One Earth Solar Farm

Volume 6.0: Environmental Statement [EN010159]

Volume 1: Introductory Chapters

Chapter 5: Description of the Proposed Development

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Contents

5. Description of the Proposed Development

5.1 Overview

5.1.1 This Chapter provides a description of the Proposed Development. The physical characteristics of the development are described alongside the key activities that will be undertaken during construction, operation and maintenance, and decommissioning. The description of the Proposed Development as set out in this chapter, informs the technical assessments within **Chapters 6 to 17 of Volume 2, Aspect Chapters** of the Environmental Statement (ES). This document has been updated at Deadline 3. The document references have not been updated from the original submission. Please refer to the **Guide to the Application [EN010159/APP/1.3.4]** for the list of current versions of documents.

5.1.2 The Proposed Development comprises the construction, operation and maintenance, and decommissioning of a solar photovoltaic (PV) array electricity generating facility. The project includes solar PV panels, Battery Energy Storage Systems (BESS), onsite substations and associated grid connection infrastructure which will allow for the generation and export of electricity to the proposed National Grid High Marnham Substation. The Applicant has secured a connection agreement with National Grid which will allow export and import of up to 740 megawatts (MW) of electricity to the National Grid High Marnham Substation.

5.1.3 The location of the Proposed Development is shown in **ES Volume 3, Figure 3.1: Ecological Designations [EN010159/APP/6.20]** and described in **ES Volume 1, Chapter 3: Description of Site and Surrounding Area [EN010159/APP/6.3]**, with consideration of alternatives described in **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN010159/APP/6.4]** of this ES.

5.1.4 All land within the Order Limits will be included in the Development Consent Order (DCO) Application, this will comprise the following:

- PV Modules;
- Mounting Structures;
- Power Conversion Stations (PCS);
- Battery Energy Storage Systems (BESS);
- Onsite Substations and Ancillary Buildings;
- Low Voltage Distribution Cables;
- Grid Connection Cables;

Fencing, security and ancillary infrastructure;

- Access Tracks; and
- Green Infrastructure (GI).

5.1.5 This Chapter is supported by the following Plans/ Drawings/ Sections as contained in **Volume 2:**

- **Location Plan (showing the Order Limits) [EN010159/APP/2.1];**
- **Works Plan [EN010159/APP/2.3];**

Streets, Rights of Way and Access Plans [EN010159/APP/2.4]; and

- **Illustrative Layout Plan [EN010159/APP/2.7].**

5.1.6 Further detailed information is also contained within the following other documentation:

- Volume 5: Reports and Statements:
  - **Design Approach Document [EN010159/APP/5.8];** and
  - **Outline Design Parameters [EN010159/APP/5.10].**
- Volume 7: Other Documents:
  - **outline Construction Environmental Management Plan [EN010159/APP/7.4];**
  - **outline Operational Environmental Management Plan [EN010159/APP/7.5];**
  - **outline Decommissioning Environmental Management Plan [EN010159/APP/7.6];**
  - **outline Landscape and Ecology Management Plan [EN0105159/APP/7.7];**
  - **outline Soil Management Plan (including Excavated Materials Management Plan) [EN010159/APP/7.10];**
  - **outline Battery Safety Management Plan [EN010159/APP/7.11];**
  - **outline Site Waste Management Plan [EN010159/APP/7.12];**
  - **outline Public Rights of Way Management Plan [EN010159/APP/7.14];** and
  - **Glint and Glare Assessment [EN010159/APP/7.16].**

5.2 Project Parameters and Rochdale Envelope

5.2.1 The need for flexibility in design, layout and technology is recognised in National Policy Statement EN-1[1] as details of a development, such as the final design, may not be finalised until after consent is granted. To accommodate flexibility, a 'Rochdale Envelope' approach is used, as described in PINS Advice Note Nine[2]. The Rochdale Envelope approach involves the technical assessments being undertaken and based on a defined 'envelope' within which the project will be delivered, featuring maximum and minimum parameters, so that an assessment of the reasonable worst case scenario can be undertaken. This includes details of, where relevant, the size (footprint, width, and height, **Outline Surface Water Drainage Strategy Plans [EN010159/APP/2.6]** with particular reference to the **Height Parameter Plan** contained within the **Site Layout Plan [EN010159/APP/2.5]** for the Solar PV Infrastructure), technology, and locations of the different elements of the Proposed Development, where flexibility over the final design needs to be retained. The parameters should be as realistic as possible to determine likely significant effects as accurately as is possible.

5.2.2 The use of the Rochdale Envelope approach has therefore been adopted to present a reasonable worst-case assessment of the potential environmental effects of the Proposed Development. Schedule 1 of the **Draft DCO [EN010159/APP/3.1]** describes the Proposed Development split into works packages. Those numbered works packages are controlled by maximum parameters which are included in the corresponding areas on the **Works Plan [EN010159/APP/2.3]** (setting the maximum spatial extent of the works), the list of parameters for each works package in the **Outline Design Parameters [EN010159/APP/5.9]**, and as shown on the **Height Parameter Plan** contained within the **Site Layout Plan [EN010159/APP/2.5].**

5.2.3 The list of parameters for each of the Works described below can be read alongside the Works Plans (see **Outline Design Parameters [EN010159/APP/5.9]**), which sets the maximum spatial extent of each Work that forms the authorised development.

5.2.4 To assist with the interpretation of the Rochdale Envelope, Illustrative Layout Designs have been created to provide a visual representation of the PV Arrays within each individual field within the Order Limits in accordance with the parameters set out within this Chapter. The Illustrative Designs have been provided for illustrative purposes only. For topics where the nature of the assessment requires a specific level of details, it is the establishment of the

[1] Department for Energy Security & Net Zero (2023), Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf

[2] Planning Inspectorate (2018), Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope. Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope

maximum or minimum parameters which enables a robust assessment of likely significant effects to be undertaken within this ES.

5.2.5 Both the eastern and western Battery Energy Storage Systems (BESS) and on-site Substation Compounds could include either (or a combination) of BESS, on-site substation and solar PV. The ES has assessed the potential for the entire area to be occupied by the on-site Substation Compounds since this represents the worst-case scenario. This optionality is reflected on the Works Plan EN010159/APP/2.3.

5.3 Good Design

5.3.1 Good design, as required by NPS EN-1, has been a fundamental consideration from the outset of the Proposed Development, influencing the site selection, sustainability, and appearance of the Proposed Development.

5.3.2 Design is an iterative process, and as such the Proposed Development has evolved from non-statutory consultation to the submission of the DCO. This evolution, relevant to environmental factors, is set out in **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN010159/APP/6.4]**.

