation, Policy, and Guidance

4.2.1 This Chapter has been prepared in line with the following legislation, policy, and guidance:

- The Environmental Impact Assessment (EIA) Regulations[1]
- Overarching National Policy Statement (NPS) for Energy (EN-1) 2025[2]
- NPS for Renewable Energy Infrastructure (EN-3) 2025[3]
- NPS for electricity networks and infrastructure (EN-5) 2025[4]; and
- Planning Inspectorate Advice Note Seven[5].

4.2.2 Sections of the above documents relating to the presentation of alternative options assessed have been provided in **ES Volume 3, Appendix 4.1: Legislation, Policy, and Guidance [EN0110020/APP/6.20]**.

4.2.3 This Chapter of the ES presents a description of the alternatives considered and evolution of the Proposed Development to date. Considering relevant legislation, policy, and guidance, this Chapter discusses:

- 'Do Nothing' Scenario
- Alternative Locations
- Alternative Renewable Technologies; and
- Design, Size, and Scale.

4.3 Need for the Proposed Development

4.3.1 The Climate Change Act 2008 (as amended 2019)[6] requires "*the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline*". In addition, the United Kingdom (UK) government's Clean Power 2030 Action Plan[7] sets clear ambitions for energy generation and storage capacities, including:

- 45 - 47 gigawatts (GW) of solar power generation; and
- 23 - 27GW of battery capacity.

4.3.2 The first design principle of the Proposed Development as listed in Section 4.7 of this Chapter is to maximise the amount of clean electricity exported to the grid. The Proposed Development would therefore contribute to the UK government targets as set out in the Clean Power 2030 Action Plan to increase the generation of clean, cheap, and secure energy in the UK.

4.3.3 NPS EN-1[2] paragraphs 3.2.8 and 3.2.9 state that:

- "*The Secretary of State should assess all applications for development consent for the types of infrastructure covered by this NPS on the basis that the government has demonstrated that there is a need for those types of infrastructure, which is urgent, as described for each of them in this Part.*"; and
- "*In addition, the Secretary of State has determined that substantial weight should be given to this need when considering applications for development consent under the Planning Act 2008.*"

4.3.4 Furthermore, EN-1 paragraph 4.2.16 and 4.2.17 identifies a critical national priority (CNP) for low carbon infrastructure, including "*for electricity generation, all onshore and offshore generation that does not involve fossil fuel combustion (that is, renewable generation…)*".

4.3.5 Paragraph 3.3.63 states "*Subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy. Government strongly supports the delivery of CNP Infrastructure, and it should be progressed as quickly as possible*."

4.3.6 A detailed case for the need for the Proposed Development is presented in the **Statement of Need [EN0110020/APP/5.8]**, submitted as part of the Application.

4.4 The 'Do Nothing' Alternative

4.4.1 The Applicant does not consider the 'Do Nothing' scenario as a reasonable alternative to the Proposed Development as it would not deliver the proposed renewable electricity generation and storage capacity which would undermine the Government's strategy to generate 45-47GW of solar energy by 2030. The Proposed Development would make a critical and timely contribution to decarbonisation and the security of energy supply in the UK, whilst helping shield consumer bills from volatile energy prices and international supply markets.

4.4.2 In addition, NPS EN-1 paragraph 4.3.27 states that "*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 Secretary of State's decision".*

4.4.3 The same rationale has been applied to the alternative of a 'smaller development' than the Proposed Development. A smaller development would not make best use of the grid agreement, contribute as significantly to national net zero goals for clean and secure energy, or meet the first design principle as outlined in Section 4.3. This approach is in accordance with NPS EN-1 paragraph 4.3.23, in which the 'Do Nothing' alternative would not realistically deliver the same infrastructure capacity in the same timescale - "*The Secretary of State should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security, climate change, and other environmental benefits) in the same timescale as the proposed development."*

4.4.4 The **Statement of Need [EN0110020/APP/5.8]** has been prepared and is submitted alongside the ES to present the need for the Proposed Development at the proposed scale.

4.5 Alternative Renewable Technologies

4.5.1 The Applicant has taken into consideration alternative technologies within the Proposed Development even though it is a solar developer. Solar energy has been identified as the most suitable technology for the scale of generation required to meet the capacity at the new 400 kilovolt (kV) National Grid substation proposed on land immediately east of Long Lane, Brinsworth, S60 JTT (Long Lane 400kV Substation). However, the Applicant is cognisant that a large portion of the Site has been identified by Rotherham Metropolitan Borough Council (RMBC) as being suitable for wind development, and notes that there are active wind turbines in the local area.

