Lime Down
Solar Park

Environmental Statement

Volume 1, Chapter 3: The Scheme

September 2025

Revision 1

Planning Inspectorate Reference: EN010168

Document Reference: APP/6.1

APFP Regulation 5(2)(a)

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3 The Scheme

3.1 Introduction

3.1.1 This chapter of the Environmental Statement (ES) provides a description of the physical characteristics of the Scheme and the activities that would be undertaken during the construction, operation, and decommissioning phases. The description contained within this chapter informs each of the technical assessments within **ES Volume 1, Chapter 7** to **Chapter 20 [EN010168/APP/6.1]**.

3.1.2 This chapter is supported by the following figures in **ES Volume 2**:

- **Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]** (including Figure 3-1-1 to 3-1-5);
- **Figure 3-2: Key Construction Phase Features [EN010168/APP/6.2]** (including Figure 3-2-1 to 3-2-9);
- **Figure 3-3: Indicative 400 kV Substation and BESS Layout [EN010168/APP/6.2]**; and
- **Figure 3-4: Landscape and Ecology Mitigation Plan [EN010168/APP/6.2]**.

3.1.3 This chapter is supported by the following appendices in **ES Volume 3**:

- **Appendix 3-1: Battery Energy Storage System and Substation Description [EN010168/APP/6.3]**;
- **Appendix 3-2: Cable Route Corridor Construction Method Statement [EN010168/APP/6.3]**; and
- **Appendix 3-3: Illustrative Drawings [EN010168/APP/6.3]**.

3.1.4 This chapter should be read alongside the following Development Consent Order (DCO) plans:

- **Location Plan [EN010168/APP/2.1]**;
- **Land Plan [EN010168/APP/2.2]**;
- **Works Plan [EN010168/APP/2.3]**;
- **Streets Plan [EN010168/APP/2.4]**;
- **Public Rights of Way Plan [EN010168/APP/2.5]**;
- **Access Plan [EN010168/APP/2.6]**; and
- **Traffic Regulations Measures Plans [EN010168/APP/2.7]**.

3.2 Description of the Scheme

The Scheme and Order Limits

3.2.1 The Scheme comprises a solar photovoltaic (PV) electricity generating station of over 50 megawatts (MW) and associated development comprising Battery Energy Storage System (BESS) Area, substations, grid connection infrastructure and other infrastructure integral to the construction, operation and maintenance, and decommissioning phases.

3.2.2 The PV electricity generating station and BESS Area are located within five land parcels referred to as Lime Down A, B, C, D and E (hereafter collectively referred to as the 'Solar PV Sites') (refer to **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]**).

3.2.3 The Cable Route Corridor is the area within which the export connection cables (hereafter referred to as the 'Grid Connection Cables') would be located to connect the Solar PV Sites to the National Grid at the existing Melksham Substation (hereafter referred to as the 'Existing National Grid Melksham Substation') and the area within which cables connecting the Solar PV Sites would be located (hereafter referred to as 'Interconnecting Cables') (refer to **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]**).

3.2.4 Works at the Existing National Grid Melksham Substation involve the addition of new electrical infrastructure and associated civil works to comprise a new 400 kV feeder bay to connect the Grid Connection Cables for the Scheme (refer to the **Grid Connection Statement [EN010168/APP/7.5]** for further details).

3.2.5 Highways Improvements Areas (refer to **ES Volume 2, Figure 2-1: Elements of the Site [EN010168/APP/6.2]**) are sections of the highway network that will contain localised improvements, such as improvements to road edge where it is deteriorated, or temporary highway and traffic works required to safely accommodate the Abnormal Indivisible Load (AIL) deliveries. These areas will support the movement of construction vehicles on narrower sections of the local highway network within parts of the construction vehicle routes to the Site (refer to **ES Volume 1, Chapter 13: Transport and Access [EN010168/APP/6.1]**).

3.2.6 The Scheme would be located within the Order Limits, also referred to as 'the Site'. The Order Limits contain all elements of the Scheme comprising the Solar PV Sites (containing the BESS Area and onsite substations), the Cable Route Corridor, the Existing National Grid Melksham Substation, and the Highways Improvements Areas (shown in **ES Volume 2, Figure 1-2: The Order Limits [EN010168/APP/6.2]** and described further in **ES Volume 1, Chapter 2: The Order Limits [EN010168/APP/6.1]**).

Works Packages

3.2.7 The Scheme is also described in Schedule 1 of the **Draft DCO [EN010168/APP/3.1]** where the 'authorised development' is divided into works packages. The works numbers for those packages are summarised below and referred to throughout this chapter. Note that the works package areas overlap.

Work No.1

3.2.8 The solar photovoltaic generating station contained within the Solar PV Sites Lime Down A to E:

- Lime Down A comprises an area of approximately 94 ha;
- Lime Down B comprises an area of approximately 70 ha;
- Lime Down C comprises an area of approximately 241 ha;
- Lime Down D comprises an area of approximately 212 ha; and
- Lime Down E comprises an area of approximately 131 ha.

Work No.2

3.2.9 The energy storage facility comprising the BESS Area contained within Lime Down D.

Work No.3

3.2.10 Works in connection with 132 kV and 400 kV Substations comprising:

- Work No. 3A — substation up to 400 kV; and
- Work No. 3B — substations up to 132 kV.

Work No.4

3.2.11 Works to the Existing National Grid Melksham Substation to facilitate connection of the Scheme to the National Grid including population of the substation bay.

Work No.5

3.2.12 Works in connection of the Grid Connection Cables and Interconnecting Cables between the Solar PV Sites and connecting to the Existing National Grid Melksham Substation including works to lay electrical cables, access, and temporary construction laydown areas for electrical cables.

Work No.6

3.2.13 Works associated with each of the Solar PV Sites, including boundary treatment; security and monitoring equipment; landscaping and biodiversity mitigation and enhancement measures; internal access tracks and improvement, maintenance and use of existing private tracks; access arrangements; footpaths, cycle routes and roads; temporary footpath diversions; signage and information boards; earthworks; drainage and irrigation infrastructure and improvements to existing drainage and irrigation systems; electricity and telecommunications connections; and secondary temporary construction/decommissioning compounds and laydown areas.

Work No.7

3.2.14 Temporary construction and decommissioning compounds within each of the Solar PV Sites and works associated with these comprising areas of hardstanding; car parking; site and welfare offices and workshops; security infrastructure, including cameras, perimeter fencing and lighting; area to store materials and equipment; site drainage and waste management infrastructure (including sewerage); and electricity, water, wastewater and telecommunications connections.

Work No.8

3.2.15 Works to facilitate both temporary construction access, and permanent access to the Order Limits.

Work No.9

3.2.16 Works to create and maintain habitat management areas.

Work No.10

3.2.17 Creation of permissive paths for use of pedestrian, cycle, and equestrian users.

Associated Development

3.2.18 The Scheme also includes associated development in connection with Work No. 1 to 10 including fencing, gates, boundary treatment and other means of enclosure; bunds, embankment, trenching and swales; irrigation systems; drainage systems; services and utilities connections; works to alter the course of non-navigable rivers, streams or watercourses; ramps, bridges and means of access; security and monitoring measures; improvement, maintenance and use of existing private tracks; footpath diversions and enhancement; landscaping and related works; habitat creation and enhancement; site establishment and preparation works; earthworks and excavations; works for the protection of buildings and land; tunnelling, boring and drilling works; and other works to

mitigate any likely significant adverse effects from the construction, maintenance, operational or decommissioning phases of the Scheme.

The Rochdale Envelope

3.2.19 The design of the Scheme is an iterative process based on environmental assessment and consultation with statutory and non-statutory consultees. **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN010168/APP/6.1]** describes this process further, including options that have been considered and discounted or amendments made to the Scheme design to date. The design of the Scheme has been developed within the framework provided by the **Design Principles and Parameters [EN010168/APP/7.4]**. The **Design Approach Document [EN010168/APP/7.3]** describes the design evolution of the Scheme within this framework.

3.2.20 The EIA presented within this ES has been undertaken adopting the principles set out in the Planning Inspectorate's Advice Note Nine: Rochdale Envelope (Ref 3-1) which provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008 (Ref 3-2). The advice note acknowledges there may be aspects of the Scheme design that are not yet fixed and, therefore, it may be necessary for the EIA to assess likely worst-case variations to ensure all foreseeable significant environmental effects of the Scheme are considered.

3.2.21 Aspects of the Scheme that require design flexibility include, but are not limited to, the arrangement of the:

- Solar PV Panels and panel type/specification;
- Conversion Units/33 kV Sub-distribution Switch Rooms;
- Associated Development such as the Battery Energy Storage System (BESS) Area, and Substations; and
- Grid Connection Cables and Interconnecting Cables, i.e. the routing of the cables within the Cable Route Corridor.

3.2.22 It is necessary that there will be some flexibility built into the design of the Scheme when submitting the DCO Application so that the detailed design of the Scheme can be informed by technical considerations, post-consent work, and take advantage of innovation in technology. This is of particular importance in order to maintain flexibility due to the rapid pace of change in solar PV and battery storage technology, whilst maintaining a robust and comprehensive assessment of potential effects. Where such flexibility or optionality is required, this is explained in Section 3.3 to Section 3.6.

3.2.23 The technical assessments therefore assess an 'envelope' within which the works would take place (the Rochdale Envelope). As such, the DCO Application

and EIA will be based on maximum and, where relevant, minimum parameters. These parameters are considered in detail by the technical authors as part of the EIA to ensure the realistic worst-case effects of the Scheme are assessed for each potential receptor. The parameters are set out below.

Design Parameters

3.2.24 **Table 3-1** sets out the design parameters that have been assessed within this ES. Each Scheme component is described in more detail in Section 3.3. Each technical chapter has assessed the design identified to be the likely worst-case scenario for that discipline in order to determine effect significance. Where necessary and appropriate, the technical chapter also sets out mitigation measures that would be implemented as part of the Scheme.

3.2.25 The **Design Principles and Parameters [EN010168/APP/7.4]** document submitted as part of the DCO Application provides the principles and maximum parameters for the detailed design of the Scheme and is secured by a requirement in the **Draft DCO [EN010168/APP/3.1]**. When the detailed design for the Scheme is submitted for approval to the relevant planning authorities, those details must accord with the **Design Principles and Parameters [EN010168/APP/7.4]**. This ensures that the environmental effects (of the detailed design) would be the same as or no worse than those assessed and reported in the ES.

Table 3-1: Design Parameters Used for the Environmental Statement

Scheme Component	Parameter Type	Applicable Design Parameter
Solar PV Panels	Solar PV Panel type	Solar PV Panels will be bifacial monocrystalline panels, comprising two layers of toughened, low reflectivity glass.
	Solar PV Panel colour	The solar panels will be either black or dark blue.
Solar PV Mounting Structures	Material	Metal frame holding the solar panels in rows.
	Installation	Solar PV Panels would be secured via metal posts driven into ground to an approximate depth of 1.5 m to 4 m (dependant on ground conditions). In areas where archaeological protection is required, concrete feet or other non-ground penetrative techniques would be used.
Tracking Solar PV Tables (Option A)	Indicative orientation and slope	Solar PV Panels aligned in north-south rows. The panels will rotate to the east and west and tilt up to a maximum inclination of 60° from horizontal.
	Minimum height of the lowest part of the Solar PV Panel above ground level (AGL)	Solar PV Panels would have a minimum clearance of 0.4 m AGL at maximum tilt (+/- 60 degrees).
	Maximum height of Solar PV Panels AGL	Solar PV Panels would have a maximum height of 4.5 m AGL at maximum tilt (+/- 60 degrees). The maximum height when Solar PV Panels are horizontal would be 2.5 m AGL.
	Separation distance between rows	Solar PV Panels would be positioned in rows with a minimum separation distance of 2.5 m at the closest point when horizontal.
Fixed Solar PV Tables (Option B)	Indicative orientation	Solar PV Panels would be aligned in east-west rows of Solar PV Tables. The Solar PV Panels would be secured to fixed south facing Solar PV Tables with a fixed tilt angle of between +10 degrees to +35 degrees from horizontal.