5.3.3 Project specific Design Principles have been prepared with reference to the National Infrastructure Commission's Guidance on Design Principles for National Infrastructure[3] and have been adopted by the Proposed Development from the outset. The Design Principles are categorised under the headings of Climate, People, Places and Value (see details contained within the Design Approach Document in **Design Approach Document [EN010159/APP/5.8]**). The Design Principles have informed the **Outline Design Parameters [EN010159/APP/5.9]** which are proposed to be secured in order to control and guide the detailed design of the Proposed Development.

5.3.4 In addition to the above, the **Illustrative Masterplan [EN010159/APP/2.7]**, **Work Plan [EN010159/APP/2.3]** and **Design Principles [EN010159/APP/5.8]** have been developed with input from the environmental technical teams, taking account of embedded environmental measures to avoid, as far as is possible, likely significant effects from occurring. The design of the Proposed Development has been an iterative process, based on the various environmental assessments and consultation with statutory and non-statutory consultees during non-statutory and statutory consultation (as above, see **ES Volume 1, Chapter 4: Alternative and Design Evolution [EN010159/APP/6.4]**). This includes the siting and design of the solar infrastructure (in particular the location of the PCS); the siting of project substations and BESS, the setback and offsets of the solar infrastructure from sensitive receptors; the parameters of the GI; and the strategy

[3] Available at: https://nic.org.uk/app/uploads/NIC-Design-Principles.pdf

to biodiversity net gain. Details of the embedded environmental measures are included in **Chapters 6 to 17 of Volume 2, Aspect Chapters**.

5.3.5 Further information on how the Design Principles have been established and how they have informed the Proposed Development can be found within **the Design Approach Document [EN01059/APP/5.8]**.

5.4 Operational Phase (including Maintenance)

Components of the Proposed Development During Operation and Maintenance

5.4.1 The following sections provide a description of the different elements of the Proposed Development. Each section sets out the maximum parameters that have been assessed within this ES as secured within the **Outline Design Parameters** [**EN01059/APP/5.9**]. The **Works Plan** [**EN01059/APP/2.3**] show the spatial extent within which each of the different elements described below can be located. As above, where required, each environmental topic has used the worst-case parameters within the Rochdale Envelope to determine the potential for significant effects and identify suitable mitigation measures.

5.4.2 The Order limits comprises approximately 1,414 ha (3,494 acres) and includes the following components. The Proposed Development is also described in Schedule 1 of the **draft DCO** [**EN0101059/APP/3.1**] where the "*authorised development*" is divided into works packages. The works numbers for those packages are identified below and are referred to throughout this ES.

- Work No. 1: Solar PV Infrastructure
- Work No. 2: BESS
- Work No. 3: Substations
- Work No. 4: Grid Connection Cable Route and work to facilitate the connection to the National Grid High Marnham substation
- Work No. 5: Ancillary Works
- Work No. 6A: Primary Construction and Decommissioning Compounds
- Work No. 6B: Secondary Construction and Decommissioning Compounds
- Work No. 7: Highway Works and works to facilitate access to highways and private streets
- Work No. 8: Landscape and Ecology

5.4.3 Further associated development within the Order Limits in connection with and in addition to the Proposed Development will include:

- fencing, gates, boundary treatment and other means of enclosure;
- bunds, embankments, trenching and swales;
- 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, 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;
- works for the provision of security and monitoring measures such as CCTV columns, security cabins, lighting columns and lighting, cameras, lightning protection masts and weather stations;
- improvement, maintenance, repair and use of existing streets, private tracks and access roads;
- laying down, maintenance and repair of new internal access tracks, ramps, means of access, footpaths, permissive paths, cycle routes and roads, crossings of drainage ditches and watercourses, including signage and information boards;
- temporary footpath diversions and closures;
- noise, landscaping and biodiversity mitigation and enhancement measures including planting and acoustic barriers;
- tunnelling, boring and drilling works;
- earthworks, site establishments and preparation works including site clearance (including vegetation removal, demolition of existing buildings and structures); 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; and
- other works to mitigate any adverse effects of the construction, maintenance, operation or decommissioning of the authorised development.

Work Area No. 1: Solar

5.4.4 Work Area No.1 shows the maximum extent of solar PV infrastructure proposed. An illustrative layout is shown on the **Illustrative Masterplan** [**EN010159/APP/2.7**]. The extent of the solar PV infrastructure has been determined through the assessment of environmental constraints, and through consultation with stakeholders, landowners, local residents (including Parish Councils and individual homeowners) and utilities asset owners.

5.4.5 The design process for the solar PV infrastructure has incorporated a number of off-sets via the **Outline Design Parameters** [**EN010159/APP/5.9]** from features such as drainage ditches, watercourses, water bodies, hedgerows and tree lines. Offsets from public rights of way and residential dwellings have been secured through the **Works Plan [EN010159/APP/2.3].** Offsets from utilities are secured via Protective Provisions which will be included in Schedule 14 of the **Draft DCO [EN01059/APP/3.1]** which will ensure appropriate protection for utilities and other apparatus owned by statutory undertakers. The Solar PV Site (Work No. 1) Includes the following elements:

Solar PV Modules and Arrays

5.4.6 Solar PV modules convert sunlight into electricity by utilising individual photovoltaic cells to generate a direct current (DC) electrical output. The solar PV modules will likely consist of Bifacial' modules, which are a relatively new technology and have PV cells and toughened glass on both the upper and lower surface, allowing sunlight to be converted to electricity on both sides of the panels. The solar PV module frame encasing the cells is typically built from anodised aluminium.

5.4.7 The Proposed Development will consist of Solar PV Modules placed on Mounting Structures arranged in rows, known as PV Tables. The PV Array is a distinct group of PV Tables which are grouped together to form a PV Array Area. A PV Array Area represents a parcel of land within the Solar PV Site where PV Arrays may be installed. A group of PV Modules that are connected to one another are known as 'PV Strings'.

Figure 5.1 Indicative Solar Array

5.4.8 The land beneath the PV Array Areas will be converted from arable land to shade tolerant grass or similar along with other ecological mitigation measures, as set out in the outline Landscape **Outline Landscape and Ecology Management Plan [EN010159/APP/7.7].**

5.4.9 A range of solar PV technologies are developing rapidly and may be available at the time of construction, in addition as detailed in the National Policy Statement for Renewable Energy Infrastructure[4] the generating capacity should not be seen as an appropriate tool to constrain the impacts of a solar farm; therefore the generating capacity and size of individual PV Panels are not specified in the DCO Application, rather the maximum total surface area of all PV Panels is limited to the area shown on the Works Plan for Work No. 1. The maximum total land area occupied by Works No 1 is 2336 acres.