4.5.2 To generate a comparable level of renewable energy through wind power to meet the grid agreement secured would require in excess of 150 4.5-megawatt (MW) turbines (approximately 200m tip height). The associated environmental impacts for a wind development of this scale would likely be greater than anticipated for a solar development.

4.5.3 Given the location of the point of connection (POC) at Long Lane 400kV Substation (approximately 96km from the nearest coast), offshore generation technologies such as tidal and offshore wind were not considered.

4.6 Consideration of Alternative Locations

4.6.1 This section describes the process for the consideration of alternative locations for the Proposed Development and should be read in conjunction with **Appendix 1: Site Selection Assessment** of the **Planning Statement [EN0110020/APP/5.4]**.

4.6.2 The Applicant secured an agreement with National Grid to export up to 750MW of clean renewable energy to the existing National Grid Brinsworth Substation.

4.6.3 One of the site selection factors (see paragraph 4.6.12) and the starting point for the location of the Proposed Development was to ensure it was located as close to the available substation capacity at the National Grid Brinsworth Substation as possible. This is because an agreed POC is essential for proceeding with a feasible solar development and is instrumental in defining the Study Area. Given the limited availability of connections into the National Electricity Transmission Systems (NETS) (which are necessary for the deployment of utility-scale solar), it is important that any available connection is used as efficiently as possible. This allows the Proposed Development to export clean renewable energy into the National Grid infrastructure to then be distributed to homes and businesses for electricity.

4.6.4 Using the POC as a site selection factor, in accordance with NPS EN-3 paragraph 2.10.24, the Applicant sought to establish a Search Area for an initial search for suitable land to be included in the Site for the Proposed Development. How the Search Area was selected and the alternative sites considered is discussed in the proceeding paragraphs.

4.6.5 NPS EN-3 paragraph 2.10.16 sets out that the "*connection voltage, availability of network capacity, and the distance from the solar farm to the existing network can have a significant effect on the commercial feasibility of a development proposal.*" Paragraph 2.12.14 goes on to state that "*to maximise existing grid infrastructure, minimise disruption to existing local community infrastructure or biodiversity and reduce overall costs, applicants may choose a site based on nearby available grid export capacity.*"

4.6.6 Following NESO's Grid Reform process, the solar component of the Proposed Development was given a Gate 2 Phase 1 offer, meaning it is expected to be connected between 2026 and 2030, in keeping with the projected completion date for National Grid's Long Lane 400kV Substation. Long Lane 400kV Substation is located 800m east of the National Grid Brinsworth Substation. National Grid updated the Applicant's agreement to export 750MW of renewable energy to Long Lane 400kV Substation. As such Long Lane 400kV Substation is the new POC for the Proposed Development (see **ES Volume 1, Chapter 5: The Proposed Development [EN0110020/APP/6.5]**). Long Lane 400kV Substation is due to be completed and operational in time for the connection date of the Proposed Development in 2029. Further details regarding the grid connection agreement are provided in the **Grid Connection Statement [EN0110020/APP/7.1]**.

4.6.7 The Applicant reviewed the Site Selection process and concluded that given the Long Lane 400kV Substations proximity to the National Grid Brinsworth Substation, it still meets the POC site selection factors in paragraph 4.6.12 and consider the site selection assessment for the Proposed Development to still be robust. There have been no changes to the site selection factors or location of the Proposed Development as a result of the POC moving to Long Lane 400kV Substation. Long Lane 400kV Substation is closer to the Site than the National Grid Brinsworth Substation and as such reduces the length of the cable for the

Proposed Development and is likely to reduce environmental impacts associated with the construction of the cable.

The Search Area and Site Selection

4.6.8 As set out in **Appendix 1: Site Selection Assessment** of the **Planning Statement [EN0110020/APP/5.4],** a 12 kilometre (km) Search Area from the National Grid Brinsworth Substation was selected as the maximum distance viable for the Proposed Development, as chosen by the Applicant, acknowledging the environmental constraints, and cumulative impacts beyond this radius, and that construction of the cable route can lead to significant costs that increase with length. In addition, land that is further than 12km from the POC has the potential to increase environmental impacts due to the increasing cable route length that would be required to connect the Proposed Development into the POC. The Search Area is shown in **ES Volume 3, Figure 4.2: 12km Search Area [EN0110020/APP/6.19]** and further justification for this Search Area is included in Section 4 of **Appendix 1: Site Selection Assessment** of the **Planning Statement [EN0110020/APP/5.4]**.