Scheme Component	Parameter Type	Applicable Design Parameter
	Minimum height of the lowest part of the Solar PV Panel AGL	Solar PV Panels would have a minimum clearance of 0.4 m and no less than 0.6 m above the 0.1% Annual Exceedance Probability (AEP) flood level.
	Maximum height of Solar PV Panels AGL	Solar PV Panels would have a maximum height of 3.5 m AGL.
	Separation distance between rows	Solar PV Panels would be positioned in rows with a minimum separation distance of 2.5 m at the closest point.
Integrated Conversion Units /33 kV Sub-distribution Switch Rooms	Maximum dimensions	15 m by 5 m and a maximum height of 3.5 m.
	Material	The Conversion Units /33 kV Sub-distribution Switch Rooms would be housed in a metal container and would be externally finished in keeping with the prevailing surrounding environment, often with a grey painted finish.
	Foundations	A concrete foundation slab, strips or footings up to 16 m by 6 m and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required. Conversion Units /33 kV Sub-distribution Switch Rooms will be elevated by mounting structures so that they are no less than 0.6 m above the 0.1% Annual Exceedance Probability (AEP) flood level or where this is not possible as high as practicable.
Standalone Conversion Units	Inverters	9 m by 6.5 m and a maximum height 3.5 m
	Transformers	6.5 m by 5.5 m and a maximum height 3.5 m
	Switchgear	6.5 m by 2.5 m and a maximum height 3.5 m

Scheme Component	Parameter Type	Applicable Design Parameter
	Material	The equipment would be finished to be in keeping with the prevailing surrounding environment, The exact colour will be subject to manufacturer specifications and will be carefully selected in subdued, non-reflective tones to sit as discreetly as possible within the landscape.
	Foundations	A concrete foundation slab, strips or footings up to a metre greater than the maximum dimension of the relevant piece of equipment and a levelling layer of aggregate with a maximum depth of 0.8 m, or a concrete plinth set onto the topsoil where non-ground penetrative works are required. Standalone inverters, transformers and switchgear will be elevated by mounting structures so that they are no less than 0.6 m above the 0.1% Annual Exceedance Probability (AEP) flood level or where this is not possible as high as practicable.
Solar PV Sites Perimeter Fencing	Type	Deer wire mesh and wooden post security fence with wooden posts.
	Installation	Directly driven into the ground using a standard post driver. There would be no excavation of foundations. 'Concreting in' of posts would be used in limited circumstances such as corner or tension posts.
	Height	Maximum height of 2.5 m.
Security System	Type	A closed-circuit television (CCTV) camera system would be deployed around the perimeter of the operational areas of the Solar PV Sites.
	Mounting	CCTV cameras would be mounted on posts with a maximum height of approximately 3 m. The poles would be galvanised steel and externally finished to be in keeping with the prevailing surrounding environment. The exact colour will be subject to manufacturer specifications and will be carefully selected in subdued, non-reflective tones to sit as discreetly as possible within the landscape.
132 kV Substation	Maximum compound area	0.9 ha.

Scheme Component	Parameter Type	Applicable Design Parameter
	Maximum height	7 m to the top of the busbars.
	Maximum foundation depth	Piled foundations to a maximum 12 m depth
	132 kV Relay and Control Rooms	Maximum dimensions of 5 m by 10 m and maximum height of 4.2 m.
	33 kV Switch Room	Maximum dimensions of 4.5 m by 18 m and maximum height of 4.2 m.
	Compound perimeter	A maximum of 3 m high palisade fencing around the compound. A maximum of 2.5 m high deer type wire mesh and wooden post fencing outside of the palisade fencing.
400 kV Substation	Maximum compound area	4.25 ha
	Maximum height	13 m to the top of the busbars.
	Maximum foundation depth	Piled foundations to a maximum 12 m depth.
	400 kV Relay and Control Rooms	Maximum dimensions of 12.7 m by 34 m and maximum height of 4.8 m.
	132 kV Relay and Control Rooms	Maximum dimensions of 13 m by 13 m and maximum height of 4.8 m.
	33 kV Switch Room	Maximum dimensions of 4.5 m by 18 m and maximum height of 4.2 m.
	Compound perimeter	A maximum of 3 m high palisade fencing around the compound. A maximum of 2.5 m high deer type wire mesh and wooden post fencing outside of the palisade fencing.

Scheme Component	Parameter Type	Applicable Design Parameter
BESS Area	Maximum compound area	5.5 ha.
	BESS Battery Container	Maximum height of 4.5m (comprising 3.5 m BESS Containers and 1 m silencers).
	BESS foundation	Maximum 4 m depth.
	Integrated Conversion Units	15 m by 5 m and a maximum height of 3.5 m.
	Compound perimeter	A maximum of 3 m high palisade fencing around the compound.
Access	BESS Area and Substation Accesses	Maximum 6 m wide road (8 m at passing places) constructed of asphalt over a levelling layer of substrate. The access points from the public highway and bends in the track would be wider to accommodate abnormal indivisible load turning space.
	Solar PV Access Tracks	A maximum of 3.5 m wide (6 m at passing places) constructed of hardcore or gravel over a levelling layer of substrate. The access points from the public highway will comprise reinforced concrete.
	Parking	Parking bays will be provided at the substations and BESS Area.
On-Site Cables	Cable Type	On site components such as Solar PV Panels, Conversion Units and BESS Containers would be connected with 33 kV, 1.8 kV, 400 V and lower voltage control cables to suit the detailed design.
	Indicative cable trench dimensions	Up to 1.6 m in width and up to 1.2 m depth.
Interconnecting Cables	Cable Type	The Conversion Units, 33 kV Sub-distribution Switch Rooms, 132 kV Substations, 400 kV Substation and the Solar PV Sites would be connected with 33 kV to 132 kV Interconnecting Cables.

Scheme Component	Parameter Type	Applicable Design Parameter
	Indicative cable trench dimensions	The open cut cable trench would be up to approximately 1 to 7 m wide. This includes separation distances where multiple cables are running in parallel. To accommodate this trench depth would be up to 2 m deep (and a minimum of 1.2 m depth in fields returned to agriculture during the operation of the Scheme).
	Indicative working width	The Scheme allows for necessary spatial flexibility in the routing of the Interconnecting Cables. The working area for installation of the Interconnecting Cables is anticipated to be a 25 m wide corridor. This will be widened in places to accommodate required operations (such as the crossing of watercourses, roads, utilities etc.) and narrowed in others, for example to minimise removal of hedgerows. The working width includes the trench, soil, and spoil storage, working area and haul road with passing places where required. As is typical for cable installation projects, the haul road would be up to a maximum of 7 m wide and would run directly on the subsoil surface with temporary track matting used where required. Where passing places are incorporated into the haul road these will be up to 12 m wide.
	Fencing	The working width for the Interconnecting Cables would be demarcated by temporary (heras style) fencing where required.
	Horizontal Directional Drilling	25 m x 25 m launch /receptor pit working area.
Grid Connection Cables	Cable Type	The 400 kV Substation and the Existing National Grid Melksham Substation would be connected via a single 400 kV circuit comprised of three buried cables, fibre optic cable, and low voltage control cable.
	Indicative cable trench dimensions	The open cut cable trench would be up to approximately 1.7 m wide. Grid Connection Cables would be installed in a trench up to 2 m deep (and a minimum of 1.2 m depth in fields returned to agriculture during the operation of the Scheme).

Scheme Component	Parameter Type	Applicable Design Parameter
	Indicative working width	The Cable Route Corridor allows for necessary spatial flexibility in the routing of the Grid Connection Cables. The construction working area for installation of the Grid Connection Cables will typically be a 25 m wide corridor. This will be widened in places to accommodate required operations (such as the crossing of watercourses, roads, utilities etc.) and narrowed in others, for example to minimise removal of hedgerows. The working width includes the trench, soil, and spoil storage, working area and haul road with passing places where required. As is typical for cable installation projects, the haul road would be up to a maximum of 7 m wide and would run directly on the subsoil surface with temporary track matting used where required. Where passing places are incorporated into the haul road these will be up to 12 m wide.
	Fencing	The working width of the Cable Route Corridor would be demarcated by temporary (heras style) fencing where required.
	Horizontal Directional Drilling	25m x 25m launch /receptor pit working area.
Existing National Grid Melksham Substation	Point of connection	The Grid Connection Cables would connect to the national grid at the Existing National Grid Melksham Substation. Minor modifications would be undertaken by National Grid at the Existing National Grid Melksham Substation relating to extending the existing busbars within the substation. The Applicant's (Lime Down Solar Park Limited) works would comprise installation of a new 400 kV feeder bay and associated connection works.

3.3 Components of the Scheme

3.3.1 **Table 3-1** above describes the design parameters of the Scheme. Further detail of the role and function of the Scheme components are presented below.

Solar PV Infrastructure (Work No.1)

Solar PV Panels

3.3.2 The Solar PV Panels would convert sunlight into electrical current (as direct current (DC)). The Solar PV Panels would be bifacial which are designed to let some sunlight through and have a transparent backing. The solar cells of bifacial panels are also able to absorb energy from the rear of the cell and any reflected light to increase energy production compared to monofacial panels.

3.3.3 Various factors (such as electrical design) inform the number and arrangement of Solar PV Panels in each table. Flexibility is required to accommodate future technology developments at the detailed design stage, as referenced above.

3.3.4 The Applicant does not propose a limit on the generating capacity of the Scheme in the DCO Application as the environmental effects associated with the Scheme are determined by the relevant design parameters and not capacity.

Solar PV Mounting Structures

3.3.5 Each Solar PV Panel would be mounted on a metal rack, known as a Solar PV Mounting Structure. The most common installation solution on existing UK solar farms is to drive the piles directly into the ground without the need for the excavation for foundations and avoiding disturbance to the surrounding land surface (soils). This installation method, to a maximum depth of 4 m (dependent on ground conditions), will be used other than in areas where archaeological protection is required, where concrete feet or other non-ground penetrative techniques will be used to secure the Mounting Structures.

3.3.6 The Scheme would utilise either east-west single axis tracker Solar PV Mounting Tables (Option A) or fixed south facing Solar PV Mounting Tables (Option B).

3.3.7 The Applicant seeks consent for both tracker (Option A outlined in **Plate 3-1**) and fixed Solar PV Mounting Table options (Option B outlined in **Plate 3-2**) within the Solar PV Sites.

3.3.8 For the purposes of assessment, the tracker panels have been assumed in **ES Volume 1, Chapter 8: Landscape and Visual [EN010168/APP/6.1]** as a worst-case scenario given their greater height. **ES Volume 1, Chapter 14: Noise and Vibration [EN010168/APP/6.1]** also assesses tracker panels given that fixed Solar PV Panels do not have any moving parts and therefore have no noise emission associated with them. The Glint and Glare section of **ES Volume 1, Chapter 20: Other Environmental Matters [EN010168/APP/6.1]** considers both fixed and tracker panel options as either type of panel may constitute the worst case scenario depending on the type and location of the receptor.

Tracking Solar PV Tables (Option A)

3.3.9 A tracker system involves attaching the Solar PV Panels to a motorised table that can move in relation to the sun. This allows for optimal power generation throughout the day. The Solar PV Panels would be stored horizontally overnight. The Scheme would utilise a single-axis tracker system which tilts the Solar PV Panels around a horizontal north-south axis thus tracking the movement of the sun from east to west, as illustrated in **Plate 3-1** to **Plate 3-3**.