5.4.10 The DCO Application will include flexibility that allows for different configurations of PV Modules. The final elevations of the PV Modules will be influenced by various design factors such as local topography, and selection of PV Module type and configuration. The gap between the rows of PV Tables will vary responding to local topography, but will have a minimum separation distance of 3m, as secured in the **Outline Design Parameters [EN010159/APP/5.9]**, to minimise

[4] Department for Energy Security & Net Zero (2023) National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: https://assets.publishing.service.gov.uk/media/64252f5f2fa848000cec0f52/NPS_EN-3.pdf

effects of shadowing, to ensure optimal efficiency and to allow access between the PV Tables for maintenance. The maximum heights of the solar PV modules are shown within and are secured via the **Outline Design Parameters [EN010159/APP/5.9]** and the **Height Parameter Plan** contained within the **Site Layout Plan [EN010159/APP/2.5].**

5.4.11 At the detailed design stage, subject to the chosen technology, configuration, topography it may transpire that the full extent of the land, as shown as Works No 1, is not required. If this is the case, then any areas of Works No 1 that are surplus to requirements will remain in agricultural use and / or will be used for additional habitat creation. This would be confirmed through the production of the detailed LEMPs, secured by DCO Requirement (a copy of the oLEMP is included as part of the DCO Application see **Outline Landscape and Ecology Management Plan [EN010159/APP/7.7]**).

Figure 5.2 Indicative Solar Array and mounting structure

PV Mounting Structure

5.4.12 The PV Tables include metal rails (usually made of aluminium) to directly support the PV Panels; those rails will be supported by larger metal frames (usually made of galvanised steel), which are fixed on top of metal piles. The metal piles are also typically made of galvanised steel and are driven into the ground to a maximum depth of up to 3m. The appearance of the mounting structure will likely be metal (galvanised steel) and will have a rough matt finish.

5.4.13 The mounting structure will include fixed panels within the PV Array Areas, which will be installed to face south at a 10-25 degree pitch, to optimise daylight absorption. The tilt of the fixed panels has been considered within the **Glint and Glare assessment [EN010159/APP/7.16**], which has informed the design of the Proposed Development.

5.4.14 **ES Volume 2, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7]** has determined areas of potential flood (including from the River Trent, as well as surface water) taking account of future climate change levels. Following discussions with the Environment Agency where possible (taking account of environmental, engineering and maintenance considerations) a freeboard of 300mm is required. The minimum height of the lowest part of the mounting structure will be 0.7m above ground level (AGL) outside areas of potential flooding. The maximum height of the lowest part of the PV Panels will be 1.8m AGL within the extent of the designed flood event, as shown on the **Height Parameter Plan** contained within the **Site Layout Plan [EN010159/APP/2.5]** (see **ES Volume 2, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7]**).

5.4.15 A 5.3m minimum clearance shall be maintained (in still and conductor swing) from the National Grid 400kv or 275kv overhead lines to the highest point of the PV Tables.

5.4.16 Foundations are most likely to be galvanised steel poles driven into the ground. These will either be piles rammed into a pre-drilled hole or directly driven into the ground. Alternative mounting solution that may be required are; a pillar attaching to a steel ground screw. As above, maximum depth of piled mounting structures will be 3m below ground level (BGL). Within areas of archaeological interest the mounting structures may be fixed to a concrete base (see **ES Volume 2, Chapter 9: Buried Heritage [EN010159/APP/6.9]**).

5.4.17 **Table 5.1** provides the basis of assessment for the PV Modules and Mounting Structures.

Table 5.1 Solar PV Module and PV Module Mounting Structures

Solar PV Module	Outline Design Parameter
Module Colour	The PV Modules will be dark blue, grey or black in colour
PV Module Mounting Structure	
Minimum Height of Lowest Modules	0.7m AGL
Maximum Height of Highest Modules	3.8m AGL
Minimum Space Between Rows	3m
Minimum clearance from National Grid 400kv or 275kv overhead lines to the highest point of the PV Tables	5.3m
Indicative Slope of PV Modules	Fixed facing south at 10–25-degree pitch from the horizontal

Mounting Structure Appearance	The appearance of the PV mounting structures will be bare metal or galvanised with a matt finish.
Foundation Type	Pile driven, screw mounted or concrete foundations
Maximum Depth of Piles	3m BGL

Power Conversion Stations (PCS)

5.4.18 The PCS incorporate the inverters, transformers and switchgear and are required to manage the electricity generated by the PV Panels. An explanation of each is provided below:

- Inverters – these convert DC electricity from the solar PV modules to alternating current (AC), allowing export onto the grid system. The number of modules that can be connected to each inverter will be determined by the size of the inverters available on the market.
- Transformers – these are required to step up the voltage of the AC electricity generated by the inverters across the solar sites before it reaches an onsite substation (see further details below) and connect to the National Grid High Marnham Substation (see Volume 1, Chapter 3: Description of the Site and Surrounding Area [EN010159/APP/6.3] for further details).
- Switchgear - this includes electrical disconnect switches, fuses or circuit breakers. The purpose of the switchgears is to control and protect the staff and electrical infrastructure during service and maintenance. It is noted that the technology will not use sulphur hexafluoride (SF6)-reliant assets.

5.4.19 The above will be housed (‘integrated’) together within an enclosure, or will be rated for outdoor use in both instances they will be a muted colour to be sympathetic with surroundings. The PCS Unit will be pre-assembled and preconfigured with a maximum dimension of 13m in length and 3m in width. Monitoring and control systems will consist of manual controls at the conversion units, and automatic and centralised monitoring and control features at the control rooms on the onsite substations (see below).

Figure 5.3 Typical PCS Example

5.4.20 As above, **ES Volume 2, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7]** has determined areas of potential flood (including from the River Trent, as well as surface water) taking account of future climate change levels. Following discussions with the Environment Agency, where possible (taking account of environmental, engineering and maintenance considerations), a freeboard of 300mm is required in areas of potential fluvial flood risk to allow water to flow below the PCS. Outside of the areas of potential flooding (see **Volume 1, Chapter 7: Hydrology and Hydrogeology [EN010159/APP/6.7]**) the PCS units will be mounted on metal skids on a concrete slab foundation up to 2m BGL. The PCS will not exceed a height of 4.5m AGL outside of the potential flood zones. Within the flood zone the PCS will be mounted on stilts to allow flood water to move beneath the PCS, should there be a flood event. The stilts will be pile driven, up to 3m BGL. Within the areas of potential flooding, the height of the PCS will not exceed 6m AGL.