4.6.9 Given the location of the POC on the eastern edge of the urban areas of Sheffield and Rotherham, areas to the west of the POC were not considered feasible due to both the environmental and technical constraints of the urban areas. As such, the Study Area was refined to areas to the east and south of the POC as shown in **ES Volume 3, Figure 4.2: 12km Search Area [EN0110020/APP/6.19]**.

4.6.10 As illustrated in **ES Volume 3, Figure 4.1: Constraints for Site Location [EN0110020/APP/6.19]**, the South and West Yorkshire Green Belt extends to cover land up to 15km east of the POC. Additionally, Natural England's Provisional Agricultural Land Classification (ALC) data showed a band of Best and Most Versatile (BMV) land running north to south approximately 8 to 18km east of the POC. Should the Proposed Development be sited outside of these constraints, it would require a cable length of at least 20km to connect to the POC from the nearest point of a potential site, plus any additional interconnecting cables required. This cabling distance would result in greater environmental impacts and present considerable technical challenges to avoid residential and environmental constraints, reducing the constructability of the Proposed Development.

4.6.11 In determining a suitable location for the Proposed Development, the Applicant sought to develop a single new Nationally Significant Infrastructure Project (NSIP) generating a minimum of 500 – 750MW which:

- Would contribute to meeting the UK's urgent need for low carbon energy generation
- Would be as close as possible to an available grid connection or part of the transmission network in which capacity exists as highlighted within discussions with National Grid
- Would avoid impacts on sensitive landscapes and environments as far as practicable
- Would be situated an appropriate distance from densely populated residential communities

- Would as far as possible be located outside of BMV Agricultural Land based on the information known at the time taken from Provisional ALC (England) Map produced by Natural England
- Would predominantly be located outside of the Flood Zones, to ensure that more sensitive electrical infrastructure could be located outside of areas at risk of flooding
- Would be readily accessible from existing strategic road network to facilitate construction access; and
- Would be delivered on land which could be acquired voluntarily thereby avoiding or minimising the need for large scale compulsory acquisition (and, in the case of BMV Agricultural Land, could potentially help identify the least productive areas of land using local knowledge from farmers).

4.6.12 It is generally acknowledged that large scale solar developments require three fundamental attributes. EN-3 identifies these core attributes, amongst other considerations, including -

- Existence of sufficient land to deliver the project and meet the scale of the Proposed Development's aims
- Availability and capacity of a suitable point of connection to the NETS; and
- Solar irradiation levels to support the development's potential to produce an efficient and economic energy yield.

4.6.13 During this site selection process, as set out in **Appendix 1: Site Selection Assessment** of the **Planning Statement [EN0110020/APP/5.4]**, the Applicant considered whether sufficient Previously Developed Land (PDL) would be available to develop a utility scale solar development, however an assessment of PDL/brownfield land within the wider Search Area identified no land of an adequate land area to facilitate a large-scale solar project either individually or in combination with other sites.

4.6.14 Subsequently, as set out in **Appendix 1: Site Selection Assessment** of the **Planning Statement [EN0110020/APP/5.4]** the Applicant undertook an assessment of potentially available land within the Search Area that had suitable characteristics for ground-mounted solar, taking into account the following considerations:

- Ecology – potential impact on designated and non-designated sites, habitats and species
- Landscape and visual – potential impact on national and local designations, key views, landscape character and visual amenity
- Green Belt – the contribution of the land to the five Green Belt purposes
- Cultural heritage and archaeology – impact on designated and non-designated assets and potential for below-ground archaeology
- Community – impact on residential properties in terms of visual disturbance, noise and air quality
- Flood risk – consideration of the flood zone and prioritising sites in Flood Zone 1, over zones 2 and 3, in compliance with the sequential test
- Agricultural land – the presence of best and most versatile agricultural land, with lower grade land being preferred over higher grade
- Land use – conflict with Local Plan designations

- Construction access – accessibility to the highway network, existing access arrangements and whether there were any other practical implications to construction
- Public rights of way – potential impact on users and potential for suitable offsets; and
- Operational impacts – whether the site could be technically developed for a solar farm, in terms of gradient and efficiency and be suitability maintained.