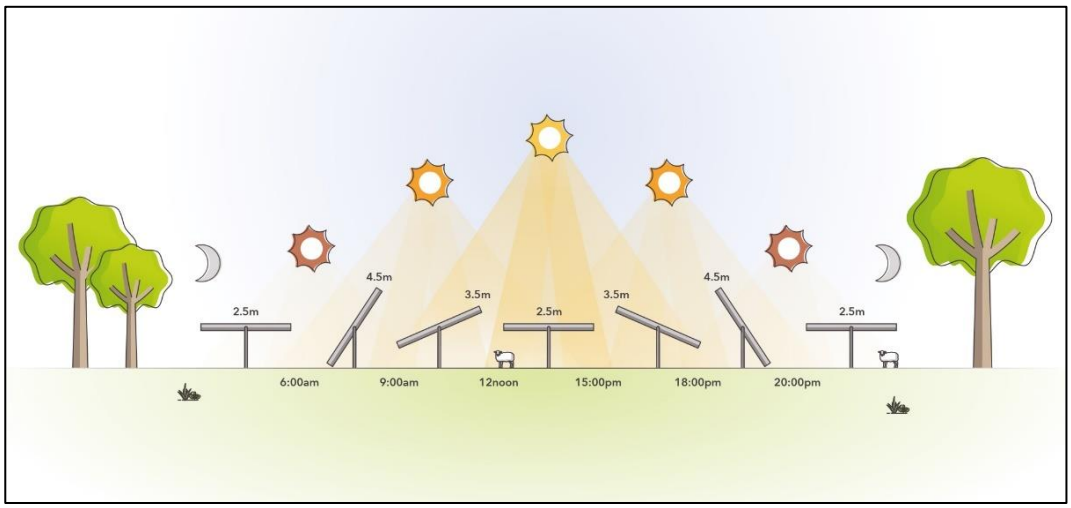
3.3.10 A detailed feasibility study undertaken by the Applicant has determined that east-west single axis tracker Solar PV Panels would generate more renewable energy generation per annum compared with a fixed south facing layout and would be utilised within the Solar PV Sites, unless there are practical or environmental constraints. This is due to ongoing technological advances and environmental and economic considerations. For example, recent studies by the Solar Energy Research Institute using world-wide data (Ref 3-3) found single axis tracker systems significantly outperform fixed tilt configurations in terms of energy output, and that using single axis tracker systems with bifacial panels can produce 35% more energy than fixed tilt monofacial panels. Single axis trackers also have the benefit of being lower in height for most of the day compared to the fixed south facing arrangement.

3.3.11 Therefore, the 4.5 m tracker panel maximum envelope provides better solar generation throughout the day, across different seasons, especially in the early morning and late afternoon. This leads to improved generation, delivering more energy from the same land footprint per MW than the 3.5 m envelope and other solar technologies.

Plate 3-1: Typical Tracker Solar PV Panels in an Angled Orientation

Plate 3-2: Typical Tracker Solar PV Panels in a Near Flat Orientation

Plate 3-3: Illustration Tracker Solar PV Panels following the sun position



3.3.12 Tracker panels can include one panel (1P) or two panels (2P) attached to each Solar PV Mounting Tables (note, **Plate 3-4** illustrates 4 panels attached to the Solar PV Mounting Tables, albeit this is not a tracker arrangement). 1P are less efficient at converting sunlight into electrical current and provide a lower ground cover ratio. 1P are up to 3.5 m in height and do not require as much support from their foundations. Therefore, 1P would be used where concrete feet (refer to Plate 3-4:) or other non-ground penetrative techniques are identified as being required to mitigate impacts to buried archaeology. Refer to **ES Volume 3, Appendix 3-3: Illustrative Drawings [EN010168/APP/6.3]** for a diagram of 1P panels with concrete feet. Each environmental discipline chapter defines the worst case scenario for the purposes of assessment (refer to **ES Volume 1, Chapter 6: Environmental Impact Assessment Methodology [EN010168/APP/6.1]**).

3.3.13 The Applicant has committed to use of single axis tracking Solar PV Panels and implementing a resting angle of 5° in field C14 where required to avoid potential glint and glare impacts to the railway. These measures are secured within the **Outline CEMP [EN010168/APP/7.12]** and the **Outline OEMP [EN010168/APP/7.13]**.

Plate 3-4: Fixed Panels on Concrete Feet

Fixed Solar PV Tables (Option B)

3.3.14 Fixed south facing Solar PV Panels are the most common approach for ground mounted solar PV facilities in the UK to date and involve installing Solar PV Panels to fixed tables, arranged in rows facing south. An example of fixed south facing arrangement is presented in **Plate 3-5**.

3.3.15 Fixed south facing Solar PV Panels may be utilised at an individual field level where practical and/or environmental constraints prevent the use of Tracking Solar PV Tables.

3.3.16 As for Option A, concrete feet, or other non-ground penetrative techniques, may be used as archaeological mitigation to secure the mounting structures to the ground. The use and implementation of concrete is set out in the **ES Volume 3, Appendix 12-6: Archaeological Mitigation Strategy [EN010168/APP/6.3]**.

3.3.17 The Applicant has committed to use of 2.5m 1P fixed south facing panels where required in field B11 to avoid potential glint and glare impacts to residential receptors. These measures are secured within the **Outline CEMP [EN010168/APP/7.12]** and the **Outline OEMP [EN010168/APP/7.13]**.

Plate 3-5: Typical Fixed Solar PV Panels (with Conversion Unit/Inverter)

33 kV Sub-distribution Switch Rooms

3.3.18 33 kV Sub-distribution Switch Rooms (refer to **Plate 3-6**) would be located throughout the Solar PV Sites to collect the generated power and manage its delivery to the 132 kV and 400 kV Substations. The 33 kV Sub-distribution Switch Rooms would be similar in appearance to the Integrated Conversion Units and be contained within the same design parameters (refer to **Table 3-1**) and indicative locations shown on **ES**

Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]. The locations shown on **Figure 3-1** are indicative for the purposes of assessment.

Plate 3-6: Typical 33 kV Sub-distribution Switch Room

Conversion Units

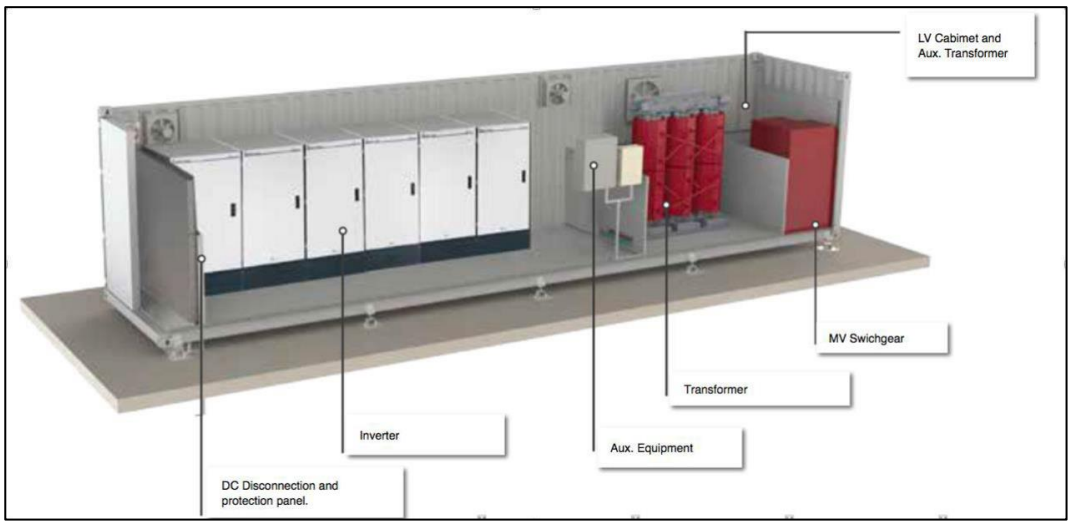
3.3.19 The Conversion Units incorporate the inverters, transformers and switchgear and are required to manage the electricity generated by the Solar PV Panels. These would either be standalone equipment or they would be housed ('integrated') together within a container. The Design Parameters allow for both options (as set out in **Table 3-1**). For the purpose of this assessment, indicative locations for Conversion Units are shown in **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]**. The exact number of Conversion Units may change within the envelope of the Solar PV Sites and will be confirmed at the detailed design stage. To account for this flexibility in design, up to two Conversion Units at each location identified in **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]** has been assessed where appropriate to present a worst-case.

3.3.20 Inverters are required to convert the DC electricity collected by the Solar PV Panels into alternating current (AC), which allows the electricity generated to be exported to the National Grid. Transformers are required

to step up the voltage of the AC electricity generated by the Solar PV Panels before it reaches the 132 kV and 400 kV Substations. Switchgear is the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear is used both to de-energise equipment to allow work to be done and to clear faults.

3.3.21 An integrated Conversion Unit would comprise one or two central inverters, transformers and switchgear all housed within a complete, preassembled and preconfigured unit. Monitoring and control systems would consist of manual controls at the Conversion Units, and automatic and centralised monitoring and control features at the control rooms on the onsite substations. **Plate 3-7** provides an illustration of a typical integrated Conversion Unit.

Plate 3-7: Typical Integrated Conversion Unit



3.3.22 Standalone inverters, transformers and switchgear collectively making up a Conversion Unit may also be implemented individually. **Plate 3-8** provides an illustration of typical Standalone equipment.

Plate 3-8: Typical Standalone Equipment Making Up a Conversion Unit

3.3.23 Both options integrated and standalone options would sit on a concrete foundation slab, strips or footings for each of the units and a levelling layer of aggregate; or a concrete plinth set atop the topsoil where non-ground-penetrative works are required.

Battery Energy Storage System Area (Work No.2)

3.3.24 The BESS would be situated in Lime Down D. The BESS Area will be designed to provide peak generation and grid balancing services to the electricity grid. The BESS Area allows excess electricity generated from the Solar PV Panels or excess energy in the grid to be stored in the batteries and exported at strategic times of the day to provide flexibility and enhance grid reliability.

3.3.25 **Plate 3-9** shows an example image of a BESS Area arrangement with associated infrastructure.

Plate 3-9: Typical Battery Energy Storage System

3.3.26 The batteries would be housed within enclosures (referred to as 'BESS Containers' within this ES). The BESS Containers would be mounted on concrete foundations, although other types of foundations such as compacted gravel, metal pile, or ground screw pile may be used depending on ground conditions.

3.3.27 The Scheme is anticipated to include approximately 270 BESS Containers. The layout is shown in **ES Volume 2, Figure 3-3: Indicative 400 kV Substation and BESS Layout [EN010168/APP/6.2]**. The precise number of BESS Containers will depend upon the level of power capacity of energy storage that the Scheme will require at the time of procurement. Regardless, the BESS Area will not exceed the maximum compound area defined in **Table 3-1**.

3.3.28 To ensure the efficiency of the batteries and ensure optimum operating conditions, each of the BESS Containers would have an integrated heating and cooling system (Thermal Management System). The Thermal Management System would be integrated into the units within which they are housed.

3.3.29 Similar to the Solar PV Panels, the BESS Containers would be connected to inverters, transformers and switchgear which may be integrated into a single container or as standalone components. The maximum parameters for the inverters, and transformers and switchgear would be the same as those associated with the Solar PV Panels (refer to **Table 3-1** and the **Works Plans [EN010168/APP/2.3]**).

3.3.30 The inverters, and transformers and switchgear would convert the electricity between AC and DC and would step the voltage up or down depending on the direction of the energy flow allowing the BESS Containers to receive electricity from the 400 kV Substation for storage,

and to release the stored energy via the 400 kV Substation to the National Grid. A separate BESS Control Building would also be located within the BESS Area.

3.3.31 Cabling between BESS Containers and other infrastructure within the BESS Area will either be above ground in cable trays or laid in a trench up to 1.2 m in depth and 1.6 m wide.

3.3.32 The BESS Area and components used to construct the facility will be certified to UL 9540 (2023) (Ref 3-4) and/or BS EN IEC 62933-5-2 (Ref 3-5) standards. Future standards which supersede these standards will be used as appropriate. BESS Containers would have installed fire detection, explosion prevention, and suppression systems in accordance with National Fire Protection Association (NFPA) 855 requirements and National Fire Chiefs Council guidance and confirmed in the **Outline Battery Safety Management Plan (BSMP) [EN010168/APP/7.21]**. The current 2023 version of NFPA 855 (Ref 3-6) is due to be updated in 2026 and the Applicant will ensure that the requirements set out in the updated document are implemented for the Scheme through the **Outline BSMP [EN010168/APP/7.21]**.