5.4.21 Following noise modelling of noise generated by the PCS Units (see **Volume 2, Chapter 15: Noise and Vibration [EN010159/APP/6.15]**), to ensure noise does not result in likely significant effects, the PCS units will not be located within 100m of residential amenity space and will not be located within 50m of a Public Right of Way or bridle paths, without acoustic mitigation. Acoustic mitigation would be in the form of an acoustic fence or acoustic mitigation container. The fence would be located outside of the PCS footprint.

5.4.22 **Table 5.2** provides the basis of assessment for the PCS units.

Table 5.2 PCS Unit Parameters

PCS Units	
Maximum Enclosure Dimensions	13m long x 3m wide Height outside the extent of the designed flood event (as defined within ES Chapter 7 [EN010159/APP/6.7]): 4.5m AGL Height within the extent of the designed flood event (as defined within ES Chapter 7 [EN010159/APP/6.7]): 6m AGL
Indicative mounting foundation Outside the extent of the designed flood event	Foundation up to 2m BGL
Indicative mounting foundation Inside the extent of the designed flood event	Mounted on stilts which will be pile driven, up to 3m BGL.
Indicative colour	Muted colour to be sympathetic with surroundings
Location	Will not be located within 100m of residential amenity space and will not be located within 50m of a Public Right of Way, without acoustic mitigation

Work Area No. 2: BESS

BESS Details

5.4.23 The purpose of this scheme is to seek consent for the development of a ground mounted solar photovoltaic generating station. The BESS is associated development to the solar PV generating station which can provide various services, such as but not limited to, storing energy in times of low demand and exporting when required to the national grid, providing ancillary services for grid stability, and participating in the capacity market. There will be up to two onsite BESS Compounds located within the Proposed Development, one on the east and one on the west of the River Trent which are shown on Work Area No. 2. These will be located adjacent to each of the substation locations as shown on Work Area No. 3 (discussed below).

Figure 5.4 Typical BESS Container Example

5.4.24 The batteries will be housed within an enclosure; the maximum dimensions of the individual modular battery storage enclosure and interconnector enclosure within a BESS compound is 13m x 5m (W x D) and up to 3.5m AGL. These enclosures may be modular and joined depending on equipment choice to be determined at detailed design stage. Each BESS will require a heating, ventilation and air conditioning or liquid cooling system to ensure the efficiency of the batteries, which will be integrated with the containers. The BESS enclosures will be a muted colour to be sympathetic to the surroundings (e.g. grey, green or black). The precise number of individual battery storage enclosures will depend on the latest battery technology in terms of, level of power capacity and duration of energy storage.

5.4.25 An adapted Medium Voltage (MV) enclosure, the same dimensions as the battery storage enclosure, will be used as the monitoring and control functions, which will operate, isolate, and control the exported power from the BESS. It should be noted that, depending on the technology, the power conversion system may be integrated with the battery storage containers and the additional MV equipment will include switch gear and transformer, subject to detailed design. The container will also require a heating, ventilation and air conditioning or liquid cooling system. The BESS MV enclosure will also be designed to allow for containment of any oil spill to ensure it is not released into the environment. This would be determined in detailed design. The BESS MV container is incorporated within the maximum parameters for the BESS compound.

5.4.26 The west BESS compound will occupy an area up to 112,000m^2. The east BESS compound will occupy an area up to 85,000m^2. BESS enclosures will measure up to 3.5m AGL, excluding foundations. The BESS will be placed on a concrete foundation depending on ground conditions. Ancillary buildings within the BESS compound will measure up to 8m tall with a footprint of up to 1,200m^2. The buildings will be on reinforced concrete foundations up to 2m deep. The colour of the Ancillary Buildings will be a muted colour to be sympathetic to the surroundings.

5.4.27 The BESS equipment will be located at a distance of at least 300m from residential properties in order to reduce the likelihood of disturbance due to noise from fixed plant. In addition, the BESS units will make use of the manufacturer's noise reduction measures to reduce noise from the BESS units at source. The BESS units will also be orientated to make sure, as far as is practicable, that the main noise generating elements of the BESS units (such as ventilation openings) are facing away from nearby residential properties.

5.4.28 As the Proposed Development progresses, the likely configuration of equipment will be determined based upon environmental and technical factors. A reasonable worst-case scenario has been assessed based on maximum parameters. The detailed design must follow the Outline Design Parameters.

BESS Fire Safety

5.4.29 The BESS will be designed in accordance with latest guidance and policy, to ensure they operate safely. The outline design has been based on the current guidance. This includes minimum guidance from the National Fire Chiefs Council (NFCC)[5], NFPA 855[6] and FM Global 5-33[7].

5.4.30 As battery technology develops the detailed design will be compliant with the relevant battery safety design standards at time of construction.

5.4.31 An outline Battery Safety Management Plan (oBSMP) is included within DCO Application see **Outline Battery Safety Management Plan [EN010159/APP/7.11]** and an Unplanned Emissions Assessment has been undertaken (see **Outline Battery Safety Management Plan [EN010159/APP/7.11]**).

5.4.32 The oBSMP provides the requirements for the BESS in the event of a fire. It outlines the safety design measures for mitigating risks for the BESS, provides detail on suppression and detection mechanisms, thermal management systems, ventilation and deflagration, emergency response and guidance, post-incident recovery, drainage strategy, as well as the requirement for fire suppression mechanisms, including sources of firefighting water for the Fire and Rescue team. Any information that may assist in an effective emergency response will be passed on to the Fire and Rescue team.

5.4.33 The outline design to date has used a spacing of 6m between units adhering to the latest guidance and standards such as NFCC, NFPA 855 and FM Global 5-33. Detailed design will review and comply with appropriate guidance at time of

[5] Available at: https://nfcc.org.uk/wp-content/uploads/2023/10/Grid-Scale-Battery-Energy-Storage-System-planning-Guidance-for-FRS.pdf

[6] Available at: https://www.nfpa.org/codes-and-standards/nfpa-855-standard-development/855

[7] Available at: https://liiontamer.com/wp-content/uploads/Property-loss-prevention-data-sheet-5-33-ESS.pdf

design. The MV station units have 6m separation between adjacent units. This will also be reviewed in detailed design. Wider spacing between groups of units shall be adopted to provide robust fire breaks and further reduce the probability of fire spreading. Separation between BESS groupings and site features such as buildings, public right of way, combustible materials and vegetation shall be adhered to according to NFPA 855.

5.4.34 The BESS units will be compliant with testing requirements of UL 9540a *Testing the fire safety hazards associated with propagating thermal runaway within battery systems* and demonstrate that fire is unlikely to propagate at a cell, module and rack level with preference for full system testing.

5.4.35 There shall be no unauthorised access to the battery enclosures. Each site will be unmanned during operation. The site will be monitored remotely 24/7, 365 days a year.