4.6.15 Following this assessment, the Applicant engaged with landowners to explore the feasibility of securing the identified sites from this search. Engagement with landowners focused on securing sufficient land to deliver a scheme over 100MW to maximise the available grid connection. Where landowners were not supportive of their land being included within the Proposed Development, those parcels were discounted from further consideration. This is considered appropriate, given that it is desirable to reduce the amount of land that needs to be acquired through compulsory acquisition and that it would be difficult to justify compulsory acquisition powers if there are alternatives where landowners are providing their land willingly. If there were parcels of land where policy required the analysis of alternatives (i.e. in relation to flood risk or impact on sites where the Habitats Regulations are engaged), land ownership was not the only reason for discounting sites, however, this was not the case for the Order Limits at the site selection stage.

4.6.16 Once the willing landowners had been identified with sufficient land to meet the grid connection threshold, the initial Order limits were created. The Proposed Order Limits were subsequently defined based on the outcomes of these assessments as described in Section 4.7.

Cable Corridor Options

4.6.17 The Cable Corridor Options have been identified to connect the Proposed Development to the POC. As stated in paragraph 2.2.7 of NPS EN-5[4] "*The connection between the initiating and terminating points of a proposed new electricity line will often not be via the most direct route. Siting constraints, such as engineering, environmental or community considerations will be important in determining a feasible route*."

4.6.18 The Cable Corridor Options were developed by identifying the most direct technologically feasible route to connect, and rerouting to avoid residential areas where possible. The identification of Cable Corridor Options also aimed to minimise impacts on environmental assets including ecological and heritage designations, areas of woodland, and watercourses. Where appropriate, the Cable Corridor Options border natural borders such as field boundaries and roads, to minimise impacts to open fields and reduce impact to landowners.

4.6.19 While the previous points note an approach to avoidance, there has also been a philosophy applied to minimise the length of corridors as far as practicable based on the environmental assessments. An overview of the assessment factors is as follows, and includes:

- Area availability (e.g. sufficient space for trenchless crossings, construction compounds, access points, if and as required);
- Total length of route;

- Proximity to Scheduled Monuments, Listed Buildings, Archaeological designations and Registered parks;
- Crossings of Network Rail and National Highways assets;
- Crossings of buried utilities (electricity, high pressure gas, etc);
- Local Nature Reserves, National Nature Reserves;
- Proximity to residential receptors (as far as possible); and
- Access to site for construction and decommissioning.

4.6.20 (Note: points like ALC have not been considered in detail, as it has been expected that the cable works would be temporary, and reinstatement of soil post construction would allow return to original use).

4.6.21 The Cable Corridor Options identified following the steps above have been assessed for feasibility to be included as part of the Proposed Development. These options have been refined through the design process as discussed in Section 4.7.

4.7 Design Evolution

4.7.1 The Applicant aims to maximise the amount of clean energy generated to export to the National Grid, whilst designing both a socially and environmentally sensitive development. The Proposed Development has sought to embed good design from the outset and has therefore been developed in line with preliminary design principles.

4.7.2 These design principles were developed in line with guidance published by the National Infrastructure Commission titled 'Design Principles for National Infrastructure'[8], covering the key themes of climate, people, place, and value; reflecting the broad scope of design. The design principles are as follows:

1. Maximise the amount of clean energy exported to the National Grid
2. Craft a project that is resilient to the impacts of climate change
3. Take opportunities to limit the amount of embodied carbon across the Proposed Development
4. Engage with stakeholders to develop the design
5. Support local ecology and enhance biodiversity, enriching ecosystems where possible
6. Find out what is important to people about the local area and seek to incorporate feedback
7. Consider how people engage with their local environment and retain these patterns and practices where possible
8. Enhance recreational access across the landscape
9. Respect landscape character and cultural heritage
10. Minimise visual impact
11. Contribute to the local economy; and
12. Support research and development.

4.7.3 The design and layout of the Proposed Development have formed part of an iterative process that has been informed by the ongoing environmental assessments, site selection assessment and taking into consideration the preliminary design principles, non-statutory and statutory consultation feedback, and engagement with stakeholders and consultees.

4.7.4 The design process has been informed by engagement with stakeholders and consultees, which has included a series of internal technical design workshops, meetings with statutory consultees and meetings with the host local authorities and Members of Parliament. The feedback from the engagement undertaken to date has informed the ongoing design layout.