3.3.33 Other fire safety measures include spacing requirements between the BESS Containers and between the BESS Area and other infrastructure. These measures are secured via the **Outline BSMP [EN010168/APP/7.21]**.

3.3.34 Provision would also be made for fire water containment, which is considered further in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]**.

3.3.35 Further details of the BESS Area are contained within **ES Volume 3, Appendix 3-1: Battery Energy Storage System and Substation Description [EN010168/APP/6.3]**.

Substations (Work No.3)

3.3.36 The **Works Plans [EN010168/APP/2.3]** identify the areas where the substations can be located. The indicative layout in **ES Volume 2, Figure 3-3: Indicative 400 kV Substation and BESS Layout [EN010168/APP/6.2]** and **ES Volume 3, Appendix 3-3: Illustrative Drawings [EN010168/APP/6.3]** include an example configuration for the substations.

132 kV Substations

3.3.37 Up to 132 kV Substations will be located at Lime Down A, Lime Down C, Lime Down D and Lime Down E (refer to **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]**).

3.3.38 Power would be fed from the Conversion Units/33 kV Sub-distribution Switch Rooms to 132 kV Substations, which in turn would feed power directly to the 400 kV Substation.

3.3.39 The 132 kV Substations would consist of electrical infrastructure such as transformers, switchgear and metering equipment. The electrical infrastructure would be outside (i.e. not contained within a building). The Substations would have a separate Control Building (with welfare facilities) which may incorporate a metering room, though this may instead be a smaller separate structure.

3.3.40 An example of a 132 kV Substation is shown in **Plate 3-10**.

Plate 3-10: Typical 132 kV Substation Compound

400 kV Substation

3.3.41 One 400 kV Substation would be located within Field D22 of Lime Down D (refer to **Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]**).

3.3.42 The 400 kV Substation would consist of electrical infrastructure including the transformers, switchgear and metering equipment. The 400 kV Substation would be connected to the 132 kV Substations via the Interconnecting Cables and step up the voltage to 400 kV ready to be exported to the Existing National Grid Melksham Substation via the Grid Connection Cables.

3.3.43 The 400 kV Substation would also step down the voltage from 400 kV to 132 kV, 132 kV to 33 kV, and 400 kV to 33 kV. This would allow for both

excess electricity provided from the grid at 400 kV and provided from the Solar PV Sites at 33 and 132 kV to be stored within the BESS Area.

3.3.44 The electrical infrastructure would be outside (i.e. not contained within a building) and would comprise separate infrastructure and conductors. The 400 kV Substation would have a separate Control Building (with welfare facilities) and a metering room.

3.3.45 An example of substation components is shown in **Plate 3-11** and **Plate 3-12** provide a digital rendering of the 400 kV Substation.

Plate 3-11: Typical (Large 400 kV) Power Transformer

Plate 3-12: Digital rendering of the 400 kV Substation

Note: this image was digitally created by Omina (the Applicant's Engineering Consultancy) using the 400 kV Substation design for the Scheme.

Grid Connection Works at Existing National Grid Melksham Substation (Work No.4)

3.3.46 Work will be undertaken within the existing 400kV AIS substation including the population of the bay onto the existing busbars: The work consists of installation of:

- A 400 kV 3-phase 4000 A circuit breaker for control and protection of the outgoing circuit serving the Scheme;
- A 3-phase set of current transformers for protection of the new outgoing 400 kV feeder circuit and the overlap with the National Grid system;
- A 3-phase High Accuracy Metering Current and Voltage Transformer assembly for commercial metering of the connection;
- A 3-phase 400 kV Line disconnector/earth switch for isolation and earthing of the outgoing 400 kV feeder circuit;
- A 3-phase set of 400 kV high voltage cable sealing ends and cables connecting the National Grid site with the Scheme's site at Lime Down D; and
- A 3-phase Power Quality ready Capacitor Voltage transformer.

3.3.47 Also required is protection, control and ancillary apparatus for the circuit to be housed within the existing National Grid substation and may also include the addition of a small local building sized approximately 6 m x 3

m, comprising duplicate feeder protection systems, commercial metering systems, National Grid owned protection and control equipment and User Remote Control and data acquisition apparatus.

3.3.48 At this stage the location of the bay to be used by the Scheme within the Existing National Grid Melksham Substation is not yet known. However, it is confirmed that the southern portion of the Existing National Grid Melksham Substation operated by Scottish and Southern Energy Networks would not be used. Refer to the **Works Plans [EN010168/APP/2.3].**

Cabling

On-Site Cables

3.3.49 Cabling between PV modules will typically be above ground level along a row of Solar PV Tables, fixed to the Solar PV Mounting Structures, and then underground between the rows and to the Conversion Units and 33 kV Sub-distribution Switch Rooms.

3.3.50 Additional low voltage auxiliary cabling would supply the CCTV and monitoring equipment.

3.3.51 In identified archaeologically sensitive areas, cables will be installed to avoid or minimise disturbance below ground level.

Cable Route Corridor (Work No.5)

3.3.52 The exact location of the Grid Connection Cables and Interconnecting Cables within the Cable Route Corridor will be determined at the detailed design stage. For assessment purposes, the placing of the cable anywhere within the Cable Route Corridor has been considered. The Cable Route Corridor is 50 m wide along the majority of its length with an increase in width up to 665m at a number of locations including utility, road and rail crossings. The construction working width will typically be 25 m wide and will narrow at hedgerow crossings.

3.3.53 The voltage of the Interconnecting Cables and the number of circuits would affect the width and number of cable trenches required.

3.3.54 The width and spacing of the cable trenches will vary depending on environmental constraints, engineering requirements, or if crossing third party apparatus (e.g. railway lines). Crossings would be carried out via a combination of open cut trenching and Horizontal Directional Drilling (HDD), with the latter used if needed to avoid and reduce adverse environmental effects.

3.3.55 A number of Avoidance Areas have been identified (refer to **ES Volume 2, Figure 3-2-1** to **3-2-10**: **Key Construction Phase Features**

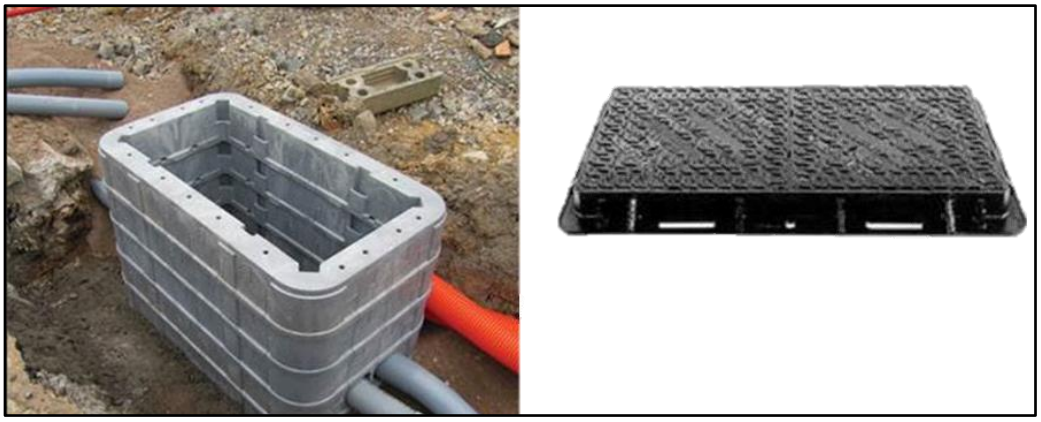
[EN010168/APP/6.2] and **ES Volume 3, Appendix 3-2: Cable Route Construction Method Statement [EN010168/APP/6.3])** where non intrusive installation methods will be used to avoid impact to sensitive features such as watercourses, hedgerows and mature vegetation.

3.3.56 Data cables will be installed, typically alongside electrical cables in order to allow for monitoring during operation, such as the collection of solar data from pyranometers and inverters.

3.3.57 Joint bays will link sections of underground cables. These will be a minimum of 250 m to a maximum of 2 km apart. The dimensions of these are determined by how many sets of cables will be in the jointing bay. A joint bay for six cables /joints would be approximately 20 m long and 6 m wide and approximately 3 m deep. The base of the joint bay must be level and a concrete pad installed (approximately 150 mm thick with light reinforcement) as a working surface.

3.3.58 Fibre communication chambers will be installed typically every 500 to 750m but can be up to 2,000 m apart along the cable route. These are generally located at field boundaries. The final locations would be determined at detailed design. The excavation for this type of chamber would be approximately 1.5 m length, 1 m wide and 1.5 m deep. The appearance is illustrated in the **Plate 3-13** below. They would stand 10 mm to 20 mm above ground.

Plate 3-13: Fibre Chambers (construction and external appearance)



3.3.59 Following installation of the cables the construction working area would be fully reinstated back to its original condition.

Grid Connection Cables (Work No.5A)

3.3.60 The electricity generated by the Solar PV Panels and/or stored by the BESS Area would be exported from or imported to the 400 kV Substation to the Existing National Grid Melksham Substation via underground Grid

Connection Cables routes within the Cable Route Corridor. The voltage of the Grid Connection Cables would be 400 kV.

Interconnecting Cables (Work No.5B)

3.3.61 The Conversion Units would be connected to the 33 kV Sub-distribution Switch Rooms or 132 kV Substations, and on to the 400 kV Substation via underground Interconnecting Cables. The voltage of the Interconnecting Cables would be between 33 kV and 132 kV.

Distribution Network Operator Connections

3.3.62 It is likely that local grid connections to the distribution network (operated by Scottish and Southern Electricity Networks) will be made for all substations. This will allow the generating station to connect to the local grid network to obtain short-term auxiliary power to the substations to maintain operation in the event that there is a technical problem with the connection to the National Grid.

3.3.63 Where connections to the local grid network are not practicable the substations will be equipped with a backup diesel generator. This generator is intended to operate in the event of a grid connection failure (power outage). It will also maintain communication and protection systems to ensure a safe restart when power is restored.

3.3.64 During reinstatement to grid connection, diesel generators provide immediate power to essential systems, including communication and protection systems, which are vital for coordinating the restart process. Generators operate independently of the grid and while BESS Area can store and discharge energy, BESS Area may not always have sufficient capacity to handle prolonged outages or the initial surge in demand during a restart. Diesel generators supplement the BESS Area to ensure continuous power supply and maintain critical infrastructure, facilitating a smoother and safer restart.

Site Access (Work No.8)

3.3.65 Wherever practicable, existing field accesses will be utilised for access to the Order Limits. If a suitable field access does not exist, for example due to poor highway visibility, new accesses would be constructed. Accesses would be designed to ensure there are no impacts on veteran or protected trees as a result of vehicle movements, however, there may be localised removal of sections of hedgerows as required, e.g. for visibility splays.

3.3.66 The access points into the individual Solar PV Sites have been designed to accommodate articulated heavy goods vehicles (HGV) with a maximum length of 16.5 m (excluding accesses which would be used for ecological/landscape mitigation and therefore would not require HGV

access). Visibility splays have been included and based on the recorded speed of the vehicles on the road network (85th percentile speeds) to ensure safety. There may be some variation on visibility splays based on site specific conditions.

3.3.67 A number of deliveries within the Order Limits during the construction phase would be Abnormal Indivisible Loads (AILs). An AIL is where the vehicle exceeds 44 tonnes, the width is over 2.9 m or the length is more than 18.65 m. These are likely to include deliveries of transformers and cable drums. A separate standalone AIL assessment has been undertaken as part of the DCO application and is appended to the **Outline CTMP [EN010168/APP/7.22]**.