5.4.36 Each BESS container will likely be fitted with a fire suppression system such as an aerosol system for fire suppression in the event of a fire. If an automatic sprinkler system is to be fitted, the water supply for this system will be integrated into the design of each BESS container and each BESS shall have an inlet to allow for connection to water pipes. Any contaminated water will be removed from the containers and contained in an external containment area along with any run-off. There shall be no firewater released to the environment before appropriate testing has been carried out, as per the oBSMP see **Outline Battery Safety Management Plan [EN010159/APP/7.11]**.

5.4.37 External firefighting water storage units accommodating a combined total of 480,000 litres of water (as discussed with Nottinghamshire and Lincolnshire Fire and Rescue Services) will be provided for use by fire fighters in case of a fire in the BESS compound. Water would be stored in either static tanks or bunded open water areas. The water source shall have delivery rate of no less than 1,900 litres per minute for two hours.

5.4.38 Each BESS area compound and Sustainable Drainage (SuDs) features serving them would include impermeable lining to prevent infiltration to the ground . Attenuation features utilised to manage surface water runoff from the BESS compound will include an automatic penstock valve (or similar valve) (which includes manual backup) to contain runoff in the event of fire suppression being required. The water containment area will have a volume capable of capturing the full capacity of firewater with no positive discharge, which will allow the water to be stored following an emergency event and removed if contaminated.

5.4.39 Each BESS site will have at least two access points with access tracks with a width of 6m. Suitable passing places will be provided, where required.

5.4.40 The lighting of the BESS Compounds will be in accordance with Health and Safety requirements. The BESS compounds would not be permanently lit. Task specific lighting would be used in the case of emergency works. Passive Infra Red controlled lighting will be used where access is required outside of working hours. Internal lighting within control buildings would be used but light spillage controlled.

5.4.41 **Table 5.3** provides the basis of assessment for the BESS. A plan showing the illustrative layout of the BESS compounds is provided in **Outline Battery Safety Management Plan [EN010159/APP/7.11].**

Table 5.3 BESS Details

BESS	
BESS Enclosures	13m x 5m (W x D) Height: up to 3.5m AGL
	Indicative colour: Muted, to be sympathetic with surroundings
BESS Spacing (refer to the **Outline Battery Safety Management Plan (oBSMP) [EN010159/APP/7.11]**)	Battery unit – Battery unit 6.0m Battery unit – MV Station 6.0m MV Station – MV Station ≥6.0m The separation distance between the BESS and transformer will be a minimum of 6m unless sufficient 3rd Party data demonstrates less is safe (as agreed with the FRS). Battery group to Battery group 8.0m MV Station group to MV Station group ≥7.0m
BESS Compound West of the River Trent	Area up to 112,000m^2
BESS Compound East of the River Trent	Area up to 85,000m^2
Foundation type	Reinforced concrete up to 2m BGL.
Ancillary Buildings	Ancillary buildings will be located within each BESS compound, up to 8m AGL with a footprint of up to 1,200m^2.
	Indicative colour: Muted to be sympathetic with surroundings
BESS water storage (refer to the **Outline Battery Safety Management Plan (oBSMP) [EN010159/APP/7.11]**)	Both the west and east BESS compounds will include up to 480,000l of water storage
BESS Surface Water (refer to the **Outline Battery Safety Management Plan (oBSMP) [EN010159/APP/7.11]**)	Both the west and east BESS compounds will include a water containment area capable of capturing the full amount of firewater.

Work Area No. 3: Substations

5.4.42 There will be two onsite substations operating at 400kV/33kV located within the Proposed Development, which are shown on Work Area No. 3. The onsite substations will comprise electrical infrastructure such as the transformers, switchgear, control buildings and metering equipment as required to facilitate the export of electricity to the National Grid High Marnham Substation.

5.4.43 The substations will be located within their own compounds. One substation compound will be located on the west of the River Trent and one will be located to the east of the River Trent. The west substation compound will 250m x 190m (up to 47,500m2) with a maximum height of 13.5m AGL. The east substation compound will be 170m x 140m (up to 23,800m2) with a maximum height of 13.5m AGL. Foundations include a concrete slab foundation up to 2m BGL. Both substation locations may also require lightning rods up to 25m in height, this will be determined by a lightning protection study to be undertaken at the detailed design stage, following consent. The substation will be located at a distance of at least 300 m from residential properties in order to reduce the likelihood of disturbance due to noise from fixed plant.

5.4.44 The onsite substations will contain 400kV switchgear buildings, 33kV switch rooms, transformers, control buildings, generators and other associated facilities, the exact numbers of which are subject to detailed design. The onsite substation compounds will also include ancillary buildings up to 8m AGL with a footprint of up to 1,200m^2 which will include office space and welfare facilities as well as operational monitoring and maintenance equipment. The ancillary buildings will be located on reinforced concrete foundations up to 2m BGL. The colour of the ancillary buildings will be a muted colour to be sympathetic to the surroundings. It is not anticipated that a connection to the public sewer network will be required, rather waste water associated with welfare facilities will be contained in a Cesspit or similar Foul/Wastewater Storage Tanks to be emptied as and when required, by tanker.

5.4.45 The Substation Compounds and Sustainable Drainage (SuDs) features serving them would include impermeable lining to prevent infiltration to the ground. Attenuation features utilised to manage surface water runoff from the Substation Compounds will include an automatic penstock valve (or similar valve) (which includes manual backup) to contain runoff in the event of fire suppression being required.

5.4.46 The lighting of the Substation Compounds will be in accordance with Health and Safety requirements. The substation compounds would not be permanently lit. Task specific lighting would be used in the case of emergency works. Passive Infra Red controlled lighting will be used where access is required outside of working hours. Internal lighting within control buildings would be used but light spillage controlled.

5.4.47 **Table 5.4** provides the basis of assessment for the Onsite Substations. A plan showing the illustrative layout of the Onsite Substations is provided in **Site layout plans [EN010159/APP/2.5].**

Table 5.4 Onsite Substations

Onsite Substations	
Substation West of the River Trent	250m x 190m (up to 47,500m2) Height: 13.5m AGL
Substation East of the River Trent	170m x 140m (up to 23,800m2) Height: 13.5m AGL
Lightning Rod within the West and East Substation Locations	Up to 25m AGL in height
Foundation type	Concrete slab up to 2m BGL.
Ancillary Buildings	Ancillary buildings will be located within each substation compound, up to 8m AGL with a footprint of up to 1,200m^2.
	Indicative colour: Muted to be sympathetic with surroundings

Work Area No.4: Grid Connection Cable Route

5.4.48 The electricity generated by the Proposed Development is to be exported via a up to 400kV connection between the onsite Substations and the National Grid High Marnham Substation via underground cables. The grid connection cables will comprise up to 400kV cables buried within a trench up to 3m BGL, and up to 10m wide. These will be buried in accordance with British Standard and National Grid boundary recommendations, which sets out recommended separation depths to minimise the risks of magnetic field effects on relevant receptors. This works package includes electrical engineering works in and around the National Grid High Marnham Substation and temporary construction areas to facilitate the construction of Work No. 4.

