Proposed Solar PV Development

Byers Gill Solar
EN010139

6.2.2 Environmental Statement
Chapter 2 The Proposed Development

Planning Act 2008

APFP Regulation 5(2)(a)

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

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RWE
14 Bird Street
London
W1U 1BU
United Kingdom
www.rwe.com

Table of Contents

Table of Tables

Appendices

Figures

2 The Proposed Development

2.1 Introduction

2.1.1 This chapter of the Environmental Statement (ES) provides an overview of the site location and context, together with a detailed description of the Proposed Development (Section 2.3). It also outlines details of environmental mitigation measures (Section 2.6), the construction, operation and long-term management (Section 2.7), and the decommissioning (Section 0), of the Proposed Development. This information is used to inform the environmental topic assessments which are detailed in ES Chapters 5 to 12 (Document References 6.2.5 to 6.2.12).

2.1.2 The Order Limits of the Proposed Development and the use of the 'Rochdale Envelope' approach for assessment purposes is discussed in Section 2.2 and shown in ES Figure 1.1 (Document Reference 6.3.1.2).

2.1.3 The following figures have been produced to illustrate the Proposed Development:

- ES Figure 2.1 (Document Reference 6.3.2.1) presents an overview of the Proposed Development including Panel Areas (groups of solar photovoltaic (PV) modules);
- ES Figure 2.2 (Document Reference 6.3.2.2) presents the layout of the Proposed Development, including other supporting solar infrastructure;
- ES Figures 2.3 – 2.8 (Document References 6.3.2.3 to 6.3.2.8) present the design of each Panel Area;
- ES Figure 2.9 (Document Reference 6.3.2.9) presents a cross section of a typical fixed solar panel;
- ES Figure 2.10 (Document Reference 6.3.2.10) presents the typical arrangement of the inverter, transformer and BESS arrangement.
- ES Figure 2.11 (Document Reference 6.3.2.11) presents the typical layout of access and supporting infrastructure;
- ES Figure 2.12 (Document Reference 6.3.2.12) presents the typical layout of switchgear;
- ES Figure 2.13 (Document Reference 6.3.2.13) presents the underground cable route options;
- ES Figure 2.14 (Document Reference 6.3.2.14) presents the typical layout of a substation;
- ES Figure 2.15 (Document Reference 6.3.2.15) presents a typical fence and gate;
- ES Figure 2.16 (Document Reference 6.3.2.16) presents a typical CCTV pole;
- ES Figure 2.17 (Document Reference 6.3.2.17) presents a cross-section of a typical access track;

- ES Figure 2.18 (Document Reference 6.3.2.18) presents a typical shipping container style unit;
- ES Figure 2.19 (Document Reference 6.3.2.19) presents key environmental designations;
- ES Figure 2.20 (Document Reference 6.3.2.20) presents the landscaping and ecological enhancements for the Proposed Development; and
- ES Figure 2.21 (Document Reference 6.3.2.21) presents the construction compound locations and access points.

2.2 The Order Limits

2.2.1 The Order Limits for the Proposed Development, which considers the maximum area of land potentially required for the construction, operation and decommissioning of the Proposed Development, is shown in ES Figure 1.1 Location Plan (Document Reference 6.3.1.1).

2.2.2 The Order Limits are based on the land anticipated to be required temporarily, with permanent rights of access, or permanently for the construction and operation of the Proposed Development. The Land Plans (Document Reference 2.4) illustrate the acquisition of land and/or rights as part of the Development Consent Order (DCO) application. The Order Limits also include all land necessary for any works where the Proposed Development interfaces with existing utilities and these are discussed further in the Statutory Undertakers Position Statement (Document Reference 7.7).

2.2.3 The Proposed Development has been subject to ongoing design development and the Order Limits have been refined in response to environmental and technical factors as identified as part of the Environmental Impact Assessment (EIA) process, as well as consultation responses. This process has ensured that the Order Limits only include land which is required to deliver the Proposed Development and any essential mitigation.

2.2.4 The exception to the above relates to the cable routes where an element of flexibility remains through the inclusion of both on-road and off-road cable route options as shown on ES Figure 2.13 (Document Reference 6.3.2.13). Whilst the Applicant is seeking to reach agreement on the off-road routes by negotiation, both options have been assessed as part of this ES and are included in the Order Limits to ensure that the Proposed Development would be deliverable. The Order Limits identify the extent of the limits of deviation within which the cables may be installed, and the cable route options are discussed further in ES Chapter 3 Alternatives and Design Iteration (Document Reference 6.2.3) and the Statement of Reasons (Document Reference 4.1).

The Rochdale Envelope and the use of design parameters

2.2.5 The design of the Proposed Development has been refined throughout the EIA process through the use of iterative design. This iterative design process has taken into account

comments made during consultation, including in response to the Preliminary Environmental Information Report (PEIR). ES Chapter 3 Alternatives and Design Iteration (Document Reference 6.2.3) describes how feedback and environmental impacts have informed decision-making where design alternatives have been considered, as well as the reasons for selecting the proposed design over other alternatives considered.

2.2.6 Several technical parameters have yet to be finalised for the Proposed Development. The Applicant is therefore proposing to use design parameters which will fix a worst-case scenario for any element of the design which is not fixed, dependent on the receptor in question. In order to present a worst-case scenario to inform the ES, the smallest spacing between solar PV modules has been presented, alongside the greatest possible height of solar PV modules dependant on emerging technology. This is a reasonable worst-case design, as the maximum solar PV module height presented would require greater spacing between the panels. Both of these parameters have been assessed in order to provide a worst-case scenario for the Proposed Development.

2.2.7 It is therefore the intention of the Applicant to implement the advice within PINS Advice Note Nine: Using the 'Rochdale Envelope' [1] regarding the degree of flexibility that may be considered appropriate with an application for development consent under the Planning Act 2008 ('the Act').

2.2.8 In particular, the Advice Note outlines that:

- "*the DCO application documents should explain the need for, and the timescales associated with, the flexibility sought, and this should be established within clearly defined parameters*;
- *the clearly* defined *parameters established for the Proposed Development must be sufficiently detailed to enable a proper assessment of the likely significant environmental effects and to allow for the identification of necessary mitigation, if necessary, within a range of possibilities;*
- *the assessments* in *the ES should be consistent with the clearly defined parameters and ensure a robust assessment of the likely significant effects;*
- *the DCO must not permit the Proposed Development to extend beyond the clearly defined parameters which* have *been requested and assessed. The Secretary of State (SoS) may choose to impose requirements to ensure that the Proposed Development is constrained in this way; and*
- *the more detailed the DCO application is, the easier it will be to ensure compliance with the Regulations".*

2.2.9 The Advice Note also acknowledges that there may be aspects of the design that are not yet fixed, resulting in the need for the EIA to assess likely worst-case variations to ensure that all foreseeable significant environmental effects of the Proposed Development are assessed.

2.2.10 This is of particular importance to maintain due to the ever-evolving technology and speed of product development within solar PV module and energy storage technology markets. This Rochdale Envelope approach is being followed in this ES.

2.3 Description of the Proposed Development

2.3.1 The Proposed Development would comprise of the following key infrastructure (as shown in ES Figures 2.1 to 2.18 (Document References 6.3.2.2 to 6.3.2.18) and described through Schedule 1 of the draft DCO (Document Reference 3.1):

Work No. 1

2.3.2 Ground mounted solar photovoltaic generation station comprising of solar PV modules and associated mounting structures and on site supporting equipment (or the balance of solar plant) including inverters, transformers and switch gear. These works are spread across six Panel Areas as described in Table 2-2.

Work No. 2

2.3.3 Battery Energy Storage Systems (BESS) which comprises:

- BESS units located centrally within each Panel Area;
- Auxillary transformers and associated bunding;
- Power conversion system units including inverters, switch gear, transformers and ancillary equipment;
- Containers or enclosures housing the BESS;
- Monitoring and control systems;
- Heating, ventilation and air conditioning systems;
- Fire safety infrastructure; and
- Containers for storage, control and welfare.

Work No. 3

2.3.4 33kV underground electrical cables connecting the Solar Panels (Work No. 1) to the BESS (Work No. 2) and the on-site substation (Work No. 4). 132kV underground electrical cables connecting the on-site substation (Work No. 4) to the National Grid substation at Norton (Work No. 6) within panel areas. As well as the following works:

- fencing, gates, boundary treatments and other means of enclosure;
- improvements, maintenance and use of existing private tracks;
- laying down of internal access tracks, ramps, means of access, footpaths, roads, including the laying and construction of drainage infrastructure, signage and information boards;

- works for the provision of security and monitoring measures such as CCTV columns, lighting columns and lighting, cameras, weather stations, communications infrastructure, and perimeter fencing;
- landscape and biodiversity mitigation and enhancement measures including planting; and
- works required for crossing, moving, re-routing or over/undergrounding of existing utility assets (including water, gas, sewer pipes, electricity distribution/transmission cabling, telecommunications etc).

Work No. 4

2.3.5 Onsite substation, including the following works:

- Substation, switch room and ancillary equipment;
- Power conversion system units including inverters, switch gear, transformers and ancillary equipment;
- Control building housing offices, storage containers, welfare facilities, waste storage and car parking within a fenced compound.
- Monitoring and control systems;
- 132kV harmonic filter compound;
- Electrical cables;
- Communications mast up to 15m in height;
- Fire safety equipment; and
- Access gates track and security fencing.

Work No. 5

2.3.6 Works including:

- 132kV underground electrical cables outside of panel areas connecting the on-site substation (Work No. 4) and the National Grid Substation at Norton (Work No. 6);
- Fencing, gates, boundary treatment and other means of enclosure;
- Laying of internal access tracks, means of access, footpaths, roads, including construction of drainage infrastructure, signage and information boards; and
- Works required for crossing, moving, re-routing or over/undergrounding of existing utility assets.

Work No. 6

2.3.7 Construction of electrical infrastructure within the National Grid substation at Norton including:

- A compound for electrical works and infrastructure necessary for the onwards transmission of electricity;
- Electrical cables;
- 132kV connection bay including all associated electrical equipment and civil engineering works necessary to enable the onward transmission of electricity; and
- Access gates and tracks associated with these works.