Solar PV Sites Accesses

3.3.68 The access locations are set out in **Table 3-2** and shown in **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2].**

Table 3-2: Solar PV Site Access

Access	Description	Construction Phase	Operation Phase	Decom. Phase
1	**Lime Down C** - West of Fosse Way south of railway bridge	✓	✓	✓
2	**Lime Down C** - East of Fosse Way south of railway bridge	✓	✓	✓
2a/b	**Lime Down C** - West and east of Pig Lane	✓	✓	✓
3	**Lime Down C** - East of Fosse Way north of railway bridge	✓	✓	✓
4	**Lime Down B** - East of Fosse Way (byway), to the north of crossroads	✓	✓	✓
4a/b	**Lime Down B** - East and west of Unnamed Road north of Norton	✓	✓ (4b only)	✓
5	**Lime Down A** - West of Unnamed Road between Fosse Way and Sherston	✓	✓	✓

Access	Description	Construction Phase	Operation Phase	Decom. Phase
6	**Lime Down A** - East of Unnamed Road between Fosse Way and Sherston This access utilises an existing field access to Fields A11 and A12. These fields would be used for ecological/landscape mitigation and therefore would not require HGV access.	✓	✓	✓
7	**Lime Down D** - East of Bradfield Cottages road	✓	✓	✓
8	**Lime Down D** - West of Bradfield Cottages road	✓	✓	✓
9	**Lime Down D** - Unnamed road East of Hullavington crossroads	✓	✓	✓
10	**Lime Down D** - North off A429	✓		✓
11	**Lime Down E** - North of Cabbage Lane, near Rodbourne	✓	✓	✓
12	**Lime Down E** - North of Cabbage Lane, near Rodbourne (west of Access 10)	✓	✓	✓
13	**Lime Down E** - North of Cabbage Lane, near Rodbourne (west of Access 11)	✓	✓	✓
14	**Lime Down E** - End of Cabbage Lane, near Rodbourne (west of Access 12)	✓	✓	✓
15	**Lime Down E** - End of Cabbage Lane, near Rodbourne (west of Access 13)	✓	✓	✓

Access	Description	Construction Phase	Operation Phase	Decom. Phase
16	**Lime Down E** - South of Cabbage Lane, near the rail line This access utilises an existing field access to Fields A11 and A12. These fields would be used for ecological mitigation and therefore would not require HGV access.	✓	✓	✓
17	**Lime Down E** - South of Cabbage Lane, near the rail line (South of Access 15)	✓	✓	✓
17a/b	**Lime Down E** - Further south on Cabbage Lane (approx. 650 m south of Access 15)	✓	✓	✓
18	**Lime Down E** - South of A429	✓	✓	✓
19	**Lime Down C** - East of Fosse Way south of railway bridge.	✓	✓	✓
20	**Lime Down D** - West of Bradfield Cottages road, south of Norton (Emergency access in operation only)	✓	✓	✓
21	**Lime Down D** - East of Hill Haynes Lane (Emergency access only)	✓	✓	✓

3.3.69 Accesses 5, 10, 18, 19 and 20 set out in **Table 3-2** will provide access to the substations and BESS Area and be suitable for AILs. These will comprise a track up to 6 m wide (with up to 8m wide passing places) constructed of asphalt over a levelling layer of substrate. The access points from the public highway and bends in the track would be wider to accommodate abnormal indivisible loads turning space. AIL numbers and access routes to the Order Limits are considered in **ES Volume 1, Chapter 13: Transport and Access [EN010168/APP/6.2].**

3.3.70 Access tracks would also be established within the Solar PV Sites. These would be a minimum of 3.5 m wide (with up to 6 m wide passing places) compacted stone tracks with 1:2 gradient slopes on either side. Where practicable, existing access tracks will be used and upgraded. The access tracks shown on **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]** are indicative locations for the purposes of assessment. The locations and alignments of the internal access tracks within the Solar PV Sites are likely to change depending on the final layout design and the construction methodology.

Cable Route Corridor Accesses

3.3.71 The access locations for construction of the cable route corridor are set out in **Table 3-3** (refer to **ES Volume 2, Figure 3-2: Key Construction Phase Features [EN010168/APP/6.2]**).

Table 3-3: Cable Route Corridor Access

Access	Description
101	North of The Street, Grittleton
102	South of The Street, Grittleton
103	North of Neeld Court
104	South of Neeld Court
105	North of Unnamed Road, Sevington;
106	South of Unnamed Road, Sevington;
107	North of Cromhall Lane
108	South of Cromhall Lane
109	North of Fowlswick Lane
110	South of A420
111	North of A420
112	North of Chippenham Lane
113	South of Chippenham Lane
114	East of Stowell Lane
115	North of A4 Bath Road
116	North of Unnamed Road, East of Easton

Access	Description
117	South of Unnamed Road, East of Easton
118	East of Unnamed Road, South of Easton
119	West of Unnamed Road, South of Easton
119a	East of Lacock Road
120	West of Coppershell
121	South of Coppershell
122	North of Corsham Road
123	North of Silver Street
124	South of Silver Street
125	West of Goodes Hill
126	South of Westlands Lane (West)
127	South of Westlands Lane (East)

Highway Improvement Areas

3.3.72 Highway improvements will be made to facilitate construction. The Highway Improvement Areas are shown in **ES Volume 2, Figure 3-2: Key Construction Phase Features [EN010168/APP/6.2]**).

3.3.73 Works within the Highway Improvement Areas comprise modifications to the existing highway such as improvements to road edge where it is deteriorated, minor works to enable construction vehicle movements such as provision of passing places within the existing highway boundary, traffic management measures and provision of visibility splays.

3.3.74 To safely accommodate AIL vehicle movements along construction routes, Highway Improvement Areas in the wider area are also required. These comprise minor, temporary modifications at six junctions and include the removal of street furniture, widening of junctions, and vegetation removal. These are listed below and shown in **ES Volume 2, Figure 2-4: Public Right of Way (PRoW) and Highways [EN010168/APP/6.2]**.

- A350 /Corsham Road junction;
- A365 /B3109 junction (Box Fiveways);
- A46 Bath Road /Acton Turville Road junction;
- A46 Bath Road /B4040 junction;

- B4093 /The Gibb crossroad; and
- A429 /B4014 roundabout.

Fencing and Security

3.3.75 Fencing would be deer wire mesh and wooden post fencing with a maximum height of 2.5 m as illustrated in **Plate 3-14**.

Plate 3-14: Typical Deer Fencing

3.3.76 There would be palisade fencing around the substations and BESS Area which would have a maximum height of 3 m as illustrated in **Plate 3-10**.

3.3.77 Pole mounted internal facing CCTV systems would be used around the perimeter of the operational elements of the Solar PV Sites. It is anticipated that these would be galvanised steel poles, externally finished to be in keeping with the prevailing surrounding environment, with a maximum height of 3 m.

Landscaping, Ecological Mitigation and Enhancement (Work No.9)

3.3.78 The masterplan for the Scheme is provided in **ES Volume 2, Figure 3-4: Landscape and Ecology Mitigation Plan [EN010168/APP/6.2]** with principles for how the land will be managed throughout the operation phase set out within the **Outline Landscape and Ecological Management Plan (LEMP) [EN010168/APP/7.18]**.

3.3.79 The Scheme will involve new planting, field boundary enhancement and planting of seed mixes within the Solar PV Sites as shown in **ES Volume 2, Figure 3-4: Landscape and Ecology Mitigation Plan**

[EN010168/APP/6.2]. Planting will also be used to provide screening through:

- The creation of new woodland blocks and belts;
- Planting new hedgerows;
- Reinforcing existing boundary hedgerows; and
- New tree planting.

3.3.80 The enhancements and planting would increase biodiversity and contribute to the Scheme achieving Biodiversity Net Gain (BNG). Further information is provided within **ES Volume 1, Chapter 8: Ecology and Biodiversity EN010168/APP/6.1]** and **ES Volume 1, Chapter 10: Landscape and Visual [EN010168/APP/6.1]**.

3.3.81 The **Outline LEMP [EN010168/APP/7.18]** has been developed to support the DCO Application. This sets out the principles for managing and reinstating the land within the Order Limits during the operation and maintenance phase after construction is completed. Prior to the commencement of any phase of development, a detailed LEMP will be prepared and submitted to and approved by the relevant planning authority, and this will be secured by Requirement in the DCO. This will ensure the potential construction and operational impacts are minimised and that, where practicable, opportunities for beneficial effects are secured as part of the Scheme. The LEMP must be prepared substantially in accordance with the **Outline LEMP [EN010168/APP/7.18]** which will be submitted as part of the DCO application.

Permissive Paths (Work No.10)

3.3.82 Permissive paths are incorporated into the Scheme design, as shown in **ES Volume 2, Figure 3-4: Landscape and Ecology Mitigation Plan [EN010168/APP/6.2]**. The permissive paths will contribute to the wider network of footpaths in the area and facilitate greater public access to the countryside during the lifetime of the Scheme. The design and implementation of the permissive paths is set out in the **Outline PRoW and Permissive Path Management Plan [EN010168/APP/7.17]** and secured by a Requirement in the **Draft DCO [EN010168/APP/3.1]**.

Surface Water Drainage

3.3.83 **ES Volume 3, Appendix 11-1: Flood Risk Assessment and Drainage Strategy Covering Report [EN010168/APP/6.3]** has been prepared to support the DCO Application. The strategy identifies how the Scheme would manage surface water across the Solar PV Sites and not increase flood risk. It details measures to manage the surface water drainage from

the Scheme (e.g. Solar PV Sites, access tracks and areas of hardstanding across the Order Limits) and any required changes needed to existing land drainage. The strategy will be developed into a detailed drainage strategy prior to construction secured by a Requirement in the **Draft DCO [EN010168/APP/3.1]**.

3.4 Construction Phase

Construction Programme

3.4.1 Subject to being granted development consent and following a final investment decision, the earliest construction could start is in 2027. Construction of the Solar PV Sites and Cable Route Corridor is likely start in tandem. The installation of cable within the Cable Route Corridor would require up to approximately 18 months, and the construction of the Solar PV Sites would require an estimated 24 months and the operation and maintenance phase anticipated to commence in 2029. **Table 3-4** indicates the potential construction durations across the different parts of the Scheme, showing a series of overlapping stages.

Table 3-4: Indicative Construction Programme

Aspect	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Lime Down A																								
Lime Down B																								
Lime Down C																								
Lime Down D																								
Lime Down E																								
Point of Connection Works																								
BESS Area																								
Cable Route Corridor																								

Construction Activities

Site Preparation and Enabling/Civil Engineering Works for the Solar PV Sites (Work No.7)

3.4.2 The following activities would be required as part of the site preparation and civil engineering works:

- Preparation of land for construction, including localised site levelling (where required). The land level changes would be localised and minor;
- Import of construction materials, plant and equipment to site;
- Establishment of the perimeter fence;
- Establishment of the construction laydown areas;
- Construction of the internal access roads; and
- Marking out the location of the Scheme infrastructure.

3.4.3 The following activities would be required as part of the enabling works (not necessarily in order):

- Construction of site entrance and construction vehicle delivery holding area;
- Establishment of the temporary construction compounds, which includes site offices/welfare area and parking area;
- Upgrade, modification or improvement of highways where required for site construction;
- Diversion and/or connection to existing 11 kV and/or 33 kV power lines as required for construction;
- Preparation of land for construction, including localised site levelling (where required) and vegetation clearance;
- Import of construction materials, plant and equipment to site;
- Establishment of the construction area fence where required for construction works to progress (the installation of the perimeter fence would progress with site construction in each area and therefore would not be complete at the start of site construction);
- Establishment of the temporary laydown areas within the Solar PV Sites;
- Construction of the internal access roads; and

- Marking out the location of the operational infrastructure.

Installation of Solar PV Panels

3.4.4 The following activities would be required to install the Solar PV Panels:

- Import of components to site;
- Piling and erection of module mounting structures;
- Mounting of modules would be undertaken using hand-held power tools;
- 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; and
- Installation of control systems, monitoring and communication.