4.7.5 A **Consultation Report [EN0110020/APP/5.1]** is submitted with the Application, providing a summary of consultation feedback, how the Applicant has had regard to the feedback, and how the design has evolved in response. A **Design Approach Document (DAD) [EN0110020/APP/5.7]** has also been prepared and submitted with the Application. The DAD sets out the evolution of the Proposed Development's design.

4.7.6 The layout and extent of the Proposed Development have been through four formal design iterations. The first stage of design (Stage 1) was held prior to the Non-statutory Consultation and is presented in **ES Volume 3, Appendix 4.2: Design Evolution [EN0110020/APP/6.20]**. The second stage of design (Stage 2) relates to the updated design for the March 2025 Project Update and EIA Scoping Report submission and is presented in **ES Volume 3, Appendix 4.2: Design Evolution [EN0110020/APP/6.20]**. The third stage of design (Stage 3) relates to the design that was presented at Statutory Consultation and was subject to assessment within the Draft ES. The final stage (Stage 4) forms the design for the Application and consolidates changes resulting from feedback received during Statutory Consultation, Targeted Consultation and further environmental surveys.

Stage 1 Design – April - September 2024

4.7.7 Following identification of the Proposed Order Limits as outlined in paragraph 4.6.15 above, the land was subject to an initial assessment to identify within the Proposed Order Limits land suitable for solar photovoltaic (PV) arrays and associated infrastructure. The assessment focussed on the suitability of land parcels based on environmental, social and economic factors. Minimum offsets to environmental features were agreed by the design team to inform the design process. Potentially sensitive receptors including residential properties and villages were identified. The design team sought to take a bespoke approach to these receptors and identified areas surrounding these receptors as potential solar PV arrays to be designed in discussion with residents.

Solar PV Array and Associated Infrastructure

4.7.8 The Stage 1 design was informed by desktop assessments and site visits. The design team identified areas that were considered unsuitable for accommodating solar PV array and associated infrastructure and were therefore discounted including:

- Land within 25m of Ancient Woodlan
- Land within 10m of existing PRoWs
- Land containing existing hedgerows and vegetation; and

- Land in proximity to residential properties, including individual residential dwellings, and around settlements such as Brampton-en-le-Morthen, Hardwick, Ulley, Harthill, Woodall and High Moor.

4.7.9 The areas that were removed for solar PV arrays were retained within the Proposed Order Limits for potential landscape mitigation and enhancement, as shown in the Stage 1 design in **ES Volume 3, Appendix 4.2: Design Evolution [EN0110020/APP/6.20]**.

4.7.10 At Stage 1, the location of the Battery Energy Storage Systems (BESS) and on-site substations were still under consideration. At Stage 1 it was acknowledged that the Proposed Development would include BESS and that two or more on-site "satellite" substations would be 4.7.11required, in addition to a primary substation which would collect electricity from the satellite e substations.

4.7.11 After Stage 1, three distinct areas became apparent within the Order Limits, and were named to allow for clearer discussion of the land (**ES Volume 3, Figure 3.2: Site Referencing [EN0110020/APP/6.19]**). These were:

- Whitestone 1 (W1), the northernmost area (centred on National Grid Reference (NGR) SK503962)
- Whitestone 2 (W2), the central area (centred on NGR SK477874); and
- Whitestone 3 (W3), the southern area (centred on NGR SK481807).

4.7.12 Further information on W1, W2, and W3 is provided in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]**.

Grid Connection Cable Corridor Options

4.7.13 During Stage 1, the design team also carried out an assessment to identify potential underground cabling corridors to connect the land areas to each other and into the National Grid Brinsworth Substation.

4.7.14 **ES Volume 3, Appendix 4.2: Design Evolution [EN0110020/APP/6.20]** shows the indicative Cable Corridor Options that were under consideration at Stage 1. These routes were at a preliminary design phase and underwent careful planning and assessment as described above.

4.7.15 This design was presented in the first consultation (Non-Statutory Consultation) which occurred from 18 November 2024 to 31 January 2025.

Stage 2 Design – January - March 2025

4.7.16 In early 2025, the Applicant received an amended agreement to connect to Long Lane 400kV Substation, rather than the National Grid Brinsworth Substation. Given the proximity of Long Lane 400kV Substation to the National Grid Brinsworth Substation, the Order Limits (when accounting for the new location of the POC) was still entirely within the 12km Study Area that was set. On that basis, the Applicant considered that the site selection process and design evolution that was undertaken thus far was still valid.