Work No. 7

2.3.8 The temporary construction and decommissioning of access tracks and compounds comprising:

- works to improve existing farm access from public highway, and install temporary traffic lights, banksmen or other measures to manage traffic;
- works to excavate and store soil, clear vegetation and obstacles, level, shape and prepare surface for construction track to be installed;
- storage of equipment and materials;
- civils investigations and works to reinforce ground with weight-bearing support infrastructure, maintain integrity of structures beneath road surface
- creation of temporary construction access tracks, laydown and working areas;
- works required for crossing, moving, re-routing or over/undergrounding of existing utility assets;
- temporary stopping up of watercourses for installation of culverts, drainage and other features to cross water courses;
- areas of hardstanding;
- car parking;
- site and welfare offices, canteens and workshops;
- area for download and turning;
- security infrastructure;
- site drainage and waste management infrastructure; and
- electricity, water, waste-water and telecommunications connections.

Work No. 8

2.3.9 Works to facilitate access for all works comprising:

- The creation of accesses from, or access to the public highway;
- Visibility splays;
- Works to widen and surface the public highway; and
- The installation of temporary traffic lights or facilities for manned traffic management.

Work No. 9

2.3.10 Works for areas of green infrastructure comprising:

- Soft landscaping and planting, including tree and hedgerow planting;
- Habitat creation and management, including earthworks, landscaping, means of enclosure and the laying and construction of drainage infrastructure; and
- The laying of permissive paths, signage and information boards.

2.3.11 In connection with the above works, the draft DCO also include provision for further associated development comprising such other works that may be necessary for the purpose of or in connection with the relevant part of the Proposed Development within the Order Limits. These works include:

- haul roads, ramps, watercourse and other temporary crossings, vehicular and pedestrian means of access including creation of new tracks and paths, widening upgrades alterations and improvements of existing roads tracks and paths;
- fencing, gates, boundary treatments and other means of enclosure;
- bunds, embankments, trenching and swales;
- provision of temporary and permanent ecological and environmental mitigation and compensation works, including landscaping works and habitat creation;
- working sites in connection with the construction of the authorised development including construction lay down areas, compounds, and spoil storage and associated control measures;
- works to the existing irrigation system and works to alter the position and extent of such irrigation system;
- surface water drainage systems, storm water attenuation systems including storage basins, oil water separators, including channelling and culverting and works to existing drainage networks;
- electrical, gas, water, foul water drainage and telecommunications infrastructure connections diversions and works to alter the position of such services and utilities connections;
- works to alter the course of or otherwise interfere with non-navigable rivers, streams or watercourses;

- site establishments and preparation works including site clearance (including vegetation removal, demolition of existing buildings and structure), earthworks (including soil stripping and storage and site levelling) and excavations, the alteration of the position of services and utilities and works for the protection of buildings and land;
- works for the benefit or protection of land affected by authorised development;
- works of restoration;
- tunnelling, boring and drilling works; and
- such other works as may be necessary or expedient for the purposes of or in connection with the relevant part of the authorised development.

Design parameters

2.3.12 Due to rapidly changing and evolving solar and energy storage technology markets, the Proposed Development parameters are designed to maintain flexibility to allow the latest technology to be installed at the time of construction.

2.3.13 The following sections provide further detail on each of the different elements of the Proposed Development along with any design parameters that have been assessment within this ES. Each environmental topic has assessed the design considered to be the likely worst-case scenario for that discipline to determine the potential for significant effects and identify suitable mitigation measures. The Design Approach Document (Document Reference 7.2) contains a summarised version of the parameters set for the Proposed Development.

Solar panels

2.3.14 Solar panels generate electrical power by using a solar PV module to convert sun light into direct current (DC) electricity. Individual solar PV modules, more commonly known as solar panels, contain several PV cells wired and encapsulated by tempered glass. Solar PV modules are sealed for weatherproofing and held together by a metal frame in a mountable unit.

2.3.15 Individual solar PV modules are typically 2m by 1m in width and depth and can vary in height. However, as solar PV modules are rapidly developing due to innovation in technology and processing techniques for the PV cells, the dimensions of the solar PV modules available at the time of construction may vary. The ES will therefore consider a height parameter which represents the worst-case scenario in terms of identifying potential environmental effects.

2.3.16 Solar PV modules are fixed to mounting structures in groups known as ‘strings’. The exact number and arrangement of modules depends on a range of factors including the size of the system, its location, and the direction in which the panels are installed. As technology and equipment is evolving, some flexibility in design will be required to accommodate technology advances.

2.3.17 Table 2-1 presents a summary of the solar PV module design parameters used for this ES.

Table 2-1 Solar PV module design parameters

Design Parameter	Description
Panel Alignment	Rows of solar PV modules aligned in East-West rows with panels facing South
Angle	+/- 10° to 30°
Orientation	South
Separation distance	Minimum 4m and maximum 12m between rows
Height	▪ Maximum height of up to 3.5m ▪ Minimum height of the lowest part of the panel would typically be between 0.8m
Mounting structure	The mounting structure for the solar PV modules is a metal frame (usually anodised aluminium alloy) securely fixed to the ground by galvanized steel poles which are typically driven into the ground to a depth of approximately 1m. In certain locations across the Proposed Development, archaeology constraints have been identified and an alternative mounting structure is therefore proposed in the form of ballast slabs which sit on the surface rather than penetrating the ground.

2.3.18 Typical solar PV module designs are shown on Figure 2.9 (Document Reference 6.3.2.9) with both piled and ballasted solutions shown.

On-site supporting equipment

2.3.19 A range of equipment is required to support the solar PV modules to convert the electrical power generated, manage this power and export power onto the national grid. The electrical output from the solar PV modules would be exported by low voltage cabling to shipping container style storage units which would contain an inverter, transformer and BESS. The function of each of these elements are as follows:

- inverters convert the DC generated by the solar PV modules into alternating current (AC) that can be exported to the national grid;
- transformers monitor, increase and control the voltage of the electricity produced before it reaches the on-site substation. The transformers would be located adjacent to the inverters; and
- BESS (see paragraphs 2.3.23 - 2.3.24) would comprise of containerised battery storage systems, DC-DC converter boxes and ancillary equipment.

2.3.20 The inverters, transformers and BESS would be arranged together across the Proposed Development. At this stage, it is anticipated that there would be up to 53 hybrid containers (which include an inverter and BESS) and up to 44 inverter containers

located across the Proposed Development. These would be placed on a concrete pad foundation and would measure approximately 3m in height, 2.5m in width and 12m in length, as shown in ES Figure 2.10 (Document Reference 6.3.2.10). The typical layout of this supporting infrastructure and access is provided in ES Figure 2.11 (Document Reference 6.3.2.11).

2.3.21 Low voltage cabling within the Panel Areas would be required to connect solar PV modules and the BESS to inverters where the voltage is transformed from the lower voltage to 33kV. Cabling from the solar PV modules to the inverters would typically be installed above ground, fixed to the mounting structure of the modules, with a small section placed underground where it leaves the solar PV modules and connects to the inverters.

2.3.22 The Proposed Development would utilise five switchgears to control, protect and isolate electrical currents and equipment. Switchgears allow parts of the solar PV system to be de-energised safely, allowing for routine maintenance or faults to be identified and work undertaken. A typical switchgear of the style likely to be used on the Proposed Development is shown in ES Figure 2.12 (Document Reference 6.3.2.12).

Battery Energy Storage System

2.3.23 The BESS is likely to consist of lithium-ion batteries and will allow energy to be stored on site to ensure that there is an equal distribution of electricity across the Grid, providing a balance in services where surplus electricity is produced. BESS will be included as part of the hybrid containers.

2.3.24 The BESS would require associated heating, ventilation and cooling (HVAC) systems to ensure efficiency of the batteries and these systems would be integrated within the individual containers.

Underground Cabling – Panel Areas

2.3.25 Higher voltage cables (33kV) of approximately 32.5km are required to connect the inverters and switchgears, and to connect the switchgears to the on-site substation. These are shown on ES Figure 2.13 (Document Reference 6.3.2.13).

2.3.26 Where 33kV cables are outside of the Panel Areas the preference is to use off-road routes. These routes are currently under discussion with relevant landowners and are proposed to be subject to compulsory acquisition powers. On-road routes for 33kV cables are included in the Order Limits to and ensure the Proposed Development is deliverable should it not be possible to agree the route with landowners and if compulsory acquisition powers are not granted by the SoS. The cable routes (on- road or off-road) for the Proposed Development will be confirmed post decision. For the purposes of assessment, each topic chapter has considered the realistic worst case in relation to cable routes.

2.3.27 It is anticipated that underground cables would be installed using a cable plough, wherever possible. This is considered to be the most efficient and least impactful method of cable installation, causing minimal disruption to the ground, by cutting, installing and back-filling in one operation. The underground cables will be located in existing gaps in hedgerows wherever feasible, however this assessment assumes the loss of some hedgerows as a worst case. Trees and Hedgerows to be removed are included within ES Appendix 7.8 Arboricultural Impact Assessment (Document Reference 6.4.7.8).

2.3.28 Only in instances where the cable plough cannot be used, alternative methods, such as trenching or horizontal directional drilling (HDD), will be used in more constrained locations such as going underneath water courses and roads.

On-site substation

2.3.29 A substation would be required for the Proposed Development to connect the Panel Areas to distribution and transmission networks. The substation would also house other electrical equipment such as transformers, switchgear, and metering equipment.

2.3.30 The purpose of this on-site substation is to convert low voltages from electricity generation to high voltages, or vice versa, using power transformers. The on-site substation would be located in Panel Area C. The substation compound would be 70m in length, 70m in width with a 30m x 70m parking and turning area. The equipment within would have a maximum height of 15m (which would only relate to a communications tower, with the highest electrical equipment being 8m).

2.3.31 A typical substation is shown in ES Figure 2.14 (Document Reference 6.3.2.14).

Underground cabling - on-site substation to Norton Substation

2.3.32 The Proposed Development would connect to the existing National Grid substation at Norton, located within the eastern extent of the Order Limits, by underground cabling. It is anticipated that 10km of underground 132kV cabling would be required to connect the Proposed Development from the on-site substation to the substation at Norton. The maximum dimension of the cable trench would be 1600mm depth x 2000mm wide.

2.3.33 Where the 132kV cable is outside of the Panel Areas the preference is to use off-road routes. These routes are currently under discussion with relevant landowners and are proposed to be subject to compulsory acquisition powers. On-road routes for 132kV cables are included in the Order Limits and ensure the Proposed Development is deliverable should it not be possible to agree the route with landowners and if compulsory acquisition powers are not granted by the SoS. Cable routes (on-road or off-road) for the Proposed Development will be confirmed following the grant of the DCO. Both on and off-road options are therefore assessed as part of this ES. The works would likely be carried out by the Distribution Network Operator (DNO).