5.4.49 The River Trent will be crossed using trenchless techniques to minimise ecological, hydrological and geomorphological impacts. Launch and reception pits will be required at each end of the drill section. Cabling will be installed at a minimum of 5 metres below the hard bed of the watercourse and will remain at this depth for a minimum of 10 metres either side of the watercourse bank top.

5.4.50 Ground investigation will be undertaken in advance of the design of trenchless crossings and settlement calculations will be made, to ensure that the bed levels of watercourses are not adversely affected by the works.

5.4.51 A minimum buffer of 10 metres from the flood defences and banks of the River Trent will be maintained within which there will be no built development.

5.4.52 Work Number 4 includes areas of public highway where the cables may be installed under the existing road, or within verges.

Work Area No. 5: Ancillary Works

5.4.53 Ancillary works for the Proposed Development will include low voltage cabling, associated tracks or drainage requirements, access, fencing and CCTV, as well as other ancillary buildings.

5.4.54 For onsite cabling requirements, Low Voltage Distribution Cabling between PV modules and the proposed inverters will typically be secured to the PV mounting structure, and will otherwise be buried underground to a maximum depth of 1.2 metres in a trench up to 5 metres wide. Combiner boxes may be required to rationalise cabling between PV strings and inverters. If required, these would be mounted on the mounting structures beneath the PV modules.

5.4.55 Cables will cross existing below ground utility infrastructure at 90 degrees (perpendicular) to the alignment of the utility infrastructure. The cable crossings will be at least 600mm above or below the existing below ground utility infrastructure, in line with National Grid guidance[8]. Trenchless crossing methods will be utilised where other methods are not possible, for the crossing of cables under any ordinary watercourses and drains, which will avoid disturbance within 10 metres from the banks of a watercourse. It should also be noted that where access roads cross watercourses and drains, the crossing shall be designed to accommodate cable routes.

5.4.56 Internal access tracks which are required for the Proposed Development will be up to 6.5 metres wide. New access tracks will be impermeable, also incorporating appropriate SuDS which could include ditches and swales. The makeup of the access tracks will be unbound stone over a geotextile membrane, or similar. Crossing of wet ditches or watercourses will be via clear span bridges that are approximately 6 metre wide.

5.4.57 Pole mounted internal facing closed circuit television (CCTV) systems will be installed across the Proposed Development, specifically around the perimeter of the PV arrays. CCTV will be installed up to 4.5 metres in height.

5.4.58 The lighting design for the Proposed Development will seek to limit impacts upon sensitive receptors and will be directional, orientated internally, away from the surrounding environment, and will be fitted with features to minimise light spillage. Lighting will also be specifically required for CCTV, though this will be infrared (and therefore not visible to the human eye) and will be used during

[8] National Grid T/SP/SSW/22

hours of darkness only. No external lighting will be permanently operated as part of the Proposed Development.

5.4.59 Fencing around HV elements is detailed within respective works areas. Fencing across the wider Order Limits, including around PV arrays, will comprise a deer fence (wooden posts and metal wire mesh) and will be up to 2 metres above ground level. The fence posts will measure up to 2.2 metres above ground level. Appropriate mammal gates will also be incorporated. Temporary screening as 4m agl wooden hoarding or similar, will be installed where mitigation is required to reduce glint and glare impacts (see **Glint and Glare Assessment [EN010159/APP/7.16]** in terms of the identified locations). Such mitigation screening will be in place until the proposed hedgerows are established to a height of 4m agl to provide the embedded mitigation to reduce solar reflections.

5.4.60 Permissive paths, open to pedestrians, cyclists and equestrians, will be open for use during operation.

Work Areas No.6A and 6B: Construction and Decommissioning Compounds

5.4.61 As part of the construction (and decommissioning) of the Proposed Development there will be two primary construction compounds (Work No. 6A). One compound will be on the east of the River Trent and the second will be on the west of the River Trent. The locations of Work Area 6a is shown on the **Works Plan [EN010159/APP/2.3]**.

5.4.62 Mobile lighting towers, fitted with directional hoods/cowls, will be used within the construction compounds for all activities during hours of darkness (within permitted working hours) or within sheltered areas where natural light is not sufficient.

5.4.63 There will be up to 10 satellite secondary construction compounds (Work No. 6B), which will be similarly split in an equal manner across the east and west of the River Trent. The locations of the satellite construction compounds will be within Works Area 6b. At this stage the precise locations of the satellite compounds have not been defined, however Work Area 6b incorporates offsets from sensitive receptors.

5.4.64 As the Proposed Development develops, the location of the satellite compounds will be determined based upon environmental and technical factors. The final locations must be within Works Area 6b which includes offsets from sensitive receptors.

5.4.65 During decommissioning a similar set of decommissioning compounds will be used. These will be confirmed within the DEMP in advance of decommissioning. For the purpose of the EIA, it has been assumed that the decommissioning compounds are the same size and locations as the construction compounds.

Work Area No. 7: Highway Works

5.4.66 The primary access points to the Proposed Development are shown on the **Illustrative Masterplan [EN010159/APP/2.7]** which accord with the extent of land for access secured within Work Area 7, as defined on the **Works Plan [EN010159/APP/2.3]**. The size of the primary points will be as shown on the **Streets, rights of way and access plans [EN010159/APP/2.4]** to enable two-way access for construction vehicles, as well as ensuring that the road infrastructure is suitable to allow for construction vehicles (Cars, Light Goods Vehicles, Heavy Goods Vehicles) to travel in either direction from the primary compound to the secondary compounds. Access for Abnormal Indivisible Loads (AIL) has also been considered where required.

5.4.67 Work Area No. 7 comprises of works for the creation of permanent accesses from the public highway and private streets, which also includes the creation of visibility splays, works to alter highway layouts temporarily, and also offsite works for the facilitation of movement of any abnormal loads. The location is shown on the **Works Plan [EN010159/APP/2.3].**

5.4.68 Site access and routing strategies have been discussed in consultation with the Highways Authorities as set out within the outline **Construction Traffic Management Plan [EN010159/APP/7.9]**.

5.4.69 The first 50 metres of proposed access tracks, where they meet the public highway, will comprise of blacktop (asphalt or similar).

