Tillbridge Solar

PEI Report Volume I Chapter 3: Scheme Description
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tillbridgesolar.com

@: info@tillbridgesolar.com T: 0800 046 9643

3. Scheme Description

3.1 Introduction

3.1.1 The Scheme comprises the construction, operation (including maintenance) and decommissioning of ground mounted solar photovoltaic (PV) panel arrays to generate electricity, a Battery Energy Storage System (BESS) and infrastructure to export and import electricity to the national electricity transmission network.

3.1.2 This chapter provides a description of the physical characteristics of the Scheme, alongside the proposed key activities and programme for site preparation, construction, operation and decommissioning works. This Scheme description has been used to inform each of the technical chapters of this Preliminary Environmental Information (PEI) Report.

3.1.3 This chapter is supported by the following appendices in **PEI Report Volume II:**

- **PEI Report Volume II Appendix 3-1**: Framework Construction Environmental Management Plan (CEMP);
- **PEI Report Volume II Appendix 3-2**: Outline Landscape and Ecology Management Plan (LEMP); and
- **PEI Report Volume II Appendix 3-3**: Outline Battery Fire Safety Management Plan (OBFSMP).

3.1.4 This chapter is supported by the following figure in Volume III:

- **PEI Report Volume III Figure 3-1**: Indicative Site Layout Plan.

3.2 Rochdale Envelope

3.2.1 The technology for Solar PV and BESS continues to evolve rapidly; for example, solar PV panels are becoming increasingly powerful year on year and better at minimising shading losses, which affects how developers space the rows of solar PV and the amount of land needed to achieve the export capacity. As a result, the parameters of the Development Consent Order (DCO) will maintain some degree of flexibility to allow most appropriate technology to be utilised at the time of construction.

3.2.2 In order to ensure a robust assessment of the likely significant environmental effects of the Scheme, the Environmental Impact Assessment (EIA) has been undertaken adopting the principles of the 'Rochdale Envelope' where appropriate, as described in the Planning Inspectorate Advice Note 9 (Ref. 3-1). This involves assessing the maximum (and, where relevant, minimum) parameters or limits of deviation for the Scheme where flexibility needs to be retained. Where this approach is applied to the specific aspects of the EIA, this has been confirmed within the relevant chapters of this Preliminary Environmental Information (PEI) Report. It sets worst case parameters for the purpose of the assessment, but does not constrain the Scheme from being built in a manner that would lead to lower environmental and social impacts. The draft DCO will secure these worst case parameters, providing certainty that the impacts of the Scheme will be no worse than those assessed as part of the EIA. The draft DCO will be submitted with the Application to the Secretary of State for Department for Energy Security and Net Zero anticipated to be towards the end of 2023.

3.2.3 Indicative timescales for the construction and operation of the Scheme that have been assumed for the purposes of the assessments are as follows:

- It is currently anticipated that (subject to the necessary consents being granted) construction work is anticipated to commence in Q3 2025 and will last around 24 months. This is currently considered to be the shortest duration for construction of the Scheme and is therefore a reasonable assumption at this stage of design (and is a worst case assumption for many technical assessments due to it intensifying road trips, noise, and activity onsite).
- It is currently anticipated that the Scheme will commence commercial operation from Q4 2027. The Applicant is not seeking a time limited consent with respect to the operation of the Scheme, but the operational life of the Scheme is expected to be approximately 40-60 years. The PEI Report will consider the impact of the permanent operation of the Scheme and of the maintenance and replacement of individual panels and associated infrastructure.

3.2.4 Construction of the Scheme is detailed in Section 3.4 of this chapter.

3.3 Components of the Scheme

3.3.1 The Scheme will consist of the following infrastructure:

- Solar PV panels (also known as solar modules);
- Solar stations (invertor, transformer and switchgear);
- Battery Energy Storage System (BESS);
- Battery Direct Current (DC)/DC convertors;
- On-site cabling;
- On-site sub-stations;
- Solar farm control centre;
- Equipment storage;
- Fencing, security and lighting;
- Site access and access tracks;
- Surface water drainage; and

- Electricity connection to National Grid via Cable Route Corridor. The Tillbridge circuit will be connected to an existing free bay at Cottam sub-station.