2.3.34 A cable plough would be used to install the majority of 132kV cables, however some horizontal directional drilling would be required in more constrained locations as set out in paragraphs 2.3.27 - 2.3.28.

Works at Norton Substation

2.3.35 The Applicant understands that National Grid Electricity Transmission (NGET) owns the land in Norton Substation, part of which is leased to Northern Power Grid (NPG) for their operations as the Distribution Network Operator (DNO).

2.3.36 Byers Gill Solar has a connection agreement with NPG, which would require a new 132kV circuit breaker and associated switchgear equipment and cable to be installed at the Norton Substation. This will enable the connection between the substation and the Proposed Development. These works form part of the Proposed Development and are assessed as part of the ES. It is expected that NPG would carry out these works to connect the Proposed Development.

2.3.37 NGET are proposing further reinforcement works at Norton Substation comprising of 400kV/132 kV Super Grid Transformer and associated equipment. These works are part of a wider reinforcement of the NGET network and are not directly related to Byers Gill Solar. For this reason, they do not form part of the Proposed Development.

Other infrastructure

2.3.38 Additional infrastructure would be required to support the operation of the Proposed Development. The following equipment would be installed across the Order Limits as follows:

- fencing and gates – A perimeter security fence would be installed to enclose the operational areas of the Proposed Development. The fence is likely to be a deer fence with a maximum height of 2m. The fence would be designed in such a way to allow small animals to pass through the Order Limits and would also be gated to allow access to and from the Order Limits. Typical fencing is shown in ES Figure 2.15 (Document Reference 6.3.2.15);
- CCTV – Pole-mounted, infra-red security detection cameras would be mounted on poles of up to 3m in height located within the perimeter fence. It is anticipated that these cameras would have motion detection technology for recording, and would be pointed directly within the Order Limits and away from any land outside of the Order Limits. A typical CCTV pole is shown in ES Figure 2.16 (Document Reference 6.3.2.16);
- lighting – In general, it is anticipated that the Proposed Development would not be lit, however, infrared security lighting would be required around key electrical infrastructure. This lighting would be sensor triggered and therefore not continuous;
- access tracks – Access to the Proposed Development during operation would be required for maintenance. A series of access tracks are proposed within the Order

Limits and further detail on access points onto the local highway network is provided in Table 2-3. Access tracks would be permeable to allow water to filtrate through and maintain greenfield runoff rates. A cross section for a typical access track is shown in ES Figure 2.17 (Document Reference 6.3.2.17);

- drainage – The detailed operational drainage design for the Proposed Development will be undertaken prior to construction. The overarching principle of the drainage strategy for the Proposed Development is to provide sustainable drainage solutions (SuDS) at source, ensuring that surface water run-off is managed as per existing site conditions. Further detail on the drainage strategy is provided in ES Appendix 10.1 Flood Risk Assessment and Drainage Strategy (Document Reference 6.4.10.1); and
- storage containers – It is anticipated that nine additional storage containers would be installed on site to contain extra equipment to support maintenance activities. These are depicted in ES Figure 2.18 (Document Reference 6.3.2.18).

2.4 Location of the Proposed Development

2.4.1 The Proposed Development covers an area of approximately 490 hectares (ha) and is located between Darlington and Stockton-on-Tees in North East England in an area of undulating mixed farmland with a network of local roads and Public Rights of Way (PRoW) and a mix of dispersed settlements, small villages and hamlets.

2.4.2 The majority of the Proposed Development, including the solar PV modules, on-site substation, Norton Substation and BESS are located within the administrative boundary of Darlington Borough Council. The eastern part of the 132kV cable route crosses into the administrative boundary of Stockton-on-Tees Borough Council. The northern extent of the Order Limits borders Durham County Council's administrative area. The Order Limits for the Proposed Development are shown in ES Figure 1.1 Location Plan (Document Reference 6.3.1.1).

2.4.3 The Order Limits and surroundings are comprised of agricultural fields, interspersed with individual trees, hedgerows, farm access tracks, woodlands and local farm holdings. There are several local villages located within close proximity to the Proposed Development, including Brafferton, Newton Ketton, Great Stainton, Bishopton and Old Stillington village to the north.

2.4.4 An overview of key environmental designations is provided in ES Figure 2.19 (Document Reference 6.3.2.19).

2.4.5 A detailed description of the design of the Proposed Development and environmental mitigation is located in Sections 2.3 and 2.6 of this ES chapter.

2.5 Existing conditions

2.5.1 The purpose of this section is to provide an overview of the Order Limits and surrounding area. Where relevant, further information relating to each of the

environmental topics is provided in the relevant topic chapters, as well as the supporting figures and appendices.

Overview

2.5.2 For the purposes of the ES, the Proposed Development has been split into eight distinct components, as presented in Table 2-2.

Table 2-2 Components of the Proposed Development

Component	Size	Local Authority
Panel Area A: Brafferton	114.37 ha	Darlington Borough Council
Panel Area B: Hauxley Farm	52.24 ha	
Panel Area C: Byers Gill Wood	77.16 ha	
Panel Area D: Great Stainton	75.86 ha	
Panel Area E: West of Bishopton	26.63 ha	
Panel Area F: North of Bishopton	71.9 ha	
Norton Substation	11.20 ha	Stockton-on-Tees Borough Council
Underground cables	59.45 ha	▪ Darlington Borough Council ▪ Stockton-on-Tees Borough Council ▪ Durham County Council

2.5.3 The Order Limits includes the maximum extent of land necessary to deliver the Proposed Development and considers land required for the substation, solar PV modules, hybrid and inverter containers, underground cables, connection to Norton Substation, and associated infrastructure, as well as mitigation measures including biodiversity net gain, PRoW and landscape design.

Statutory and non-statutory nature conservation designations

2.5.4 There are four internationally designated sites within 10km of the Proposed Development, comprising: Teesmouth and Cleveland Coast Special Protection Area (SPA), Teesmouth and Cleveland Coast Ramsar, Teesmouth and Cleveland Coast proposed Ramsar and Thrislington Special Area of Conservation (SAC). There are six statutory designated sites within 2km of the Proposed Development, comprising four Sites of Special Scientific Interest (SSSI) and two Local Nature Reserves (LNR). Two non-statutory designated Local Wildlife Sites (LWS) are located within 1km of the Proposed Development. The nearest designated site to the Proposed Development is Newton Ketton SSSI located 100m west of Panel Area C.

2.5.5 For further information on statutory and non-statutory nature conservation designations, please refer to ES Chapter 6 Biodiversity (Document Reference 6.2.6).

Landscape designations

2.5.6 The nearest national landscape designations are Registered Parks and Gardens located approximately 5km from the Proposed Development. The nearest Area of Outstanding Natural Beauty (AONB) and National Parks are located more than 20km from the Proposed Development.

2.5.7 There are two Areas of High Landscape Value (AHLV) within 2km of the Proposed Development. The Elstob AHLV is located approximately 30m north of the Panel Area B, and the Bradbury, Preston and Mordon Carrs AHLV is located approximately 1.1km north of Panel Area A.

2.5.8 The Proposed Development is located within two local landscape character areas. Panel Areas A-D are within 6: Great Stainton Farmland and Panel Areas E and F are within 7: Bishopton Vale. Woodland, hedgerows and hedgerow trees are relatively frequent in this area and along with the undulating landform serves to constrain visibility, though there are some more elevated and open locations with wider views. The lower lying and flatter area to the east has more arable farming and is less vegetated, leading to more open views.

2.5.9 The potential cable route options connecting the on-site substation with the Norton Substation pass through character areas within the Stockton-on-Tees Borough Council Area: 1 West Stockton Rural Fringe and 3 Billingham and Thorpe Becks.

2.5.10 For further information, please refer to ES Chapter 7 Landscape and Visual (Document Reference 6.2.7).

Scheduled monuments, listed buildings and conservation areas

2.5.11 There are four Scheduled Monuments within 2km of the Proposed Development, the closest is Motte and Bailey castle, 400m south east of Bishopton (1008668). There are 10 Grade I Listed buildings and 26 Grade II* listed building within 5km, and 71 grade II listed buildings within 2km. There is also potential for as yet unknown various archaeological remains within the Order Limits.

2.5.12 Three Conservation areas are located within 2km of the Proposed Development, including Coatham Mundeville, Bishopton and Sadberge.

2.5.13 For further information, see ES Chapter 8 Cultural Heritage and Archaeology (Document Reference 6.2.8).

Public Rights of Way / Recreational resources

2.5.14 The Order Limits and its surrounds host a network of PRoW and permissive trails with other recreational and community land uses, such as golf clubs and woodland areas within the surrounding areas.

2.5.15 There are no National Cycle Network routes through the Order Limits, but the local road network is known to be used for recreational cycling.

2.5.16 For further information, see ES Chapter 9 Land Use and Socioeconomics (Document Reference 6.2.9).

Flood zones

2.5.17 The Proposed Development is located within the Tees catchment in North-East England. As the Order Limits drains to the River Tees through two main river systems; via the River Skerne to the west and the Newton Beck to the east. The topography in this area is fairly undulating, meaning the land drains to the north, south and west.

2.5.18 The Proposed Development is located mostly within Flood Zone 1, with two small areas located within Flood Zone 3 associated with Little Station Beck and Bishopton Beck in Panel Areas D and F. Flood Zone 3 is defined as an area having less than a 1 in 100 annual exceedance probability of flooding from main rivers. The flood extent associated with the Bishopton Beck is immediately adjacent to the proposed solar PV modules in Panel Area F. The Flood Zone for Little Stainton Beck indicates the flooding occurs at a sharp turn in the watercourse.

2.5.19 For further information see ES Chapter 10 Hydrology and Flood Risk (Document Reference 6.2.10).

Noise Sensitive Receptors

2.5.20 The Proposed Development is within a rural area of generally low population density, except for individual settlements such as Brafferton, Great Stainton and Bishopton; and Redmarshall and Carlton to the east. Potential noise-sensitive dwellings are located within these settlements or as more isolated properties or farms.

2.5.21 For further information see ES Chapter 11 Noise and Vibration (Document Reference 6.2.11).

Transport Network

2.5.22 There are a number of national, regional and local roads located within 1km of the Proposed Development.

2.5.23 The closest part of the Strategic Road Network (SRN) is the A1(M) to the west of Order Limits, and the A66 to the south. The Proposed Development could also be accessed via the SRN from the A19(T) to the east. The road network within and immediately adjacent to the Proposed Development consists of more local, rural roads.