4.7.17 After the non-statutory consultation period concluded, the Applicant reviewed and considered all the feedback that had been submitted. The Stage 2 design process involved targeted engagement with statutory consultees and stakeholders, as well as internal design workshops.

Solar PV Array and Associated Infrastructure

4.7.18 Following the Stage 2 design process, a number of fields and partial fields were discounted from the area of solar PV arrays and associated infrastructure. **Table 4.1** provides a summary of the design evolution. This updated design was presented to the community in March 2025 in the March 2025 Project Update.

4.7.19 The areas that were discounted for solar PV development at that time were generally retained within the Proposed Order Limits for potential landscape mitigation and enhancement.

Table 4.1: Stage 2 Design Evolution

Location	Design Evolution
Whitestone 1	
Conisbrough	Withdrew proposed solar by 300m from southern edge of Conisbrough, reducing visual impact from the southern edge of the settlement and in views experienced when travelling along Sheffield Road.
Individual residential properties	Increased offset in proximity to individual residential properties including: • 255m from Hill Top House • 250m from Parks Farm Cottages • Removal of proposed panels on land south of Spring Bank Bungalow • Removal of proposed panels on land north of Hill Top Farm.
Firsby	Removal of proposed solar panels on land north, east and west of Firsby with offset ranging between 250 – 500m in response to existing views and topography.
Wider land	Expansion of offsets from PRoWs, maintaining one side open in several instances in response to feedback explaining the importance of the routes for recreation.
	Exclusion of proposed solar panels on land identified as having high potential for archaeological sensitivity.
Whitestone 2	
Treeton	Addition of solar PV array between B6067 and Burnt Wood.
Upper Whiston	Inclusion of 220m offset across land south of Upper Whiston to minimise impact on setting.
Ulley	Removal of proposed solar panels north of Ulley to minimise impact on the setting and views from the village, and to fragment the Proposed Development across the wider landscape.
	Removal of proposed solar panels south of Ulley on at least one side of the PRoW connecting to Aston to retain sense of openness.

Location	Design Evolution
Brampton en le Morthen	Incorporation of offset to the south, siting solar beyond landform and vegetation to minimise visual impact.
	Removal of proposed solar panels on land southwest of village to preserve sense of arrival to village from the west.
Individual properties	Increase of offsets from residential properties including Meadow View where an offset of 245m across land to the south was embedded.
Brampton Common	Removal of proposed solar panels on land at Brampton Common to retain open land between Whitestone and other solar developments to minimise cumulative impact.
Hardwick	Incorporation of offsets on land east of Hardwick to remove visual impact that would be experienced when travelling on local PRoWs.
South of Turnshaw Plantation	Removal of proposed solar on land south of Turnshaw Plantation, preserving setting to South Yorkshire Woodland Burial Ground.
Whitestone 3	
High Moor	Increased offset from High Moor, siting solar beyond landform to minimise potential for visual impact from settlement.
Woodall	Increased offset from Woodall, siting solar beyond landform to minimise potential for visual impact.
Woodall and Harthill	Removal of proposed solar on land between Woodall and Harthill, north of Harthill Reservoir, to maintain openness between the two villages and reduce visual impact.

Grid Connection Cable Corridor Options

4.7.20 There were no changes to the grid connection Cable Corridor Options at Stage 2 of the design process.

Stage 3 Design - April - August 2025

4.7.21 After the submission of the EIA Scoping Report on 23 April 2025, further environmental information was collected through surveys and desk-based studies. In conjunction with ongoing engineering design, this environmental information informed the design evolution of the Proposed Development, presented in **ES Volume 3, Appendix 4.2: Design Evolution [EN0110020/APP/6.20],** and resulted in the changes listed in the sections below.

Solar PV Array and Associated Infrastructure

4.7.22 No additional areas were proposed to be occupied by solar PV array and associated infrastructure. The overall extent of the solar PV array has been refined as the environmental surveys, preliminary assessments and land agreements have progressed.

BESS and On-Site Substations

4.7.23 The Stage 3 design included options for the siting of BESS and on-site substations, namely:

- Three potential locations for on-site substations were identified within W1. Two were located towards the centre of W1. One was located on the eastern edge of W1, south of Clifton; and
- Five potential locations for on-site substations were identified within W2, two of which had potential to include BESS.

4.7.24 Generation models indicated that the power generated in W3 would not be sufficient to require a substation in W3.

4.7.25 The location for the BESS, primary substation, and satellite substations are discussed in **ES Volume 1, Chapter 5: The Proposed Development [EN0110020/APP/6.5]**.