Work Area No. 8: Landscape and Ecology

5.4.70 Existing hedgerows, woodland, ditches, ponds and field margins will be retained within the Order Limits, with the exception of small breaks and/or crossings required for new access tracks, security fencing, cable routes and new access junctions. Hedgerows will be reinstated where a cable crossing requires partial removal.

5.4.71 Existing hedgerows will be allowed to grow in width and height under positive management for biodiversity. Dependent on location, hedgerows will be allowed to increase in height of approximately 3.5 – 4m metres and a width of between 2 and 3 metres.

5.4.72 Mitigation and enhancement areas as identified on the **Works Plan** [**EN010159/APP/2.3**] will provide areas for green infrastructure. Within Work Number 8, 4.2ha of woodland and native tree belts will be planted.

5.4.73 Offsetting provisions have been embedded within the Proposed Development design for skylark species which includes approximately 100ha of grassland, arable or set-aside habitat suitable for skylark nesting at high densities situated within large fields containing no solar or BESS infrastructure.

5.4.74 A detailed LEMP will be produced and submitted to the relevant planning authority for approval following the granting of the DCO.

5.4.75 In terms of Biodiversity Net Gain (BNG) the Proposed Development will make the following contributions (accounting for landscape proposals across all Work Numbers):

- 3440.43 habitat units, an increase of 113.17%
- 353.22 hedgerow units, an increase of 92.49%
- 77.60 watercourse units, an increase of 57.75%

Maintenance During Operation

5.4.76 The DCO is seeking time limited consent, and the Proposed Development will be operational for up to 60 years, after which time it will be decommissioned (see details on decommissioning below). For the purposes of this ES, the technical assessments presented in **Chapters 6 to 17 of Volume 2, Aspect Chapters** consider a 60 year lifespan. As such the environment technical topics have assumed the operational phase of the Proposed Development is temporary and the project is not considered permanent.

5.4.77 During the operational phase of the Proposed Development, onsite activities will be minimal and will principally relate to the vegetation management, equipment maintenance and servicing, replacement and renewal of any components that fail, and monitoring and inspection. It is anticipated that maintenance and servicing will include the inspection, repair, adjustment, altering, removal, reconstruction, refurbishment replacement or improvement of equipment to ensure the continued effective operation of the Proposed Development.

5.4.78 For the purposes of the technical assessments as presented on **Chapters 6 to 17 of Volume 2, Aspect Chapters**, the following indicative design life has been assumed.

Table 5.5 Indicative Design Life

Proposed Development Component	Indicative Design Life
Solar Panels	25-40 years
Inverters	10-20 years
Racking and Mounting Systems	Replacement not anticipated
Above Ground Electrical Wiring and Cabling	25-30 years

Proposed Development Component	Indicative Design Life
Transformers	Replacement not anticipated
Monitoring and Control Systems	10-20 years
Batteries	5-15 years
Meteorological Sensors	5-15 years
Substation Equipment	Replacement not anticipated
Communication Equipment	10-20 years

5.4.79 The likely estimates, type and quantities of waste generated during the operational phase, relating to the maintenance of the Proposed Development, as well as the measures to reduce waste are presented in the outline Site Waste Management Plan (see **Outline Site Waste Management Plan [EN010159/APP/7.12]**).

5.4.80 In addition to the replacement of the Solar PV modules, general maintenance during the operational phase includes:

5.4.81 Cleaning of Panels – at this stage a two-year cleaning cycle is assumed. Panel cleaning will be achieved using a tractor mounted cleaning system with a rotating 'car-wash' type brush. It is anticipated that water will be brought to Site in 1 m3 in intermediate bulk containers (IBC). Individual IBCs will be mounted on the rear of the tractor to provide water supply during cleaning. No cleaning products will be used, only water. During the summer the cleaning of panels will occur when the panels are cool to avoid thermal shock to the panel surface, as such this is likely to be in the morning or evening.

5.4.82 Management of vegetation - the management of GI alongside mitigation and enhancement areas during operation, will be undertaken in accordance with the oLEMP (see **Outline Landscape and Ecology Management Plan [EN010159/APP/7.7]**). The oLEMP sets out the management prescriptions (including cutting, planting and replanting of vegetation) for existing retained trees; hedgerow; woodland; individual trees; and species-rich grassland.

5.4.83 There will typically be up to 15 daily members of permanent staff onsite during the operational phase of the Proposed Development who will be undertaking the above ongoing maintenance.

5.4.84 An Operational Environmental Management Plan (OEMP) will be produced to include measures which control elements including working hours, lighting,

parking, security and monitoring of electrical equipment and drainage, material storage, management of other vegetation and permissive paths, as well as noise limits and management of waste. The OEMP is included at **Outline Decommissioning Environmental Management Plan [EN010159/APP/7.5**]. The OEMP will be approved by the authority in accordance with the oOEMP.

5.5 Construction Phase

5.5.1 The construction phase is anticipated to commence in 2027 and will be completed in 2029. The final programme will be dependent on detailed design and environmental constraints upon the timing of construction activities. Construction activities will be undertaken in accordance with the principles set out within the outline Construction Environmental Management Plan (see **Outline Construction Traffic Management Plan [EN010159/APP/7.9]**). Indicative construction activities likely to be required as provided **Table 5.6**.

Table 5.6 Indicative Construction Activity and Durations

Construction Activity	Indicative Duration
Site Establishment including: Construction of site access points > Setting out	3 months
General Deliveries: Import and export of materials from Site.	Ongoing throughout 26 months
Establishment of Site compounds including: Installation of surfacing for material storage and parking Installation of welfare buildings and site offices Establishment of secondary compounds which will be used to store materials and welfare to limit movement of internal traffic.	4 months
Site Tracks: To comprise crushed aggregate	6 months
Installation of geotextiles	14 months
Preparation of substation platform	6 months
Cabling Works	6 months
Pouring of substation concrete	2 months
Substation HV Deliveries	3 months
Internal HV Works & Buildings	3 months

Construction Activity	Indicative Duration
Solar Array Works Piling of mounting structures Mounting of solar modules to be completed using lifting machinery but fixed using hand held power tools.	16 months
Installation of cabling & cabling sand	16 months
Battery Platform	6 months
Battery Foundations	4 months
Battery Cabling	4 months
Landscaping and habitat enhancement, including fencing	Ongoing throughout 25 months
Commissioning including testing elements following the completion of key construction elements	5 months
Final Connection	1 month
Staff Movements	Ongoing throughout the anticipated 2 year programme
Installation of cabling & cabling sand	16 months

5.5.2 Construction working hours will be 7.00 - 19.00 hours Monday to Saturday. The need to undertake some limited works outside normal working hours or overnight cannot be discounted, and 24-hour working may be necessary in some locations. Such works may include, for example, some trenchless crossings if the technique in use and/or ground conditions dictate that continuous working is required, highways works (to minimise traffic disruption) or commissioning activities. If night-time working is required at specific locations, additional temporary lighting may be used at those locations for limited periods of time. Where onsite works are to be conducted outside core working hours, they will comply with the restrictions pursuant to the consenting process. **Table 5.7** below shows the indicative construction required for the Proposed Development.