2.5.24 Stockton Rail Station is approximately 3.6km east from the Order Limits. Teesside International Airport is located within 15km south of the Order Limits.

2.5.25 For further information see ES Chapter 12 Traffic and Transport (Document Reference 6.2.10).

Land quality

2.5.26 A Phase 1 Environmental and Geotechnical Desk Study (Document Reference 6.4.2.1), with site walkover, has been carried out for the Proposed Development. The assessment found that the Order Limits is currently predominantly comprised of agricultural land and an electrical sub-station, consisting of buildings, hardstanding, and electricity infrastructure, located in the eastern extent (the existing Norton substation). The Order Limits has historically been occupied by agricultural land, with the development of the electrical sub-station noted from 1938.

2.5.27 The Order Limits is predominantly underlain by Devensian Till, with Superficial Deposits in the form of Alluvial Deposits, Head Deposits, Glaciofluvial Deposits and Lacustrine Deposits are underlying the Order Limits. The bedrock stratum underlying most of the Order Limits comprises is dolomitised limestone and dolomite of the Zechstein Group. A Secondary Undifferentiated and Secondary A aquifer has been identified within the superficial deposits, with the bedrock beneath the Proposed Development classified as a Principal, Secondary A and Secondary B aquifer.

2.5.28 The preliminary assessment has not identified any potentially complete pollutant linkages comprising of organic and inorganic contaminants, and the report has identified the risk at the site to be Very Low to Low with recommended mitigation measures.

2.5.29 For further information see ES Appendix 2.1 Phase 1 Environmental and Geotechnical Desk Study (Document Reference 6.4.2.1).

2.6 Environmental mitigation design measures

2.6.1 The design of the Proposed Development has emerged as part of an iterative design process between the engineering and environmental assessment teams, as well as through statutory consultation and proactive engagement with statutory consultees, key stakeholders, and the community.

2.6.2 Throughout this design process, changes have been made and implemented into the design of the Proposed Development to avoid or reduce adverse environmental effects and to make the Proposed Development fit better into the wider landscape. These measures and changes are considered essential to the Proposed Development and are termed as ‘embedded mitigation’. Embedded mitigation relevant to each ES topic area is detailed out further below.

2.6.3 A design to show how the required environmental outcomes and objectives of that mitigation could be met is shown on ES Figure 2.20 Landscape Concept Masterplan (Document Reference 6.3.2.20).

2.6.4 Additional mitigation has then been identified in each ES topic chapter where relevant to further mitigate significant adverse effects. Opportunities for enhancement have also been identified.

2.6.5 A Mitigation Route Map (Document Reference 7.8) has been produced in support of the application, which includes a comprehensive list of all of the generic and topic specific mitigation measures secured as part of the Proposed Development.

Embedded mitigation

Climate Change

GHG emissions

2.6.6 Proposed embedded design measures which will be secured via the Outline Construction Environmental Management Plan (CEMP) (Document Reference 6.4.2.6), includes measures that are considered standard good practice to be implemented by the Principal Contractor (PC) to reduce the likelihood of impacts or their magnitude, if they were to occur. These measures, are outlined below:

- increasing recyclability by segregating construction waste to be re-used and recycled where reasonably practicable;
- adopting the Considerate Constructors Scheme (CCS) to assist in reducing pollution, including greenhouse gas emissions (GHGs), from the Proposed Development by employing good industry practice measures;
- designing, constructing and implementing the Proposed Development in such a way as to minimise the creation of waste and maximise the use of alternative materials with lower embodied carbon, such as locally sourced products and materials with a higher recycled content where feasible;
- reusing suitable infrastructure and resources already available in the Order Limits where possible to minimise the use of natural resources and unnecessary materials (e.g. reusing excavated soil for fill requirements or storing, preserving and restoring top soil);
- encouraging the use of lower carbon modes of transport by identifying and communicating local bus connections and pedestrian and cycle access routes to/ from the Proposed Development to all construction staff, and providing appropriate facilities for the safe storage of cycles;
- liaising with construction personnel for the potential to implement staff minibuses and car sharing options;
- implementing a Travel Plan to reduce the volume of construction staff and employee trips to the Proposed Development;
- switching vehicles and plant off when not in use and ensuring construction vehicles conform to current European Union (EU) emissions standards; and

- conducting regular planned maintenance of the construction plant and machinery to optimise efficiency.

Climate Change Resilience

2.6.7 Proposed climate change resilience measures which will be secured via the Outline CEMP (Document Reference 6.4.2.6) and implemented by the PC during construction include:

- using equipment's cooling systems where necessary/adapting working practices and equipment used based on current weather conditions;
- protecting workers and resources from extreme weather conditions; and
- monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways.

2.6.8 Proposed climate change resilience measures which are embedded into the design of the Proposed Development during operation include:

- BESS systems would include heating, ventilation and cooling (HVAC) systems and these would be contained within the individual equipment containers. These measures have been outlined in ES Appendix 2.12 Outline Health and Safety Plan including Battery and Fire Safety Management (Document Reference 6.4.2.12);
- where possible, all infrastructure with potential to increase flood risk is located outside of Flood Zones, and there are no permanent buildings within the Proposed Development;
- ES Appendix 10.1 Flood Risk Assessment (FRA) and Drainage Strategy (Document Reference 6.4.10.1) has included a number of adaptation measures that would be considered in the detailed design and operations management;
- there will be an 8m buffer around all mapped watercourses that cross the Proposed Development;
- monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways during maintenance activities; and
- ES Appendix 2.14 Landscape and Ecology Management Plan (LEMP) (Document Reference 6.4.2.14) outlines mitigation for landscape and habitat features impacted by low rainfall.

2.6.9 For further information, please refer to ES Chapter 5 Climate Change (Document Reference 6.2.5) and ES Appendix 5.2 CCR Assessment (Document Reference 6.4.5.2).

Biodiversity

2.6.10 Embedded design measures are needed to successfully integrate the Proposed Development within the context of the existing landscape and prevent or reduce any adverse effects on ecological features.

2.6.11 The Proposed Development has been designed so that impacts upon important habitats (comprising woodland, field margins, hedgerows and ponds) are avoided where reasonably practicable, and compensated for where not, through the retention of existing habitat and the creation or replacement of habitat. Revised layouts have enabled the retention of woodland and the majority of hedgerows and associated trees. Design iterations have also sought to avoid some areas where nesting lapwing and curlew were recorded and areas where geese and other wildfowl were recorded in the winter.

2.6.12 Proposed embedded design measures which will be secured via the Outline CEMP (Document Reference 6.4.2.6), Outline LEMP (Document Reference 6.4.2.14) and Outline DEMP (Document Reference 6.4.2.7) include the following:

2.6.13 Construction and decommissioning:

- Best practice measures to control noise, light, vibration, and airborne and waterborne pollutants, including measures intended to avoid or minimise impacts on habitats on and offsite and on nearby designated sites.
- An Invasive Plant Species (INNS) Method Statement to detail measures to minimise the risk of spreading the Himalayan balsam along Bishopton Beck.
- The appointment of an Ecological Clerk of Works (ECoW) during construction to advise on protecting valued biodiversity features and provide practical, site-specific and proportionate advice on how to achieve compliance with environmental legislation.
- Pre-construction surveys in advance of works to reconfirm the ecological baseline and identify any new ecological risk. This would be completed sufficiently in advance of any works to allow for the completion of any additional seasonal surveys, if required.
- A Species Protection Plan (SPP) which will be a live document subject to review and updating and will assist site personnel in the protection of species during construction, under the guidance of the Ecological Clerk of Works.
- Clearance of vegetation of potential value to nesting birds will be completed outside of the bird-breeding season (considered to be between mid-February and August inclusive). Where this is not possible, vegetation would be inspected/surveyed by the Ecological Clerk of Works immediately before clearance (i.e. within 24 hours of clearance works). Any active nests would be given an appropriate disturbance buffer for that species with work only allowed to take place within this buffer once the project ecologist has confirmed any young have fully fledged and left the nest.
- Pre-construction checks on trees to be felled in order to determine its current bat roost potential. If found to have potential to support roosting bats, suitable surveys would be carried out, as described in good practice survey guidelines [8].
- Hedgerows, tree lines, ditches and trees including the tree RPA are to be protected where possible during construction through the use of suitable buffers and/or fencing.
- Should ground clearance of habitat suitable for amphibian and reptiles be required then this should be undertake at the right time of year to avoid the hibernation period of amphibians - i.e. avoid the period: October to March. The Ecological Clerk of Works would supervise works and relocate any reptiles/amphibians found.

- Any removal of reptile hibernacula (not anticipated) should be done in the summer months (April to September).
- The majority of the terrestrial habitat for Great Crested Newt (GCN) within the Proposed Development was considered either suboptimal or unsuitable with the majority of suitable habitat to be retained, with no ponds to be removed. As there remains a possibility that GCN might be present in low numbers or might enter the construction area, an application for a Natural England District Level Licence (DLL) for GCN will be made. The terms of this licence will include an appropriate payment to be determined by Natural England to further the enhancement of GCN in the region.
- For mobile species such as badger, pre-construction surveys will be required to check the status of the setts identified and to locate any new active setts that would need to be protected. The design of badger access points within the security fencing such as their location and frequency will be based on baseline data and pre-construction surveys and designed by a suitably qualified ecologist in badger ecology.
- Badger setts recorded within the Proposed Development were mainly located within hedgerows or woodland along the edge of the Order Limits. It is anticipated that sett closure will not be required, with any setts recorded to be protected from direct impacts by maintaining a suitable standoff distance measured from professional judgement from existing setts and micrositing equipment and the security fence if required. Furthermore, any exposed trenches or holes are to be covered up when contractors are off site (i.e. at night time) or a slope provided to allow any trapped badgers a safe exit. Security fencing used around the Panel Areas will have badger access points allowing continued movement across the Proposed Development.
- All works in proximity to waterbodies/watercourses should follow measures outlined in a CEMP to ensure their complete protection against pollution, silting and erosion.
- It is anticipated that the majority of works will take place 10m away from watercourses/waterbodies. A small number of small tributaries will be crossed by the proposed cable route corridor. At these watercourse crossings HDD will be used. Where works will be within 10m of a watercourse/waterbodies, such as at watercourse crossings, measures outlined in the CEMP will mitigate potential impacts on water quality. Furthermore, pre-construction surveys to be carried out to check for signs of water vole within 10m of works and otter presence within 200m of works.
- No nighttime work is to take place within 30 m of watercourses/waterbodies (the period when otters are most active).
- All boundary features and other features such as larger hedgerows with trees and woodland edge that are of value to foraging bats will be retained, with it predicated that only small sections of poor-quality hedgerow will be removed to accommodate the grid connection cables and access routes. Where possible and practical, construction access and cabling will use existing field entrances and HDD will install the cables under hedgerows.
- Maintenance of appropriate buffers between Solar PV modules and trees with potential bat roost trees with potential roost features (PRF), which will be protected during development, in line with British Standard BS 5837: Trees in relation to design, demolition and construction by establishing a Construction Exclusion Zone (CEZ) around their Root

Protection Areas (RPA). Details of buffers for trees can be found in Appendix 7.5 Arboricultural Impact Assessment (Document Reference 6.4.7.5).