Construction of Electrical Infrastructure

3.4.5 The following activities would be required to construct the onsite electrical infrastructure comprising the cables, the 33 kV Sub-distribution Switch Room / Conversion Units and the substations:

- Site preparation, piling and civils for the onsite substations and control buildings;
- Trenching and installation of electric cabling;
- Pouring of the concrete foundations and plinths for the electrical equipment;
- Import of components to site;
- Cranes would be used to lift the components into position; and
- Installation of the 33 kV Sub-distribution Switch Room / Conversion Units, 132 kV and 400kV substations.

Construction of Electrical Cables

3.4.6 For cables between the 33 kV Sub-distribution Switch Room /Conversion Units and the substations within the Solar PV Sites, the following methodology and works description applies:

- Interconnecting Cables, including High Voltage power cables, would be laid to provide a link between the PV arrays, the

transformer/inverter stations and the substations where the main switchgear panels are located. There would also be Interconnecting Cables from the BESS Area to the 400 kV Substation;

- Generally On-Site Cables would be laid underground in excavated trenches adjacent to on-site tracks where practicable and between the rows of Solar PV Panels. They would be laid at a suitable depth and positioned at a distance far enough away from the Solar PV Mounting Structures to allow future repair or maintenance. Some sections of cable may be installed in ducting if required to provide additional protection or where other infrastructure such as roads and hardstanding would be built over the top;
- Where practicable, trenching would be carried out using a trapezoidal bucket to ensure stability during installation. Trenching and cable laying would be carried out progressively across the Order Limits and be phased to not interfere with other site operations such as piling, Solar PV Mounting Structure assembly or Solar PV Panel installation; and
- Care would be taken to ensure cable trench excavations can be managed and backfilled in a timely manner to avoid collapse. Trenching may be curtailed in periods of wet weather to avoid collapse of trenches of excessive contaminated run off.

Energy Storage Construction

3.4.7 The following activities would be required to construct the BESS Area.

- Installation of electric cabling;
- Construction of foundations;
- Import of components to site;
- Installation of transformers;
- Installation of batteries, inverters and switchgear; and
- Installation of fire safety measures.

Fencing and Security

3.4.8 The permanent deer fence and security system would be established during the construction phase. The fencing would be installed early on in the works where practicable to reduce the amount of temporary fencing needed. Where required, temporary fencing would be installed to secure work areas not naturally contained by existing hedgerows or fencing.

Cable Route Corridor Construction

3.4.9 The following activities would be required to construct the Interconnecting Cables and Grid Connection Cables:

- Site preparation and appropriate surveys;
- Haul road construction;
- Excavation would be undertaken using an appropriately sized tracked excavator, excavation will be carried out in layers;
- Topsoil would be segregated and stored on site to be reused;
- The trench would be cleared and bottomed out, ensuring there are no hard protrusions;
- Sand bedding would be installed at the bottom of the trench; and
- Cable installation will be conducted once joint bay locations have been established. However, it is not expected that cable installation would be continuous. Cables would be installed in groups or sections to ensure that works are completed in the most efficient manner practicable.

3.4.10 Aggregates would be stored within the temporary construction laydown areas, while cables and ducts would be stored at the secure compound area.

3.4.11 To construct the joint bays in the Cable Route Corridor:

- Excavation activities would be as listed above;
- Joint bay locations would be re-measured to verify their position before excavation commences;
- Joint bays would be approximately 20 m by 6 m dependant on ground conditions; and
- Joint bay excavation would be coordinated with the cable pulling programme to ensure that jointing bays are not left open for longer than necessary.

3.4.12 Where the need for trenchless technologies has been identified at crossing points or avoidance areas, feasibility studies will be carried out to identify the appropriate technology. Trenchless Technologies may include tunnelling, HDD, Pipe Jacking and Horizontal Auger Boring. Of the trenchless technologies which could be selected, HDD is considered to be a reasonable worst-case scenario and is assumed for the purposes of assessment. HDD construction activities are listed below:

- Site preparation and appropriate surveys;
- Launch and reception pits would be excavated using a suitable excavator, with any required shoring or battering installed. Plant and spoil would be placed a safe distance away from the edge of the excavation so as to minimise the risk of the trench sides collapsing;
- Once both the launch and receive pits has been excavated, work would then commence on the initial drill (the 'pilot bore');
- Upon completion of the pilot bore connecting the launch and reception pits the drill head would be removed from the drill string and a reamer would be attached. Reamers would be used to widen the bore until it is of an acceptable size to accept the duct; and
- Once the bore is enlarged to the required size the product pipe would then be connected to the reamer via a swivel for installation.

3.4.13 If field conditions are not suitable to track plant and equipment to the launch and reception pits, 'trackway' or similar ground protection mats would be employed to facilitate access and egress. An area of up to 25 m by 25 m would be required at the launch pit and the reception pit.

3.4.14 It is anticipated that water-based drilling and bentonite would be utilised. During drilling operations the fluids pumped through the drill string would be closely monitored by checking volume of returns flowing back to the launch pit. Visual checks would also be carried out across the drill line. If a leak of drilling fluid is identified, the pumping activities would be stopped and appropriate control measures will be actioned.

3.4.15 Refer to **ES Volume 3, Appendix 3-2: Cable Route Corridor Construction Method Statement [EN010168/APP/6.3]** for further information regarding the Cable Route Corridor construction.

Testing and Commissioning

3.4.16 Commissioning of the Scheme would include testing and commissioning of the process equipment. Commissioning of the Solar PV Panels, BESS Containers, and associated infrastructure would involve mechanical and visual inspection, electrical and equipment testing, and commencement of electricity supply into the National Grid. Individual sub-systems would be commissioned separately with each having its own procedures and prerequisite lines, and it may be necessary to commission these elements separately or at the same time, depending on the end technology utilised at the time of construction.

3.4.17 This process would take place prior to the operation phase of the Scheme.

Construction Staff

3.4.18 For the purposes of assessment, it is assumed that the construction of the Scheme elements would happen concurrently, maximising the estimated potential numbers of construction staff working on the Scheme.

3.4.19 Based on the phasing assumptions and the Applicant's experience of other similar sized solar projects, it is currently estimated that the Scheme would generate a peak of 692 construction workers and 268 Full Time Equivalent (FTE) jobs during the construction phase. The size of the workforce is based on the activities required and would fluctuate during the construction phase.

Construction Hours of Work

3.4.20 The core construction working hours (not including start-up and shut-down works) are defined as:

- Monday to Friday from 07:00 to 18:00 (daylight hours permitting);
- Saturday from 08:00 to 13:30 (daylight hours permitting); and
- No Sunday or Bank Holiday working unless crucial to construction (for example for HDD which must be a continuous activity) or in an emergency.

3.4.21 Start-up and shut-down activities on site will involve low-noise tasks, including security checks, unlocking and locking gates, and conducting toolbox talks.

3.4.22 Where practicable, construction deliveries would be coordinated to avoid HGV movements during the traditional peak morning (08:00 to 09:00) and peak afternoon (17:00 to 18:00) hours.

3.4.23 Some activities may be required outside of these times such as the delivery of abnormal loads, concrete pours for foundations, night working for cable construction works in public highways and/or HDD activities.

Construction Traffic and Site Access

3.4.24 Construction traffic and Site access is discussed further in **ES Volume 1, Chapter 13: Transport and Access [EN010168/APP/6.1]**.

3.4.25 The construction traffic associated with the Scheme will be subject to measures and procedures defined within a Construction Traffic Management Plan (CTMP). This will be secured by a Requirement in the DCO and prepared substantially in accordance with an **Outline CTMP [EN010168/APP/7.22]**. This defines information such as the routes that construction traffic must take and the measures that will be implemented

to reduce the effect of the construction phase on the local highway network.

3.4.26 A Construction Worker Travel Plan (CWTP) will be contained within the CTMP and set out proposed measures, including establishing a car share scheme and shuttlebuses for construction workers, identifying cycle and bus routes to the Order Limits, and appointing a Travel Plan Coordinator. Construction workers will also be encouraged to travel outside of peak highway network hours and use electric vehicles, where practicable. This aims to minimise the impact on the strategic and local highway network

3.4.27 The HGV routes to the Solar PV Sites that are identified in the **Outline CTMP [EN010168/APP/7.22]** represent the most suitable direct route to the relevant access from the strategic road network (M4). At this stage, the following routes are anticipated:

- Lime Down A: M4 Junction 18 → A46 → B4040 → B4039 → Unnamed Road west of Grittleton → Alderton Road → Fosse Way → Unnamed Road between Fosse Way and Sherston;
- Lime Down B and C: M4 Junction 18 → A46 → B040 → B4039 → Alderton Road → Fosse Way;
- Lime Down D: M4 Junction 17 → A429 → Unnamed Road east of Hullavington → Bradfield Cottages; and
- Lime Down E: M4 Junction 17 → A429.

3.4.28 At this stage, Access 1 to 8 for the Cable Route Corridor will be accessed from Junction 18 of the M4 and follow the A46, B4040, B4039, and an Unnamed Road west of Grittleton before deviating onto separate roads to specific accesses. Access 9 to 26 for the Cable Route Corridor will be accessed from Junction 17 of the M4 and follow the A350 and/or A420 before deviating onto separate roads to specific accesses.

3.4.29 It is expected that there will be a relatively flat profile of deliveries throughout the construction phase. Therefore, an average number of deliveries per day has been calculated based on the length of the construction phase. Notwithstanding this, it is acknowledged that there will be small peaks throughout the construction phase, especially during set up. To account for this, a 50% uplift has been applied for the purposes of assessment. At this stage, based on the preliminary construction material and equipment requirements, the following is anticipated:

- Average HGV Arrivals and Departures per Day – 48 (96 movements); and
- Peak HGV Arrivals and Departures per Day – 74 (148 movements).

3.4.30 Movements will be spread around the different areas of the Order Limits and the different routes to access the Order Limits.

3.4.31 At this stage, it is anticipated that there would be approximately 224 vehicle arrivals (448 movements) associated with car and shuttle bus transporting construction workers to and from the Solar PV Sites and Cable Route Corridor. Again, these will be spread around the Order Limits and local highway network.

3.4.32 To prevent nuisance and potential obstruction/restriction of free traffic flows caused by vehicles parked around the Order Limits, car parking to accommodate construction staff would be provided within the Order Limits. Parking on public roads within a defined radius of the Order Limits would not be permitted. These measures are secured in the **Outline CTMP [EN010168/APP/7.22]**.

Temporary Construction Compounds

3.4.33 Temporary construction compounds would be established within the Solar PV Sites (refer to **ES Volume 2, Figure 3-2: Key Construction Phase Features [EN010168/APP/6.2]**). The temporary construction compounds would comprise:

- Temporary portacabins for construction operatives (the dimension of the portacabins would vary and the maximum size for individual units is expected to be 12 m by 3 m with a typical maximum height of 3 m);
- Perimeter security fencing with a typical maximum height of 3 m;
- Parking area for construction and workers vehicles;
- Secure compound for storage;
- Temporary hardstanding;
- Wheel washing facilities;
- Temporary gated compound;
- Storage bins for recyclables and other waste; and
- Lighting (as set out below).

3.4.34 There will be temporary laydown areas progressively established across the Solar PV Sites. The purpose of each one will be to service the local works. This includes but is not limited to storage for materials, fuel, equipment needed for such works as well as welfare facilities, office space required to avoid unnecessary internal movement of personnel over long distances. The temporary laydown areas will typically be set up ahead of the installation of the Solar PV Sites, electrical components and

cabling and will be decommissioned as the relevant works in their locality progress and become completed.

3.4.35 It is anticipated that goods would be delivered by HGV to the construction compounds within the Solar PV Sites and then distributed to the point of need within the Order Limits using lighter vehicles (e.g. tractor and trailer) as required.

3.4.36 Temporary compounds would be located along the Cable Route Corridor (refer to **ES Volume 2, Figure 3-2: Key Construction Phase Features [EN010168/APP/6.2]**), along with laydown areas. The laydown areas will be located at each of the Cable Route Corridor access points and will allow construction vehicles to turn off the public highway and park safely. Laydown areas would be up to a maximum of 80 m x 80 m and include parking bays, portacabins, welfare facilities, unloading and storage areas and power generators. The areas will be secured using heras fencing and security cameras. Upon completion of construction, the compound and laydown areas will be removed and the land reinstated.