Table 5.7 Anticipated Construction Plant

Plant	Description	Indicative Dimensions	Number of Items During Construction Period
Excavator	Used for site preparation, grading, and trenching for cable laying.	Crawler Excavators 22.5 tons (length 9.53m x width 3.17m x height 2.96m) Smaller Excavators 1.7 tons (dig depth: 2.57m, dump height 2.63m)	40-50 units
Mobile Cranes	Lifting heavy equipment and panels into place.	Range from 20 to 500+ tons. Height when fully extended could range from 20 to 100m.	10 units
Compact track loaders	Moving smaller loads and materials across rough terrain.	Approx. length 4m x width 2m x height 2m.	10 units
Compact track loaders	Moving smaller loads and materials across rough terrain.	Approx. length 4m x width 2m x height 2m.	10 units
Telehandlers (Telescopic Handlers)	Used for lifting and transporting materials and equipment around the site	Height up to 20m, with a lifting capacity of 2 to 4 tons.	40 units
Bulldozers	Used for grading and levelling the site.	Approx. length 8m x width 4m x height 3m.	10 units
Aerial Work Platforms (AWPs) or Cherry Pickers	Used for accessing elevated areas during installation	Height up to 30m.	30 units
Flatbed trucks	Transporting solar panels, mounting structures, and other large materials.	Approx. length 6m to 18m x width 3m.	30 units
Dump trucks	Hauling earth, gravel, and other construction materials	Approx. length 8m x width 3m x height 3m.	10 units
Water trucks	Used for dust suppression and site watering during construction	Approx. length 6m to 18m x width 3m	10 units
Generators	To provide temporary power during installation	Approx. length 0.7m x width 0.6m x height 0.6m	25 units

Plant	Description	Indicative Dimensions	Number of Items During Construction Period
Concrete Mixers and Pump Trucks	Used for pouring concrete foundations for mounting structures and equipment pads.	Up to 8m	10 units
Pile Driver	Driving piles into the ground	Approx. 3m in height.	15-20 Units
Trencher	Cable Trenching	7.2m x 6m 4m high	4 units
Compactors	Compacting soil and gravel for roads and foundations.	Approx. length 6m x width 2.5m x height 3m	15 units
Trenchless crossing rig	Used for creating trenchless crossing	11m x 3.5m 2.6m high	1 unit
Small HDD rig	Used for crossing under hedgerows, small watercourses, small roads	3.9m x 1.1m 1.6m high	10 units

5.5.3 During construction access to the Proposed Development will be from existing and upgraded strategic points on the public road network, with access achieved via upgraded farm access tracks and new access tracks. The **Illustrative Masterplan [EN010159/APP/2.7]** shows the location of the indicative access gates.

5.5.4 During construction, but there maybe temporary closures of public rights of ways with minor diversions provided. The management of the public rights of ways will be undertaken in line with the outline Public Rights of Way Management Plan (see **Outline Public Rights of Way Management Plan [EN010159/APP/7.14]**).

5.5.5 It is anticipated that the construction phase will require an average of 554 workers onsite with a maximum of up to 750 construction staff at the peak construction period. It is assumed that construction will be undertaken across the entire Site, simultaneously. For the purposes of the technical assessments presented in **Chapters 6 to 17 of Volume 2, Aspect Chapters**, the 750 construction staff have been assessed as this represents the worst case scenario for environmental impacts.

5.5.6 A programme of landscape and habitat reinstatement and creation will commence during the construction phase. Areas under the proposed PV arrays as well as the landscape buffers will be planted with a combination of species

rich grass mix. The landscape and habitat reinstatement and creation will be undertaken in accordance with the principles set out in the oLEMP.

5.5.7 An outline Construction Environment Management Plan (oCEMP) has been prepared to support the DCO application (**Outline Construction Environmental Management Plan [EN010159/APP/7.4]**). The oCEMP sets out legislation, guidance, best practice guidance and the mitigation measures identified through the EIA process to be employed during construction phase, such as construction lighting avoiding ecological sensitive habitats. The oCEMP will form the framework for a detailed CEMP that will be agreed with the local planning authority prior to construction.

5.5.8 An outline Construction Traffic Management Plan (oCTMP) has been prepared to support the DCO application and includes details on construction logistics and construction worker travel (**Outline Construction Traffic Management Plan [EN010159/APP/7.9]**). Information is also provided to guide the delivery of material, plant, equipment and staff during the construction phase.

5.6 Decommissioning Phase

5.6.1 The Proposed Development is expected to be operational for up to 60 years from final commissioning, after which time it will be decommissioned. For the purposes of this ES, the technical assessments presented in **Volume 2, Aspect Chapters** consider a 60 year lifespan.

5.6.2 Decommissioning will include the removal of all above ground infrastructure, including the BESS and Substations foundations. Permissive paths will also be removed. Underground cables and cable ducts (below 0.9m) are proposed to remain in situ, with their retention to be reviewed at decommissioning in line with future policy and industry practice. Trees and hedgerows planted as part of the Proposed Development are assumed to remain in situ when the land is returned to the landowners. It is also expected any clear span bridges used throughout the operational period will also remain in place.

5.6.3 It is considered all of the solar PV Modules and batteries used as part of the Proposed Development will be recycled. This is considered within the waste assessment detailed in the outline Site Waste Management Plan (**Outline Site Waste Management Plan [EN010159/APP/7.12]**). At this stage, it is considered decommissioning will occur over two years.

5.6.4 During decommissioning the Proposed Development will be subject to a Decommissioning Management Plan (DEMP), which will also include within the plan a Decommissioning Traffic Management Plan (DTMP). This will set out the principal decommissioning activities and the measures that will be implemented, so far as is practical, to ensure the works do not adversely impact amenity, traffic or the environment in the surrounding area. It will also set out the monitoring and auditing activities designed to ensure that such mitigation measures are carried

out, and that they are effective. An outline DEMP is submitted (see **Outline Decommissioning Environmental Management Plan [EN010159/APP/7.6]**).

5.6.5 The effects of the decommissioning phase are often similar to, or of a lesser magnitude than the effects generated during the construction phase and have been considered in the relevant sections of the ES. However, there can be a high degree of uncertainty regarding decommissioning as engineering approaches and technologies evolve over the operational life of the Proposed Development, and assumptions have therefore been made, where appropriate.

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