- Perimeter security fencing will be implemented early in the construction phase. The fence design will be around individual Panel Areas, to allow the movement of large mammals such as deer through the landscape along retained hedgerow margins.
- Perimeter security fencing to include badger access points placed in the fencing in strategic locations to allow badgers and other small mammals, such as hares access into Panel Areas. The number of badger access points will be determined after preconstruction surveys. A suitable qualified ecologist knowledgeable in badger ecology will determine the number and location of badger access points within the security fencing. These badger access points should be in place the same day the fencing is installed.
- Regular checks of fencing will occur to ensure no deer or other large mammals have become trapped and badger access points remain operational.

2.6.14 Operation:

- Mitigation for the loss of ground nesting habitat for birds and foraging habitat for birds and bats through the provision of eight land parcels currently used for intensive agriculture to be used for biodiversity enhancement, with no Solar PV modules proposed within these areas. In addition, two large fields to the north of Bishopton will also remain free of Solar PV modules to be maintained with low maintenance grass rich sward ensuring continued availability of open ground for ground nesting birds such as curlew and lapwing.
- The establishment of a network of new and improved native-species-rich hedgerows with hedgerow trees to increase biodiversity across the Order. Limits. Existing hedgerows will be enhanced with planting along defunct hedgerows where landscape concerns suggest it is effective mitigation. Only native species will be planted along these hedgerows.
- Field margins between the boundary hedgerows and the security fencing will be enhanced in line with three options and managed accordingly: provision of winter wild bird food (sowing with specific wild bird winter food), provision of rough grass margins (sowing with tussock forming grass species), and provision of flower rich margins (sowing with a wildflower seed). It is anticipated that a third of the total length of margins will be given over to each treatment.
- Area underneath panels to be sown with a low maintenance grassland while between panels and to margins they will be sown with legume rich herbal ley/wildflora mixes, this aims to improve soil health and insect diversity such as pollinators to improved foraging habitat for species such as birds and bats. To be Land under and between Panel Areas will be sown with either a legume rich mix or a flower rich grassland mix and managed accordingly with either a light cutting or grazing regime in late autumn (August onwards) to maintain the vegetation.
- Provision of boxes to increase the opportunities for roosting bats and nesting birds such as barn owl (Tyto alba).
- Hedgerow creation and enhancement with a forecast length of approximately 12km and 29km, respectively.
- The Proposed Development is anticipated to provide a biodiversity net gain of 88% for habitat units and 108 % of hedgerow habitats, in line with the detailed design.

- Maintenance of 10 m buffers between Solar PV modules and riparian boundaries and watercourses.
- Maintenance of 8 m buffers (3m from hedgerows to security fencing and 5m from security fencing to Solar Cells) between Solar PV modules and hedges to retain foraging and commuting corridors for bats.
- Reduced cutting (flailing) along existing hedgerows to benefit nesting birds and invertebrates.
- Lighting will be limited to the construction period with occasional lighting required for maintenance works during operation, which will not be a permanent fixture. Lighting will conform to best practice guidelines [2] with respect to minimising light spill into adjacent habitats and prevent disturbance to bats and other species during construction and operation. Lighting will be minimised to that required for safe site operations. Where lighting is required, it will be directed toward the middle of the working area and will utilise directional fittings to minimise outward light spill and glare, preferably at an angle greater than 20 degrees from the horizontal).

2.6.15 For further information, please refer to ES Chapter 6 Biodiversity (Document Reference 6.2.6).

Landscape and visual

2.6.16 Embedded design measures are needed to successfully integrate the Proposed Development within the context of the existing landscape and prevent or reduce any adverse effects the landscape.

2.6.17 During construction the following physical measures will be ensured via the Outline CEMP (Document Reference 6.4.2.6):

- A pre-commencement survey of vegetation prior to construction should be undertaken to establish the extent to which any vegetation removal may be needed and identify required protection zones.
- Protect and retain existing trees and vegetation via construction exclusion zones and tree protective fencing.
- Temporary site lighting during construction required to enable safe working during hours of darkness will be designed as far as reasonably practical so as not to cause a nuisance outside of the Proposed Development. Standard best practice measures will be employed to minimise light spill, including glare.

2.6.18 ES Figure 2.20 Landscape Concept Masterplan (Document Reference 6.3.2.20) details the proposed planting and landscaping for the Proposed Development. Proposed embedded design measures which will be secured via the Outline LEMP (Document Reference 6.4.2.14) and design parameters of the Design Approach Document (Document Reference 7.2) include the following:

- Reductions to the extent of the Panel Areas to mitigate effects on villages and views from homes – with particular consideration of the opportunities provided by topographic and vegetative screening.

- Planting of tree lines along northern boundaries of the Panel Areas to reduce visibility where this can be achieved without shading panels by tree canopies.
- Re-routing of footpaths that would pass through panel areas, so that routes would only have initially open views of solar panels to one side, and an established field boundary on the other.
- New hedgerow planting where existing hedgerows are sparse or where the Panel Area edge does not coincide with an existing field boundary.
- The proposed community orchard adjacent to Bishopton recreation ground and school to provide both mitigation and a community facility.
- Limiting the height of the solar PV modules to 3.5m in height;
- Excluding solar PV modules from areas close to homes to mitigate potential effects on residential visual amenity and from some parts of the Panel Areas in order to mitigate effects on the views from and character of Brafferton, Bishopton and Great Stainton;
- Proposed perimeter fencing would be a deer fence, with a maximum height of 2m in order to present an appearance that is appropriate to the rural context;
- CCTV columns would be placed between the fencing and the solar PV modules, and oriented to look along the gap rather than beyond the Panel Areas. These CCTV columns would be no more than 3m in height;
- Access tracks and cable routes would be located to pass through existing gates and gaps in hedgerows where feasible, to avoid the need for removal of trees of hedges;
- Inverters and batteries would be approximately 3m in height and would be finished in grey; these would be located amongst the solar PV modules throughout the Panel Areas; and
- The substation would be no more than 8m in height with the exception of the communications mast which would be up to 15m. It would be screened by Square Wood and proposed planting as shown in ES Figure 2.20 (Document Reference 6.3.2.20).

2.6.19 Components of the Proposed Development required for the operation of the Proposed Development, including access tracks, would be removed during decommissioning. Changes to the routes of PRoW would not be time limited and would remain in place post-operation. Permissive rights of way and vegetation within the Panel Areas would revert to the management of the landowner.

2.6.20 For further information, please refer to ES Chapter 7 Landscape and Visual (Document Reference 6.2.7).

Cultural heritage and archaeology

2.6.21 For cultural heritage and archaeology, the primary design consideration for physical impacts to any known or potential archaeological remains is avoidance. This principle has been applied across the Proposed Development which included the alteration of the Order Limits to avoid impacts.

2.6.22 The embedded mitigation comprises design methods specifically selected to remove any below ground impacts entirely, thus removing any potentially likely significant effect to any buried archaeological remains. This is achieved through the use of above ground foundations and is proposed where areas of significant archaeology have been identified during the Phase 1 evaluation trenching. This methodology will also be applied in any areas identified during the Phase 2 evaluation trenching where significant archaeology is encountered. The methodology and areas where mitigation is to be applied are set out within ES Appendix 8.5 Archaeological Management Strategy (AMS) (Document Reference 6.4.8.5).

2.6.23 A continued flexible design process will be applied to the detailed design for the Proposed Development. This response is required in response to the nature of archaeological remains and the possibility for either known or unknown remains to be of sufficient heritage significance to warrant preservation in situ.

2.6.24 The application of these methods has been applied in agreement with the Archaeological curators.

2.6.25 Where such methods are to be applied, these are included within ES Appendix 8.5 AMS (Document Reference 6.4.8.4), or as part of a later detailed WSI guided as secured via requirement 18 of the DCO (Document Reference 3.1).

2.6.26 In relation to potential indirect impacts to designated heritage assets through a change in setting, the design process has been collaborative across the environmental disciplines to ensure a joined up and holistic approach to minimising, and removing entirely where possible, any adverse environmental effects.

2.6.27 For cultural heritage, this has concentrated on the enhancement of field boundaries which provide screening between the Proposed Development and the surrounding landscape. In collaboration with the landscape and visual impact assessment team, where existing boundaries are less than complete these have been noted for enhancement while where large gaps have been identified, these are proposed to be filled with new planting.

2.6.28 Tree and hedgerow planting will be used across the Order Limits which will significantly reduce ground level visibility of any panels, although this cannot provide full screening of the Proposed Development across the entire landscape and some visibility will remain.

2.6.29 For further information, please refer to ES Chapter 8 Cultural Heritage and Archaeology (Document Reference 6.2.8).

Land Use and socio-economics

2.6.30 The Proposed Development has been designed to avoid, eliminate or reduce potential impacts wherever possible, with certain mitigation embedded into the design. That mitigation has therefore been considered as part of this assessment.

2.6.31 A PRoW Management Plan will be in place to set out how PRoWs would be managed to ensure they remain safe to use, and disruption to users of the PRoW is minimised. An Outline Public Rights of Way Management Plan (Document Reference 6.4.2.15) sets a mitigation hierarchy for construction and decommissioning of the Proposed Development, as well as confirming the proposed embedded mitigation as shown on the Access and Rights of Way Plans (Document Reference 2.3). Measures include managing short-term closures of PRoW with minimal localised diversions where possible, and rerouting of PRoW where permanent diversions are required. As part of this, it is particularly important to highlight the proposed addition of permissive trails throughout the Order Limits, enabling a more cohesive PRoW network.