Construction Environmental Management Plan

3.4.37 An **Outline Construction Environmental Management Plan (CEMP) [EN010168/APP/7.12]** has been prepared to support the DCO Application. The CEMP describes the framework of mitigation measures to be followed and to be carried forward to a detailed CEMP prior to construction. The aim of the CEMP is to avoid and/or reduce environmental impacts from:

- Use of land for temporary laydown areas, accommodation etc.;
- Construction traffic (including parking and access requirements) and any changes to access and temporary road or footpath closure;
- Noise and vibration;
- Utilities diversion;
- Dust generation;
- Handling of soil resources;
- Spillages of oil and other chemicals;
- Run off and drainage;
- Lighting; and
- Waste generation.

3.4.38 The **Outline CEMP [EN010168/APP/7.12]** will be used as the basis for the contractor to prepare a detailed CEMP prior to construction and following the detailed design of the Scheme.

3.4.39 The detailed CEMP would be approved by Wiltshire Council following the grant of the DCO and prior to the start of construction. It would identify the procedures to be adhered to and managed by the contractor throughout construction and would clearly define roles and responsibilities. Production of the detailed CEMP is secured through a Requirement in the **Draft DCO [EN010168/APP/3.1]**.

3.4.40 Contracts with companies involved in the construction works would incorporate environmental control, health and safety regulations, and current guidance. This would ensure that construction activities are sustainable and that all contractors involved with the construction phase are committed to agreed good practice and meeting all relevant environmental legislation including:

- Control of Pollution Act 1974 (Ref 3-7);
- Environment Act 2021 (Ref 3-8);
- Hazardous Waste (England and Wales) Regulations 2005 (as amended) (Ref 3-9); and
- Waste (England and Wales) Regulations 2011 (Ref 3-10).

3.4.41 Records would be kept and updated regularly, ensuring that all waste transferred or disposed of has been appropriately processed with evidence of signed Waste Transfer Notes (WTNs) that would be kept on-site for inspection whenever requested. Furthermore, all construction works would adhere to the Construction (Design and Management) Regulations 2015 (CDM) (Ref 3-11).

Construction Lighting

3.4.42 Temporary site lighting would be used during construction to enable safe working during construction in hours of darkness or where natural lighting is unable to reach (such as sheltered/confined areas). Mobile lighting towers with a power output of 8 kilo volt-amperes (kVA) would be used for construction work, along with lighting at the construction compounds while construction is underway.

3.4.43 All construction lighting will be deployed in accordance with the following recommendations to prevent or reduce the impact on human and ecological receptors:

- The use of lighting will be minimised to that required for safe site operations;

- Lighting will utilise directional fittings to minimise outward light spill and glare (e.g. via the use of light hoods/cowls which direct light below the horizontal plane, preferably at an angle greater than 20° from horizontal); and
- Lighting will be directed towards the middle of the Order limits rather than towards the boundaries.

3.4.44 Measures to control lighting are set out in the **Outline CEMP [EN010168/APP/7.12]**.

Spoil Management

3.4.45 There will be no site wide reprofiling required, however there may be a need to flatten areas within the Order Limits. Topsoil, subsoil and spoil material is only expected to be generated from cable trenches, temporary and permanent compounds, internal access tracks, BESS Area and Substations compounds, and supporting infrastructure.

3.4.46 During construction of the Cable Route Corridor, spoil will be stored temporarily within designated areas adjacent to the cable route and within the construction compounds. The spoil will be utilised to backfill the cable trenches, HDD launch and exit pits, reinstate the temporary construction compounds and any temporary access roads. Should contaminated spoil be identified during construction, this would be transported off site to a licenced waste facility for treatment.

3.4.47 Measures to manage soil are set out in the **Outline Soil Resources Management Plan (SRMP) [EN010168/APP/7.15]**.

Waste

3.4.48 Solid waste materials generated during construction would be segregated and stored on-site in containers prior to transport to approved, licensed third party waste management facilities. This would primarily comprise packaging associated with the electrical items. During construction, the removal of waste has been accounted for in the estimated HGV deliveries a day (see Section 3.4.28).

3.4.49 Waste is considered further in **ES Volume 1, Chapter 20: Other Environmental Matters [EN010168/APP/6.1]**. The construction of the Scheme will be subject to measures and procedures defined within a detailed CEMP and Site Waste Management Plan (SWMP). These measures will include the implementation of industry standard practice and control measures for material and waste management on-site. These measures are set out in the **Outline CEMP [EN010168/APP/7.12]** and **Outline SWMP** [**EN010168/APP/7.16**] submitted with the DCO Application.

Fuel

3.4.50 Fuel for machinery and generators would be delivered by a fuel bowser as required and stored in integrally bunded above ground fuel storage tanks (cubes) which comply with the Oil Storage Regulations (Ref 3-12). The fuel storage tanks would be sheltered, secured from unauthorised access, and equipped with integral bunding capable of holding 110% of the volume of the tank (i.e. it would have 10% more capacity than needed). Spill kits would be carried by all plant and would be available at the fuelling point and other strategic locations of the Order Limits to allow for prompt clean up. All construction workers would be trained in pollution prevention and spill kit use. Oil storage areas would not be created in areas susceptible to flooding.

Water

3.4.51 An estimated 17,768 m^3 total of water would be required during construction to support welfare facilities on-site and other uses.

3.4.52 Water will be transported to the Order Limits by road from an existing nearby licenced water abstraction source and stored on site. Where mains water is available this would also be utilised.

3.4.53 During construction self-contained portable welfare units which store foul/wastewater for collection/emptying by specialist licenced contractors would be used.

Surface Water Drainage During Construction

3.4.54 The **Outline CEMP [EN010168/APP/7.12]** describes water management measures to control surface water run-off and drain hardstanding and other structures during the construction of the Scheme.

Power Supply

3.4.55 To facilitate construction, connecting to existing overhead power lines will be considered to provide power to the construction compounds where feasible. Compounds will be equipped with diesel generators where connection to power lines cannot be made.

Site Reinstatement, Biodiversity and Landscaping

3.4.56 Following construction, a programme of site reinstatement will commence. Embedded mitigation measures for soil management are set out in the **Outline CEMP [EN010168/APP/7.12]** and the Outline Soil resources Management Plan [**EN010168/APP/7.15]** including measures such as construction and exclusion zones in relation to retained vegetation,

ensuring a tidy and neat working area, covering stockpiles and storing topsoil in accordance with good practice measures.

3.4.57 An **Outline LEMP [EN010168/APP/7.18]** accompanies the DCO Application. This document sets out the principles for how the land will be managed throughout the operation and maintenance phase, following the completion of construction. Should the DCO be granted, a detailed Landscape and Ecological Management Plan will be produced prior to the start of construction.

3.5 Operation and maintenance Phase

3.5.1 The Applicant is seeking a time-limited consent with respect to the operation of the Scheme, which will start from the date of the final commissioning phase of the Scheme. The operational life of the Scheme is anticipated to be 60 years.

3.5.2 During the operation and maintenance phase, two scenarios have been considered within the ES:

- General operational maintenance activities; and
- Programme of replacement activities.

General Operational Maintenance

Operational Activities

3.5.3 During operation, other than in the context of a programme of replacement, activity on the Solar PV Sites would be restricted principally to vegetation management, equipment maintenance and servicing, ad hoc replacement and renewal of any components that fail or reach the end of their lifespan, periodic fence inspection, vegetation management along accesses, permissive paths and landscape ecological mitigation maintenance, and monitoring to ensure the continued effective operation of the Scheme.

3.5.4 Along the Cable Route Corridor, operational activity will consist of routine inspections and any reactive maintenance such as where a cable has been damaged.

3.5.5 The frequency of regular maintenance visits would reasonably be expected to be limited to no more than five visits per month to any of the Solar PV Sites. Limited use of HGVs may be required for the ad-hoc replacement of components.

3.5.6 An **Outline Operational Environmental Management Plan (OEMP) [EN010168/APP/7.13]** has been prepared to support the DCO Application. The **Outline OEMP [EN010168/APP/7.13]** sets out the

environmental principles to be followed during the operation of the Scheme. The Outline OEMP will be used as the basis for a detailed OEMP to be prepared prior to commencement of operation.

Operational Staff

3.5.7 No permanent on-site staff will be required to operate the Scheme. There will be limited staff facilities located in the control rooms associated with the 400 kV and 132 kV Substations. Equipment for monitoring the Solar PV Sites will be located in the Relay and Control Rooms. Whilst this would typically be accessed remotely, it would be available for occasional physical access during routine visits. Approximately 15 FTE staff jobs would be created, which would not be based on site.

Operational Traffic and Site Access

3.5.8 During operation, other than during the operational replacement of Solar PV Panels (refer to Paragraph 3.5.33), there will be a small number of daily vehicle trips, with additional staff attending when required for maintenance and cleaning activities.

3.5.9 Existing field accesses are proposed for the operational access where this is practicable and would reuse construction accesses. This excludes the access taken from the Fosse Way to Lime Down B which would only be used during operational programme of replacement activities (refer to Paragraph 3.5.31). The following access would be primary access used during operation (refer to **Table 3-2** and **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]**):

- Lime Down A – Access 5;
- Lime Down B – Access 4b;
- Lime Down C – Accesses 1, 2, and 19;
- Lime Down D – Access 7, 8 and 10; and
- Lime Down E – Access 18.

3.5.10 Those arriving to undertake general operational maintenance activities would generally be expected to travel by car, appropriate 4x4 type vehicle or light van. The frequency of maintenance visits would reasonably be expected to be up to five visits per month to any of the Solar PV Sites. HGVs may be required for the ad-hoc replacement of batteries, inverters and transformers associated with the substations and the BESS Area.

3.5.11 There will also be occasional trips to the proposed habitat areas within the Solar PV Sites for operational and maintenance purposes. These would typically be made by light van or 4 x 4 type vehicles and will use the

existing accesses detailed in Table 3-5 below and shown in **ES Volume 2, Figure 3-1: Indicative Site Layout Plan [EN010168/APP/6.2]** and **ES Volume 2, Figure 13-13: Operational Only Access Locations: Solar PV Sites [EN010168/APP/6.2]**. Vehicle trip generation associated with these access locations will be the same or lower than the existing agricultural use.

Table 3-5: Existing Accesses for Operation and Maintenance Only

Access	Description
201	South from Bustlers Hill Road
202	Southeast from the Fosse Way
203	West from Kennelfield Cottages
204	Southeast from the Fosse Way
205	East from an unnamed road, north of The Street
206	East from The Street
207	Northeast from an unnamed road, between The Street and Fosse Way
208	Northeast from an unnamed road, between The Street and Fosse Way
209	West from an unnamed road, south of Rodbourne Road

Operational Lighting

3.5.12 Lighting is not required within the Solar PV Sites during the operation and maintenance phase of the Scheme.

3.5.13 All routine maintenance activities would be scheduled for daylight hours as far as is practicable. Focussed task specific lighting would only be required in the event of emergency works or equipment failure requiring night-time working.

3.5.14 Motion sensing security lighting would be provided within substations and within the BESS Area to maintain safe working conditions in winter months, for security purposes, and for maintenance activities.

3.5.15 The lighting commitments for the operation and maintenance phase are set out in the **Outline OEMP [EN010168/APP/7.13]**, including details on lighting design to minimise light spill.

Operational Waste

3.5.16 Solid waste materials generated during Scheme operation and maintenance would primarily be general (household type) waste from the

staff visiting site. However, there would also be a limited volume of packaging waste associated with the delivery of spare components. In accordance with legislation and guidance applicable at the time, all general and packaging type waste would be segregated prior to transport to an approved, licensed third party landfill and recycling facilities.

3.5.17 Additionally, any waste components (e.g. faulty or damaged Solar PV Panels, batteries, cables, connectors and mounting structures) would also be removed and recycled as far as practical and in accordance with legislation and guidance applicable at the time (refer to Paragraph 3.5.31).