Grid Connection Cable Corridor Options

4.7.26 The Cable Corridor Options to the northwest of the M1 were added to minimise the likelihood of construction impacts on users of the M1 and M18 interchange. These Cable Corridor Options were narrowed around Morthen and the southern extent of Wickersley to minimise potential construction impacts on residential properties. The Cable Corridor Option that did run through the M1/M18 junction was removed.

4.7.27 The Cable Corridor Option to connect into the National Grid was also expanded in Stage 3 to include flexibility to connect into either the National Grid Brinsworth Substation or the Long Lane 400kV Substation.

Stage 4 Design – November 2025 to May 2026

4.7.28 The Stage 4 design forms the Proposed Development as submitted and assessed within this ES. Further design development was undertaken between Stage 3 (Statutory Consultation) and Stage 4 in response to feedback received from stakeholders. The feedback received and the project's response is fully detailed within the **Consultation Report [EN0110020/APP/5.1].** A full description of design development is provided within the **Design Approach Document EN0110020/APP/5.7]**. The changes can be summarised as:

- Providing a greater offset in proximity to hamlets and villages across the area
- Providing greater buffers to PRoWs
- Consolidating the land, as far as practicable; and
- Removing the extent of mitigation and enhancement land to provide a proportionate level and retain current land use and associated character.

4.7.29 The following sections provide more detail of key changes from the Stage 3 to Stage 4.

Solar PV and Associated Infrastructure

4.7.30 The extent of solar panels proposed across the Order Limits was further reduced in response to community feedback and environmental surveys. The changes are summarised below:

4.7.31 Reductions across W1 included:

- Solar panels north of Firsby were removed. This was in response to feedback received from residents relating to visual amenity and in order to protect the openness experienced when walking on PRoWs north of Firsby, particularly the route extending between Hooton Robers in the west, to Micklebring in the east
- Solar panels west of Clifton were removed. This was in response to the designation of the Roman Villa as a Scheduled Monument, protection of Clifton Conservation Area, protection of the visual amenity experienced by people walking on PRoWs west of Clifton, and concerns raised by residents and business owners located in proximity to the Order Limits
- Solar panels north of Conisbrough Lodge were removed in response to ecological surveys which identified sensitive habitat that should be retained; and
- Solar panels south of Clifton were removed in response to feedback from residents expressing concern regarding adverse impacts on the character of the village and impacts during construction on the local road network and horses present across the locality.

4.7.32 Reductions across W2 included:

- Reduction of solar panels proposed on the western edge of the Order Limits east of Treeton, utilising existing landform to provide visual screening
- Removal of solar panels from land south of Ulley in response to consultation feedback and to protect existing residential visual amenity
- Increase in the distance between Carr Lane and proposed solar panels to minimise impact on visual amenity experienced by people travelling on Carr Lane; and
- Removal of solar panels east of Long Road in response to consultation feedback and to protect residential visual amenity.

4.7.33 Reductions across W3 included:

- Withdrawal of proposed solar panels north of Harthill. Increasing the distance between proposed solar panels and residential properties maintains the southern facing slope as open and places the solar panels on flatter land, reducing the potential for visual impact
- Alteration of the layout between Woodall and Harthill in response to hydrological constraints; and
- Reduction in the area proposed to be occupied by solar panels west of Harthill Reservoir, protecting visual amenity experienced by people travelling on PRoW around the northern edge of the reservoir.

Mitigation and Enhancement Land

4.7.34 The Proposed Development seeks to make efficient use of land across the Order Limits. Where the extent of solar panels and associated infrastructure had been reduced in Stage 1-3, the land had typically remained in the emerging Order Limits as mitigation/enhancement land at Statutory Consultation. The extent of this land was reviewed as part of the Stage 4 design, only maintaining land where it had a purpose of delivering mitigation, compensation, or proportionate enhancement. As a result, the following reductions were made to the extent of mitigation land and the extent of the Order Limits reduced accordingly.

4.7.35 Reductions across W1 included:

- Land north of Firsby was withdrawn from the Order Limits, further reducing potential interaction between the Proposed Development and the settlement
- Land south of Sheffield Road (A630) was removed from the Order Limits, retaining the arable landscape that flanks the highway
- Land around Parks Farm Cottages was withdrawn from the Order Limits; and
- Land west of Clifton was withdrawn from the Order Limits, wholly removing the Scheduled Monument.