2.6.32 Through the design of the Proposed Development, it is also ensured that continued access will be provided to recreational and community facilities. This commitment will be secured via the Outline Construction Traffic Management Plan (CTMP) (Document Reference 6.4.2.8).

2.6.33 Additionally, built structures such as access tracks, substations and compounds that would require soil stripping and disturbance have been directed toward the lower quality land available (that in Subgrade 3b quality), in order to avoid potential disturbance to BMV quality agricultural land. These elements would require only 0.2ha of Subgrade 3a BMV land, primarily for access tracks. Management of soils during the Proposed Development is considered further through the Outline Soil Resources Management Plan (Document Reference 6.4.2.12).

2.6.34 For further information, please refer to ES Chapter 9 Land Use and Socioeconomics (Document Reference 6.2.9).

Hydrology and flood risk

2.6.35 Mitigation measures have been designed into the Proposed Development to reduce effects in relation to hydrology and flood risk, and a number construction and operation mitigation measures have been considered.

2.6.36 Proposed embedded measures which will be secured via the Outline CEMP (Document Reference 6.4.2.6) includes measures that are considered standard good practice to be implemented by the contractor to reduce the likelihood of impacts or their magnitude, if they were to occur. These measures, and the proposed supporting monitoring plans, are outlined below.

2.6.37 A Construction Surface Water Management Plan (CSWMP) would be produced prior to construction. This would identify any risks to surface water and how they would be

managed and monitored through construction. The production of a CSWMP will be secured via requirement 4 of the DCO (Document Reference 3.1). The outline principles of this plan can be found in the Outline CEMP (Document Reference 6.4.2.6).

2.6.38 The design of new watercourse crossings will be agreed with the Lead Local Flood Authority prior to construction. Guidance on the sizing, design and construction of the crossings will be taken from the CIRIA Culvert Design and Operation Guide [3]. The crossings will be designed to ensure they do not disconnect the watercourses at times of low flow and will be designed with appropriate freeboard for flood flow capacity. They will be designed to ensure fish and mammal movement is not restricted, increased erosion will not occur and have a buried invert so the natural bed formation remains in situ.

Runoff and sediment management control

2.6.39 The following measures would be used to mitigate any potential impacts on the water quality of the sub-catchments through erosion during construction:

- sediment control measures (silt fences, settlement/attenuation ponds etc.) would be used in the vicinity of watercourses, springs or drains where natural features (e.g. hollows) do not provide adequate protection;
- trenching or excavation activities in open land would cease during periods of intense rainfall and temporary bunding would be provided as required, to reduce the risk of sediment transport to the natural drainage system;
- permanent relocation or longer term storage of soils would be re-instated with vegetation as soon as practicable;
- the movement of construction traffic would be controlled to minimise soil compaction and disturbance. Vehicle movements (to include HGVs and plant machinery) outside the defined tracks and hardstanding areas would be avoided where possible;
- areas of temporary tracks would be completed as soon as possible and surfaced appropriately to protect soils from runoff. Temporary fences or markers should be used to ensure minimal disturbance of the surrounding land;
- wheel washing would be undertaken in designated areas only and sediment control measures would be used to ensure runoff from these areas would not enter directly into water courses; and
- no construction activities will take place within the watercourse buffer zones.

Construction pollution prevention, water quality monitoring, and emergency response plan

2.6.40 The potential impact on the water quality of the sub catchments draining the Order Limits through chemical pollution, would be mitigated through the implementation of ES

Appendix 10.1 FRA and Drainage Strategy (Document Reference 6.4.10.1)), including the following pollution control measures:

- equipment would be provided to contain and clean up any spills to minimise the risk of pollutants entering the watercourses or surface water features;
- trenching or excavation activities in open land would cease during periods of intense rainfall;
- refuelling of vehicles and plant machinery (if required) would be confined to the designated fuelling areas and would be carefully controlled and placed away from areas with high groundwater dependency and outside watercourse buffers;
- vehicles, plant machinery and equipment would be cleaned at designated washout areas located conveniently and within a controlled area of the Proposed Development;
- all fuel and chemicals would be stored within appropriately specified containers and within specifically designed stores / storage areas and would include appropriate measures to avoid spillages in line with the relevant legislation;
- drip trays would be placed under standing machinery;
- all solid and liquid waste materials would be properly disposed of in controlled landfill sites away from the site;
- routine mechanical maintenance of vehicles would be carried out off-site or in a suitable designated area of the Proposed Development; and
- there would be no unapproved discharge of foul or contaminated drainage from the Order Limits either to groundwater or any surface waters, whether direct or via soakaway.

2.6.41 Proposed embedded design measures during operation include:

- an 8m buffer zone has been designed around the perimeter of watercourses within the Order Limits for pollution and erosion control. Infrastructure has been offset 2m from the fencing such that it is approximately 10m away from the watercourse. Vegetation that will grow around this perimeter zone will increase infiltration, act to slow down surface water runoff and filter out sediment;
- where possible, building in areas at a fluvial flood risk has been avoided and critical infrastructure (including substation and electrical switchgear) has been located outside of flood zones. Where tracks are located within the fluvial flood zone they will remain at grade to ensure there is no loss of flood plain and panels will be raised above the 1 in 1000 year flood depth. No buildings such as the BESS, inverters, transformers, and sub-station have been situated within the fluvial flood zones so there has been no loss of flood storage;
- all access tracks will be permeable to allow water to filtrate through and to maintain greenfield runoff rates. The small impermeable areas will have an apron of clean crushed stone to promote natural land drainage conditions in the vicinity of

the structures. The apron will be at least 1m wide beyond the structure footprint with a depth of at least 300mm consisting of 40-70mm crushed stone. This is common practice for solar farm developments across the UK and deemed an appropriate measure to account for the introduction of a small impermeable area in a rural location; and

- the proposed solar PV module pile depth will be 1.0m, therefore subsurface infrastructure will not interact with the water table.

2.6.42 ES Appendix 10.1 Flood Risk Assessment and Drainage Strategy (Document Reference 6.4.10.1) has also outlined the following embedded mitigation measures:

- No critical infrastructure to be placed within the mapped fluvial and pluvial flood zones
- Solar panels will be raised sufficiently above the 1.0% AEP flood level and not impede overland flow routes.
- Compliance / implementation of the Drainage Strategy.
- New landscaping will improve upon existing arable farmland by intercepting runoff and promoting natural sedimentation, filtration and infiltration.
- Ancillary infrastructure will be surrounded by a crushed stone apron consisting of clean 40-70mm stone to promote natural land drainage conditions locally.

2.6.43 For further information on mitigation measures, please refer to ES Chapter 10 Hydrology and Flood Risk (Document Reference 6.2.10).

Noise and vibration

2.6.44 Inverters and any other sources of noise associated with the operational phase of the Proposed Development have been located as far as reasonably possible to a minimum of 300m from existing sensitive receptors, within the design, to minimise potential noise levels at the receptors. The inverters will also be housed within containers which will further reduce the noise levels at source. This is secured via the design principles detailed in the Design Approach Document (Document Reference 7.2)

2.6.45 It is proposed that any potential noise and vibration impacts are managed through the implementation of mitigation and management measures through the CEMP. Travel planning and HGV management mitigation measures during the construction stage will be incorporated into a CTMP.

2.6.46 ES Appendix 2.6 Outline CEMP (Document Reference 6.4.2.6) outlines the environmental and ecological mitigation measures to be implemented during the construction phase. This includes the appointment of an Environmental Clerk of Works to advise and supervise the mitigation measures outlined in the CEMP. The measures outlined in the Outline CEMP will be carried forward to a CEMP, which will be produced by the appointed PC and agreed with the relevant local planning authorities prior to construction.

2.6.47 Measures to control noise as defined in Annex B of BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites - Part 1: Noise' and measures to control vibration as defined in Section 8 of BS 5228:2009+A1:2014 'Part 2: Vibration' will be adopted where reasonably practicable. These measures represent 'Best Practicable Means' (BPM) (as defined by section 72 of the COPA 1974) to manage noise and vibration emissions from construction activities and are secured via the Outline CEMP (Document Reference 6.4.2.6)

2.6.48 ES Appendix 2.8 Outline Construction Traffic Management Plan (CTMP) (Document Reference 6.4.2.8) includes details on construction logistics and construction worker travel that includes information to guide the delivery of material, plant, equipment and staff during the construction phase.

2.6.49 During decommissioning, the contractor will ensure that the impacts from decommissioning traffic on the local community (including local residents and businesses and users of the surrounding transport network) are minimised, where reasonably practicable. Requirements will be agreed with the local authority at the time of decommissioning.

2.6.50 For further information, please refer to ES Chapter 11 Noise and Vibration (Document Reference 6.2.11).

Traffic and transport

2.6.51 A CTMP will be produced as part of the construction phase to minimise any negative environmental impacts. ES Appendix 2.8 Outline CTMP (Document Reference 6.4.2.8) has been submitted with the DCO application. Measures include:

- The proposed access arrangements for construction traffic across the construction programme;
- The access arrangements for construction vehicles and staff;
- The management of vehicles on-site;
- The location of any wheel wash facilities;
- Measures to ensure the transportation of construction materials and waste is managed as sustainably as possible;
- The scheduling of construction material and logistics traffic movements on the LRN and SRN outside of peak hours and to use designated routes into construction sites;
- The consolidation of construction worker trips if possible;
- Detail of cooperation with the Distribution Network Operator (DNO), during the works to enable connection at Norton Substation, to minimise potential cumulative effects of such works being carried out;

- Measures to implement temporary construction compounds within each site to reduce the impact of vehicle deliveries and turning movements on the LRN; and
- Any other mitigation required to minimise the impact of construction traffic on the transport network.

2.6.52 During decommissioning, the contractor will ensure that the impacts from decommissioning traffic on the local community (including local residents and businesses and users of the surrounding transport network) are minimised, where reasonably practicable. Requirements will be agreed with the local authority at the time of decommissioning.

2.6.53 For further information, please refer to ES Chapter 12 Traffic and Transport (Document Reference 6.2.12).

2.7 Management plans

2.7.1 A key control in limiting impacts upon the environment from the Proposed Development include a suite of management plans which will be in place throughout construction, operation and decommissioning. These are explained further in their relevant stage below, however at a broad level include those set out in Table 2-3.