3.5.18 Paragraph 3.5.33 summarises the anticipated design life and replacement frequency for the main elements of the Scheme (Solar PV Panels, BESS Area etc.), based on other similar solar Nationally Significant Infrastructure Project (NSIP) schemes.

3.5.19 Waste is discussed further in **ES Volume 1, Chapter 20: Other Environmental Matters [EN010168/APP/6.1]**.

3.5.20 The operation of the Scheme will be subject to measures and procedures defined within an OEMP secured by a Requirement in the DCO. The OEMP will include the implementation of industry standard practice and control measures for material and waste management on-site. These measures are set out in the **Outline OEMP [EN010168/APP/7.13]** submitted with the DCO Application.

Operational Water

3.5.21 During the operation and maintenance phase, self-contained portable welfare units which store foul/wastewater for collection/emptying by specialist licenced contractors would be deployed on an ad hoc basis (e.g. if required by maintenance crews).

3.5.22 It is anticipated that the water supply for operational staff facilities would either be transported to the Order Limits by road from an existing nearby licenced water abstraction source and stored on site; or where mains water is available this will also be utilised. Welfare facilities will be required at the substations. Any wastewater will be removed via tanker to local licenced wastewater treatment works.

The volume of stored fire water will be maintained to ensure there is sufficient water for firefighting purposes. Details of fire water supply and storage are provided within the **Outline BSMP [EN010168/APP/7.21]** which supports the DCO Application.

Surface Water Drainage

3.5.23 The detailed operational drainage design would be carried out preconstruction with the objective of ensuring that drainage of the land to the present level is maintained. It would follow either the design of a new drainage system taking into account the proposed new infrastructure (access tracks, cable trenches and structure foundations) to be constructed or, if during the construction of any of the infrastructure there is any interruption to existing schemes of land drainage, new sections of drainage would be constructed.

3.5.24 The design of new drainage systems would be based on the **ES Volume 3, Appendix 11-1** to **Appendix 11-9 [EN010168/APP/6.3]** and hydrological assessment undertaken as part of the ES.

3.5.25 Management of fire water is further described in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]**.

Cleaning of Panels

3.5.26 Due to the wet UK climate, Solar PV Panels are largely self-cleaning and deterioration in PV system output due to dust or dirt is generally low. The requirement for, and the frequency of, cleaning of the Solar PV Panels due to the build-up of dust and dirt varies depending upon site specific conditions. For example, the presence of fine dust emitters such as quarries, agricultural operations (harvesting), coastal salt water, and the volume and proximity of nearby woodland can all impact the level of dust deposition. However, the main factor influencing cleaning requirements in the UK is lichen growth which again is influenced by site specific and climatic factors.

3.5.27 The requirement for cleaning due to loss of output is balanced against cost of the cleaning operation. Some sites can operate without the need to be cleaned, whereas some sites require cleaning annually. The cleaning requirements for the Scheme can only be accurately determined once operational and, therefore, to present a worst case for the assessments presented in this ES, an annual cycle is assumed.

3.5.28 The Solar PV Panels would be cleaned using water only. Up to 495 m^3 of water would be used to clean the panels once every year. Deionised water transported to site by tanker would be used. No chemical cleaning products would be used, with stubborn dirt brushed or wiped off the panels.

Grazing

3.5.29 For the purposes of assessment and reporting of effects, as a reasonable worst case it is assumed that vegetation will be managed with machinery

and there will be no grazing at the Solar PV Sites during the operation and maintenance phase.

3.5.30 However, should consent be granted, grazing by sheep will be explored, noting that there are no known landowner restrictive covenants or other reasons that would prevent such use.

Operational Programme of Replacement Activities

Design Life

3.5.31 During the anticipated 60-year operational life of the Scheme, it is expected that there will be requirement for periodic replacement of some of the electrical infrastructure.

3.5.32 It is not expected that an extensive replacement of all components will be required across the entirety of the Scheme during one period; instead, the programme for replacement of equipment across the Scheme is anticipated be staged to maintain the electrical export to the National Grid. However, in order to maximise the flexibility for how a programme of replacements may be conducted, for example to coincide with planned repairs to the grid infrastructure, each chapter has considered the relevant worst case scenario as set out below.

3.5.33 The assessments in the ES chapters confirm that, however the programme of replacements is conducted, the replacement activity would be considerably less intensive than during construction, and any environmental effects identified can be appropriately mitigated with similar measures to those identified for the construction of the Scheme.

3.5.34 The following assumptions have been made for the programme of replacement activities:

- It is expected that the operational life of Solar PV Panels is 40 years or more, and that all the Solar PV Panels will be replaced once during the operation and maintenance phase. The Solar PV Panels are anticipated to be replaced over a maximum 12 to 24 month period;
- It is expected that the BESS Area could be replaced up to five times during the operation and maintenance phase;
- Accesses to the Solar PV Sites defined for construction (refer to Table 3-2) would be used. If any abnormal loads are required for the replacement of equipment, consultation will be carried out and approvals will be sought from the relevant local planning and highways authorities;
- Components such as Solar PV Mounting Structures, cabling and the Substation and BESS Area buildings are not anticipated to be replaced

during the operation and maintenance phase. No intrusive ground works are anticipated to replace Solar PV Panels or BESS Area; and

- It is anticipated that the Scheme will create 125 Full Time Equivalent employees, with a peak month requiring up to 360 construction workers on-site during the replacement activities; and
- Transformers are assumed to have a design life of 30 years, transformers may require replacement once during the lifetime of the Scheme although, replacement will only be carried out if required for performance or health and safety reasons.

3.5.35 The programme of replacement activities is assessed in **ES Volume 1, Chapters 7** to **Chapter 20 [EN010168/APP/6.1]**. The assessments in these chapters have considered a reasonable worst case scenario for operational replacement with regard to frequency and duration of replacement activities. Where a shorter or longer operational replacement programme is anticipated to result in a greater level of likely significant effects in respect of a particular EIA topic, the reasonable worst case programme has been assumed for the purposes of the assessment of that topic.

3.5.36 Mitigation measures associated with the programme of replacement activities will be outlined within the **Outline OEMP [EN010168/APP/7.13]**.

3.6 Decommissioning

3.6.1 Decommissioning is expected to take between 12 and 24 months and will be undertaken in phases, and for the purposes of the assessment is expected to occur after the 60-year design life of the Scheme in 2089. A requirement to decommission the Scheme is secured via a Requirement in the **Draft DCO [EN010168/APP/3.1]**.

3.6.2 An **Outline Decommissioning Strategy [EN010168/APP/7.14]** will be prepared as part of the EIA and submitted with the DCO Application. This will set out the general principles to be followed in the decommissioning phase of the Scheme. The **Draft DCO [EN010168/APP/3.1]** includes a Requirement that a detailed Decommissioning Strategy would be prepared substantially in accordance with the **Outline Decommissioning Strategy [EN010168/APP/7.14]** and approved by the relevant authorities at that time of decommissioning, in advance of the commencement of decommissioning works, and would include timescales and transportation methods. The detailed Decommissioning Strategy would ensure that decommissioning was undertaken safely and with regard to the environmental legislation at the time of decommissioning, including relevant waste legislation.

3.6.3 When the operation and maintenance phase ends, the Solar PV Sites would be decommissioned and the land returned to its original use and condition as far as practicable and returned to the landowner. All Solar PV Panels, mounting piles, cabling, inverters, transformers, switchgear, BESS Area, substations and access tracks would be removed from within the Solar PV Sites and recycled or disposed of in accordance with good practice and market conditions at that time. This will include the areas of agricultural land where the soil health, quality and structure may have improved, and the established habitats. Foundations and other below ground infrastructure will be cut to 1.2 m below the surface to enable future ploughing. Any piles would be removed.

3.6.4 Post-decommissioning, the landowners would choose how the land is to be used and managed, the landowner may return all of the land to arable use, although it is likely that established habitats such as hedgerows and woodland would be retained given their potential benefits to agricultural land and the wider farming estate. Permissive paths would be removed during decommissioning, with the precise timing to be determined by the contractor(s) and communicated to Wiltshire Council in accordance with the **Outline Decommissioning Strategy [EN010168/APP/7.14]**.

3.6.5 The mode of removing the Interconnecting Cables and Grid Connection Cables decommissioning would be dependent upon government policy and good practice at that time. Currently, the most environmentally acceptable option is considered to be leaving the cables in situ, as this avoids disturbance to overlying land and habitats and to neighbouring communities. Alternatively, the cables can be removed by opening up the ground at regular intervals and pulling the cable through to the extraction point, leaving the ducting and jointing bays in place, avoiding the need to open up the entire length of the cable route. The impact assessment is based on the worst-case parameters for each technical topic.

3.6.6 Some soil profiling may be required, and the land will be contoured in agreement with the landowner and in accordance with the **Outline Decommissioning Strategy [EN010168/APP/7.14]**, approximately similar to the current topography. Excavations will be backfilled, using appropriate imported soil if required, otherwise with soil sourced on site, using appropriate soil management techniques as set out in Decommissioning Strategy. Areas where grass does not exist because of the footprint of the previous infrastructure (e.g. the BESS Area and onsite substations) shall be reseeded with suitable native species, in liaison with the landowner and in accordance with the Decommissioning Strategy, in order to integrate the newly restored soil into agricultural use.

3.6.7 All work to the Existing National Grid Melksham Substation would remain under National Grid's control.

3.6.8 The effects of decommissioning are expected to be similar or of a lesser magnitude, than construction effects and are considered in the relevant sections of this ES. The specific method of decommissioning the Scheme at the end of its design life is uncertain at present as the engineering approaches to decommissioning would evolve over the design life of the Scheme. Assumptions have therefore been made where appropriate.

Waste

3.6.9 The waste generated at decommissioning would primarily be from the Solar PV Sites, including electrical components, the Solar PV Mounting Structures, and fencing. Waste would be managed in accordance with the relevant legislation and guidance at the time and in accordance with the **Outline Decommissioning Strategy [EN010168/APP/7.14]**. Wastes would be safely and securely stored. It is anticipated waste would either be segregated and stored on-site in containers or would be stored within secure storage buildings prior to transport to an approved, licensed third party landfill and recycling facilities.

3.6.10 At this time, it is not possible to identify either the waste management routes or specific facilities that would be used, as these are liable to change over such a timescale. Other than the Scheme elements, the waste types generated, and effects of decommissioning are likely to be similar to or lesser than the construction effects.

3.7 References

Ref 3-1 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

Ref 3-2 The Planning Act 2008 (as amended). Available at: https://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf

Ref 3-3 Rodriguez-Gallegos, C.D, et al. (2020) Global Techno-Economic Performance of Bifacial and Tracking Photovoltaic Systems. Joule, Volume 4, Issue 7, P1514 – 1541.

Ref 3-4 Underwriters Laboratories (2023) UL 9540 Energy Storage Systems and Equipment.

Ref 3-5 British Standards Institute (BSI) (2020) BS EN IEC 62933-5-2 Electrical energy storage (EES) systems - Safety requirements for grid-integrated EES systems. Electrochemical-based systems.

Ref 3-6 National Fire Protection Association (NFPA) (2023) NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.

Ref 3-7 Control of Pollution Act 1974. Available at: https://www.legislation.gov.uk/ukpga/1974/40

Ref 3-8 The Environment Act 2021. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Ref 3-9 The Hazardous Waste (England and Wales) Regulations 2005. Available at: https://www.legislation.gov.uk/uksi/2005/894/contents/made

Ref 3-10 The Waste (England and Wales) Regulations 2011. Available at: https://www.legislation.gov.uk/uksi/2011/988/contents/made

Ref 3-11 Construction (Design and Management) Regulations 2015. Available at: https://www.legislation.gov.uk/uksi/2015/51/contents/made

Ref 3-12 The Control of Pollution (Oil Storage) (England) Regulations 2001. Available at: https://www.legislation.gov.uk/uksi/2001/2954/contents/made