4.7.36 Reductions across W2 included:

- Removal of land north of Ulley in response to consultation feedback explaining that the agricultural activity adjacent to the village is an important contributor to the character of the village and should be maintained; and
- Withdrawal of mitigation land proposed south of Brampton en le Morthen.

4.7.37 Reductions across W3 included:

- Removal of mitigation land within the Order Limits between Harthill and Woodall; and
- Removal of mitigation land east of High Moor which was visible from elevated views experienced by residents of the settlement.

BESS and On-Site Substations

4.7.38 Following consultation on the location of the on-site substations and BESS at Statutory Consultation, the Stage 4 design identifies the final locations of each element. Building on the Horlock Rules, defined by National Grid to inform the siting of substations, environmental surveys, and a review of feedback received through Statutory Consultation, the following locations have been proposed:

- A single on-site substation is proposed in W1. Works No.4-1A shows the field within which the substation could be sited. The maximum footprint of the substation is 90x130m, as secured within the Outline Design Parameters.
- Two substations are proposed in W2. One, referred to as 4-2A on the **Works Plan [EN0110020/APP/2.3]** is located south of M1 and is proposed to include a project substation, BESS and solar panels. The substation would measure up to 100m x 170m. This would be the final substation before the power generated by the solar farm is sent to the POC. The second substation, referred to as 4-2B on the **Works Plan [EN0110020/APP/2.3]**, would be located between the M1 and Long Road and would be accompanied by solar panels but no BESS. This substation would measure up to 90m x 130m; and

- No substations or BESS are proposed within W3.

Grid Connection Cable Corridors

4.7.39 Following consultation and further design on the grid corridors, a series of changes have been made to allow more sensitive routing, considerate of but not limited to technical, environmental and planning constraints. Changes consistent overall were the addition of visibility splays to allow safe access through construction.

4.7.40 Key changes undertaken include:

- **Cable Route A:** This route has been adjusted in collaboration with environmental and landowner discussions to determine a more suitable crossing location of the legacy railway corridor in order to minimise the impact to existing vegetation
- **Cable Route B:** This route has been refined to allow for more flexibility in connecting to W1 past Firsby Brook, as well as providing visibility splays for three access points. Access off Sandy Lane via Sherbourne Avenue has also been added to enable flexibility in construction. Several areas of land have been removed based on being surplus to requirements for construction
- **Cable Route C:** This route been refined with addition of visibility splays for access, and refined since the Draft ES to be more considerate of adjacent proposed schemes and effects through construction
- **Cable Route D-1 and D-2:** There are two proposed options for the final grid connection corridor from Substation and BESS 2A, to allow for flexibility in construction for the most suitable option to be selected, balancing the findings of the ES, and further National Highways and National Grid engagement
- **Cable Route E:** Cable Route E has been removed based on engagement with National Grid since the Statutory Consultation and Targeted Consultation, as connection to the existing National Grid Brinsworth Substation is no longer required
- **Cable Route F:** This route has been narrowed where possible based on available environmental information, with visibility splays also added for the access point
- **Cable Route G-1 and G-2:** G-2 has been added based on further site surveys and assessment, to allow for flexibility in connecting the field closest to Treeton, and minimise construction-stage impacts by proving roads on lower gradient landscapes
- **Cable Route H:** This corridor has been implemented to replace the cables that previously would have run through the solar development areas in the same fields, to allow the scheme to remain connected
- **Cable Route I-1 and I-2:** Each option for crossing the M1 remains, with the final selection to be undertaken in the detailed design phase. In the case of I-1, the cables would be installed through the underpass. If I-2 was selected, a trenchless crossing would be utilised
- **Cable Route J:** This route remains unchanged from Draft ES and is responsible for bringing power from W3. It would connect into Cable Route K-1 or K-2 as selected in detailed design

- **Cable Route K-1 and K-2:** K-1 has been added following landowner feedback during Statutory Consultation as a potential alternative to Cable Route K-2. The decision to use either Cable Route K-1 or K-2 would be determined at detailed design
- **Cable Route L:** Option L has been selected based on environmental and engineering assessments completed through assessments to date. In addition, access visibility splays have been added to enable construction
- **Cable Route M:** This route has been amended through assessments, including to be more considerate of the changes implemented to Harthill reservoir. Woodall Lane has visibility splays also added to enable safe access for construction; and
- **Cable Route N:** There have been minor changes to this route, to allow flexibility for the trenchless crossing of the M1, should this be the preferred crossing option.

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