2.7.2 Some of the management plans are not specific to a single stage and instead include measures across the construction, operation and decommissioning phases. These include:

- ES Appendix 7.7 Arboricultural Impact Assessment (AIA) (Document Reference 6.4.7.7);
- ES Appendix 2.14 LEMP (Document Reference 6.4.2.14); and
- ES Appendix 2.15 Outline PRoW Management Plan (Document Reference 6.4.2.15).

Arboricultural Impact Assessment

2.7.3 ES Appendix 7.7 AIA (Document Reference 6.4.7.7) sets out the impacts on trees, woodlands and hedges and sets out the protection measures to be implemented during the construction phase, including activity supervision by a suitably qualified arboriculturist where appropriate.

Landscape and Ecology Management Plan

2.7.4 The management of the landscape and ecological features will be undertaken in accordance with ES Appendix 2.14 Outline LEMP (Document Reference 6.4.2.14) that is secured via requirement 12 of the DCO (Document Reference 3.1).

Outline PRoW Management Plan

2.7.5 ES Appendix 2.15 Outline PRoW Management Plan (Document Reference 6.4.2.15) describes where PRoWs are crossed by the Proposed Development and how PRoWs would be managed to ensure they remain safe to use, and disruption to users of the PRoW is minimised.

Table 2-3 Management plans

Management Plan	Purpose	Stage	Document reference
Outline Construction Environmental Management Plan (CEMP)	Sets out how negative environmental impacts will be minimised during construction.	▪ Construction	ES Appendix 2.6 (Document Reference 6.4.2.6)
Outline Construction Traffic Management Plan (CTMP)	Sets out how construction traffic and staff vehicles will be managed during construction.	▪ Construction	ES Appendix 2.8 (Document Reference 6.4.2.8)
Outline Pollution and Spillage Response Plan	Sets out methods to manage pollution and spillage incidents on site during construction.	▪ Construction ▪ Operation ▪ Decommissioning	ES Appendix 2.9 (Document Reference 6.4.2.10)
Outline Materials Management Plan (MMP)	Sets out how excavated materials that will be generated in the course of constructing the Proposed Development will be re-used in a manner that is compatible with the Waste Framework Directive and associated regulations.	▪ Construction	ES Appendix 2.10 (Document Reference 6.4.2.10)
Outline Site Waste Management Plan (SWMP)	Sets out how the Proposed Development will manage resources efficiently, and measures to prevent and minimise waste.	▪ Construction	ES Appendix 2.11 (Document Reference 6.4.2.11)
Outline Soil Resources Management Plan (SRMP)	Sets out the overall approach to managing soil resources affected by the Proposed Development.	▪ Construction	ES Appendix 2.12 (Document Reference 6.4.2.12)
Archaeological Management Strategy (AMS)	Sets out how archaeological remains, both known and currently unknown, will be managed during construction.	▪ Construction	ES Appendix 8.5 (Document Reference 6.4.8.5)
Outline Battery Fire Safety Management Plan (BFSMP)	Sets out the key measures to minimising the chances of a battery fire event and fire spread in the event of a fire. Sets out the proposed operational response to a fire event.	▪ Operation	ES Appendix 2.13 (Document Reference 6.4.2.13)

Management Plan	Purpose	Stage	Document reference
Outline Landscape and Ecological Management Plan (LEMP)	Sets out the management of the landscape and ecological features of the Proposed Development.	▪ Construction ▪ Operation ▪ Decommissioning	ES Appendix 2.14 (Document Reference 6.4.2.14)
Outline Public Rights of Way (PRoW) Management Plan	Sets out how PRoWs would be managed to ensure they remain safe to use, and disruption to users of the PRoW is minimised.	▪ Construction ▪ Operation ▪ Decommissioning	ES Appendix 2.15 (Document Reference 6.4.2.15)
Arboricultural Impact Assessment (AIA)	Sets out the protection measures to be implemented during the construction phase, including activity supervision by a suitably qualified arboriculturist where appropriate.	▪ Construction	ES Appendix 7.7 (Document Reference 6.4.7.7)
Outline Decommissioning Environmental Management Plan (DEMP)	Sets out how negative environmental impacts will be minimised decommissioning.	▪ Decommissioning	ES Appendix 2.7 (Document Reference 6.4.2.7)

Construction and Operation

2.7.6 This section of the ES considers the potential methodologies to construct and operate the Proposed Development.

Construction Programme

2.7.7 It would take approximately 12-18 months to construct the Proposed Development all at once, or 18-24 months to undertake the construction of each Panel Area in phases following the granting of the DCO application.

2.7.8 Table 2-4 presents the worst case construction programme that has been assessed within ES Chapters 5 to 12 (Document Reference 6.2.5 to 6.2.12), in accordance with the design parameter approach as set out in Section 2.2.

Table 2-4 Construction programme worst case for topic chapters

Topic chapter	Construction programme assessment scenario	Notes
Chapter 5 Climate Change (Document Reference 6.2.5)	18-24 months to construct the Proposed Development.	It is considered that a longer construction programme would result in a larger generation of GHG emissions. However neither scenario would change the outcome of significance.
Chapter 6 Biodiversity (Document Reference 6.2.6)	Both scenarios are assessed.	Impacts would be very similar; neither construction programme is considered to be 'worst case', therefore the biodiversity assessment considers both.
Chapter 7 Landscape and Visual (Document Reference 6.2.7)	Both scenarios are assessed.	Neither construction programme is considered to be 'worst case', therefore the Landscape and Visual assessment considers both.
Chapter 8 Cultural Heritage and Archaeology (Document Reference 6.2.8)	Programme length not relevant to assessment.	All archaeological work will be undertaken pre-commencement or as monitoring during construction. This is not affected by the length of time required.
Chapter 9 Land Use and Socio-economics (Document Reference 6.2.9)	12-18 months for socioeconomic and PRoW receptors. Neutral in terms of agricultural land and soils.	With regards to socioeconomic and PRoW, the shorter construction programme would result in a more intense set of effects due to an increased amount of construction activity limiting a higher number of access points at one time. The construction start date is the relevant parameter for the agricultural land assessment rather than the duration of construction.
Chapter 10 Hydrology and Flood Risk (Document Reference 6.2.10)	12-18 months to construct the Proposed Development.	Implementing and keeping on top of mitigations such as those related to sediment control is more demanding over a larger area and would also result in a larger amount of exposed earth at any one time.
Chapter 11 Noise and Vibration (Document Reference 6.2.11)	Both scenarios are assessed.	Neither are worse case as the periods of construction near to individual receptors would be the same
Chapter 12 Traffic and Transport (Document Reference 6.2.12)	Both scenarios are assessed.	The Traffic and Transport assessment is based on a worst case scenario on one day where all three Panel Areas are being constructed at once.

2.7.9 The final programme will be dependent on the detailed layout design and potential environmental constraints on the timing of construction activities.

2.7.10 The installation of solar PV modules does not involve any complex construction process or practices and therefore risk of delay beyond the programme is to be included within the ES and would largely be driven by adverse weather conditions. Many component parts of the Proposed Development would arrive on-site ready to be installed. It is anticipated that two Abnormal Indivisible Loads (AILs) would be required to enable construction of the on-site substation. This would be a weight-based abnormal load of 70 tonnes and is considered in ES Chapter 12 Traffic and Transport (Document Reference 6.2.12).

Construction Activities

2.7.11 The activities that are likely to be required for the construction of the Proposed Development are outlined below and it is anticipated that these activities would take place over several key stages.

2.7.12 The stages of construction for a typical panel area are set out below with broad estimates for the time taken for each stage. At maximum, there would be three teams working on different Panel Areas simultaneously.

2.7.13 The typical stages of the construction of each Panel Area with approximate timing is set out in Table 2-5 below:

Table 2-5 Construction stages of each Panel Area

Stage	Description	Approximate time frames
Stage 1	Enabling / Preparatory works Mobilisation; and Enabling works.	2 months
Stage 2	Foundations	4-5 months
Stage 3	Module delivery and installation	
Stage 4	Commissioning	2 months
Stage 5	Site Reinstatement and Habitat Creation	

Construction Staff and hours of work

2.7.14 Working hours during the construction phase would be 08.00-18.00 Monday to Friday, 08.00-14.00 Saturday with no activities on Sunday or Bank/Public Holidays. It is anticipated there would be around 30 – 50 staff working on each panel area on average. During Stage 3 this could peak to 100 workers per site for a limited period of time.

Plant and site access

2.7.15 It is anticipated that the principal plant required to install the solar PV modules would include:

- excavator;
- mobile crane;
- crawled Dozer;

- push press piling rig;
- power generator;
- telehandler;
- truck; and
- vibrating roller.

2.7.16 Access into each of the Panel Areas would be required to facilitate construction, as well as allowing ongoing maintenance access from the local highway network. Access points are proposed from existing accesses wherever possible as shown in ES Figure 2.21 (Document Reference 6.3.12.1) and summarised in Table 2-5.

Table 2-6 Proposed Access Points

Panel area	Access Points
Panel Area A: Brafferton	High House Lane Unnamed farm tracks off Brafferton Lane
Panel Area B: Hauxley Farm	Unnamed farm tracks off Lodge Lane
Panel Area C: Byers Gill Wood	Bishopton Lane / Elstob Lane
Panel Area D: Great Stainton	Elstob Lane Unnamed road off The Green
Panel Area E: West of Bishopton	Unnamed road off The Green
Panel Area F: North of Bishopton	Unnamed road off The Green and existing farm tracks Mill Lane from Bishopton
Norton Substation	Existing access from Letch Lane
Underground cables	To be accessed from within Panel Areas and work undertaken along the cable route. Ongoing access would only be required should a problem occur.

Construction compounds

2.7.17 One compound would be required in each Panel Area for the construction of the Proposed Development, with access via the access points as detailed in Table 2-5. This would mean that construction activities and the use of the compound in each Panel Area is kept to a shorter period of time when compared to all construction activities being based from a single, main compound. A plan which presents the access tracks and construction compounds is provided in ES Figure 2.21 (Document Reference 6.3.2.21).

2.7.18 Compounds would typically measure 60m in length and 30m in width. A 'Durabase Mat System' or a similar non-ground penetrating mat system would be used within the compounds.

2.7.19 The temporary construction compounds would contain construction worker welfare facilities, a site office, limited parking, wheel wash area, plant and machinery storage, Heavy Goods Vehicle (HGV) / delivery turning area and waste storage areas. A typical layout of a compound is shown on ES Figure 2.21 (Document Reference 6.3.2.21)

2.7.20 For security and safety purposes, any live construction areas would be closed to the public throughout the construction phase. Site security staff would patrol the site in addition to hazard warning signs and CCTV.

Waste management

2.7.21 The Proposed Development is likely to generate waste comprising of general construction waste, including packaging waste from materials, and construction materials from access roads and supporting infrastructure. During operation, it is anticipated that waste generation would be minimal. Waste from the decommissioning of the Proposed Development would be disposed of responsibly and undertaken in alignment with the future principles of recycling available at that time. Construction, operation and decommissioning of the Proposed Development is therefore expected to generate minimal waste arisings.

2.7.22 An assessment of likely waste arisings from the Proposed Development is provided in ES Appendix 2.3 (Document Reference 6.4.2.3). Measures to reduce impacts from waste management are included within ES Appendix 2.6 Outline CEMP (Document Reference 6.4.2.6). ES Appendix 2.11 Outline Site Waste Management Plan (SWMP) (Document Reference 6.4.2.11) sets out how resources and waste will be controlled during the construction stage.

Construction lighting and energy use

2.7.23 Temporary construction lighting would be intermittently used throughout the construction phase for select operations in isolated locations only at the construction compounds. Construction lighting may be used within the Panel Areas during night time hours in the winter if works require this.

Stage 1 Enabling/Preparatory Works

2.7.24 Preparatory works would be the first stage of construction and includes activities to enable and prepare the site for the construction of the Proposed Development. The types of activities that may be required during this stage are likely to include:

- establishment of and / or works to site access point(s);
- installation of any temporary / permanent culverts under water courses / ditches;
- ground clearance activities;
- construction of any access tracks and laydown areas with the Panel Areas - this will be one of the first items within the construction programme to ensure that the

majority of the construction traffic enters the Panel Areas from their new access points;

- establishment of construction compounds at each Panel Area;
- establishment of mobilisation areas, running tracks and temporary construction compounds for cable installation;
- erection of security fencing around the site perimeter, as well as access gates;
- installation of security measures such as CCTV;
- delivery of plant and machinery to site; and
- delivery of materials to enable first stages of construction.

2.7.25 There are multiple utilities crossing the Order Limits, including high pressure gas mains, water pipes, telecoms cables, electrical cables and drainage. Prior to construction, the design team and PC will review the utilities plans and use them to inform the plans for the proposed works to ensure all known utilities are avoided. Necessary offsets to known assets have been taken into account within the current design. An assessment of impacts on utilities is included in ES Appendix 2.5 Major Accidents and Disasters Assessment (Document Reference 6.4.2.5).

Stages 2 and 3 Construction of Byers Gill Solar

2.7.26 Following the preparatory works, construction of the Proposed Development would commence, including foundations, and module delivery and installation.

2.7.27 The types of activities that may be required during these stages are likely to include:

- solar PV module installation;
- installation of solar PV module support structures;
- mounting of solar PV modules;
- installation of supporting infrastructure, such as inverters, transformers, battery stations and switchgear;
- installation of the BESS;
- construction of the on-site substation;
- installation of storage containers;
- cable installation;
- site clearance activities such as stripping of topsoil, trenching (if required), storage and capping of soil;
- installation of construction drainage with pumping (if required);
- installation of cabling across the solar PV module areas and connection to the inverters; and

- installation of cables between inverter platforms, transfer stations and collecting stations and onto the point of connection and the National Grid substation.

Panel Areas installation & Supporting Infrastructure

2.7.28 The following activities would be required to install the solar PV modules:

- import of components to the Order Limits;
- site preparation and civils for the onsite substation;
- piling and erection of solar PV module support structures, with foundations to a depth of circa 1m;
- mounting of solar PV modules – this would be undertaken by hand;
- trenching and installation of electric cabling;
- transformer, inverter and switchgear foundation excavation and construction;
- installation of transformers, inverters and switchgears. Cranes would be used to lift equipment into position;
- installation of the substation; and
- installation of control systems, monitoring and communication.

Cable installation

2.7.29 The following activities would be required to construct the cable routes:

- site preparation;
- trenching and installation of electric cabling; and
- reinstatement works where necessary.

Norton substation

2.7.30 The following activities would be required within the Norton substation in order to allow the Proposed Development to connect:

- Supply and installation of a new 132kV circuit breaker and associated switchgear equipment on the 132kV switchboard.

2.7.31 It is anticipated that these works would be undertaken by the DNO as the asset owner of the substation.

Stage 4 - Commissioning

2.7.32 Following construction, the Proposed Development would go through a stage of testing prior to being commissioned and the first electricity generated and supplied to the national grid. This is likely to involve mechanical and visual inspection of the Proposed Development, as well as electrical and equipment testing.

Stage 5 Site Reinstatement and Habitat Creation

2.7.33 The management of the landscape and ecological features will be undertaken in accordance with ES Appendix 2.14 Outline LEMP (Document Reference 6.4.2.14) that is secured via requirement 12 of the DCO (Document Reference 3.1). ES Figure 2.20 Landscape Concept Masterplan (Document Reference 6.3.2.20) presents the landscape, biodiversity, and cultural heritage mitigation and enhancements to create a coordinated design for the Proposed Development.

2.7.34 A programme of landscape and habitat reinstatement and creation will commence during the construction phase. It is anticipated that areas under the solar PV modules and the landscape buffers will be planted with a combination of native grassland mix, wildflower mixes, scrub and hedgerows. Woodland blocks and belts will be planted in strategic locations to provide visual screening and ecological habitats.

Construction Environmental Management

2.7.35 ES Appendix 2.6 Outline CEMP (Document Reference 6.4.2.6) has been produced to set out the measures, commitments and actions identified in the ES to manage environmental effects during construction. These measures, commitments and actions would be carried forward to a CEMP to be approved under requirement 4 of the DCO (Document Reference 3.1)

2.7.36 The CEMP would be produced by the PC and agreed with the relevant local planning authorities prior to construction.

2.7.37 In addition to ES Appendix 2.6 Outline CEMP (Document Reference 6.4.2.6), supplementary outline management plans have also been produced as part of the DCO application which would be produced in full by the PC. These include the following:

- ES Appendix 2.8 Outline CTMP (Document Reference 6.4.2.8);
- ES Appendix 2.9 Outline Pollution and Spillage Response Plan (Document Reference 6.4.2.9);
- ES Appendix 2.10 Outline Materials Management Plan (MMP) (Document Reference 6.4.2.10);
- ES Appendix 2.11 Outline SWMP (Document Reference 6.4.2.11); and
- ES Appendix 2.12 Outline Soil Resources Management Plan (Document Reference 6.4.2.12).

Construction traffic

2.7.38 ES Appendix 2.8 Outline CTMP includes details on construction logistics and construction worker travel that includes information to guide the delivery of material, plant, equipment and staff during the construction phase.

Operational activities

2.7.39 The design life of the Proposed Development is expected to be at least 40 years.

2.7.40 During the operational phase of the Proposed Development, on-site activities would be limited and restricted to maintenance activities, replacement of any components that fail, monitoring activities and vegetation management. The Panel Areas would be surrounded by a 2m to 3m high security fence. In addition, the Proposed Development would be monitored with pole-mounted CCTV cameras along the perimeter fencing.

2.7.41 Access to the Proposed Development during operation for maintenance activities would include the access points as set out in Table 2-3.

Operation Environmental Management

2.7.42 ES Appendix 2.13 Outline Battery Fire Safety Management Plan (Document Reference 6.4.2.13) is submitted with the DCO application. The scope of the Outline Battery Fire Safety Management Plan covers the regulatory guidance, safety standards and battery management systems of the BESS. The Outline Battery Fire Safety Management Plan identifies the structures and processes that would be used to manage and control any safety risk during construction, operation and decommissioning.

2.7.43 It is expected that the Outline Battery Fire Safety Management Plan would be produced by the operator of the Proposed Development, in liaison with the equipment suppliers and agreed with the relevant local planning authorities, ahead of operation.

2.7.44 An assessment of the risk of fire from battery safety elements is included within ES Appendix 2.5 Major Accidents and Disasters Assessment (Document Reference 6.4.2.5).

2.7.45 Any solar equipment that requires to be replaced during the operational phase would be disposed of following the waste hierarchy, with materials being reused of recycled wherever possible. Any electrical waste would be disposed of in accordance with the Waste from Electrical and Electronic Equipment (WEEE) Regulations, minimising the environmental impact of the replacement of any elements of the Proposed Development. For further information see ES Appendix 2.3 Assessment of Likely Waste Arisings from the Proposed Development (Document Reference 6.4.2.3).

Decommissioning

2.7.46 As previously outlined, the design life of the Proposed Development is expected to be least 40 years.

2.7.47 Following operation, the Proposed Development would require decommissioning. The process of decommissioning would involve the removal of all solar infrastructure, including the solar PV modules, cabling within the Panel Areas and on-site supporting equipment, from the site to be recycled or disposed of in accordance with good practice and processes at that time. Any requirements to leave certain infrastructure,

for example access tracks, would be discussed and agreed with landowners as part of the decommissioning process.

2.7.48 The Order Limits would be returned to its original use as far as possible and practical with areas of established mitigation left in situ where possible and in agreement with the landowner.

2.7.49 In addition, up to 99% of materials in a solar PV module are recyclable, with organisations around the UK specialising in solar panel recycling in line with the WEEE Regulations. For further information, see ES Appendix 2.3 Assessment of Likely Waste Arisings (Document Reference 6.4.2.3).

2.7.50 Decommissioning is expected to take between of 6 to 12 months and could be undertaken in phases.

2.7.51 The effects of decommissioning are often similar to, or to a lesser magnitude, than the construction effects. The assessment undertaken as part the ES will be based on assumptions as to how decommissioning would take place and these assumptions are likely to change over time as practices for decommissioning evolve.

2.7.52 ES Appendix 2.7 Outline Decommissioning Environmental Management Plan (DEMP) (Document Reference 6.4.2.7) sets out the general principles to be followed in the decommissioning of the Proposed Development. These measures, commitments and actions would be carried forward to a detailed DEMP.

2.7.53 ES Appendix 2.7 Outline DEMP (Document Reference 6.4.2.7) includes details regarding:

- arboricultural management;
- traffic management;
- materials management; and
- waste management.

2.7.54 The DEMP would be prepared and agreed with relevant authorities at the time of decommissioning, in advance of the commencement of decommissioning works and would include timescales and methods for transportation of materials. It is expected that the requirements of the DCO would commit to its production.

References

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