3.3.2 **PEI Report Volume III Figure 3-1** includes an Indicative Site Layout Plan. It is intended to be a working document to be adapted as the results of detailed survey work become available through the EIA process. The Indicative Site Layout Plan shows the potential extent and location of the PV panels with the BESS and Solar Stations distributed throughout the Principal Site. **PEI Report Volume III Figure 3-1** also shows the potential locations of mitigation and areas for ecological enhancement, as well as the retention of existing woodland and hedgerows.

Solar PV Infrastructure

Solar PV Panels

3.3.3 Solar PV panels convert sunlight into electrical current as DC. Individual panels (or modules) used in large-scape projects are typically between 2m to 2.5m in length and 1m to 1.4m in width and consist of a series of photovoltaic cells beneath a layer of toughened glass. The panel frame is typically built from anodised aluminium.

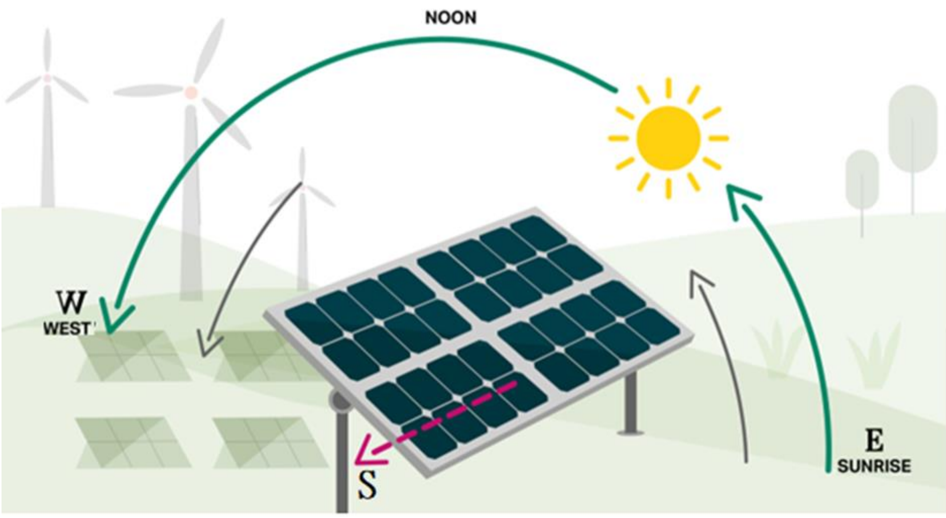
3.3.4 To ensure that the likely significant environmental effects are properly assessed, the DCO application will secure the maximum parameters for both the solar PV panels and associated development. This will ensure that the DCO considers in full the environmental impacts and is based upon a set of worst-case assumptions set out in the Environmental Statement (ES).

Plate 3-1: Illustrative image of panels and trackers

3.3.5 Each panel could have a watt-peak capacity of between 400 to 1000 watts as technology evolves. Panels will be fixed with clamps onto tracker mounting structures (refer to Plate 3-1). The panels are fixed to a mounting structure in groups known as strings. It is estimated that the Scheme will have between 1.2 and 1.5 million PV panels. Various factors will help to inform the number and arrangement of panels in each string, and it is likely some flexibility will be required to accommodate future technology developments.

3.3.6 The strings of PV will be secured on single axis trackers that are configured in rows generally orientated north-south and which will track 60 degrees east-west (refer to the illustration in Plate 3-2). The panels will move from east to west during the course of the day operated by a motor, so that there are most upfront (up to 60 degrees) at the start of the day facing east, moving gradually into a horizontal position when the sun is at its highest point in the sky for the day, and then gradually into a near upright position (up to 60 degrees) facing west at the end of the day. Each row of panels is fitted with a light meter which dictates the pace of movement; the rows across the Principal Site therefore move at slightly different times throughout the day. The noise from each individual motor will be less than 40db at a 1m distance.

Plate 3-2: Illustrative Single Axis Trackers



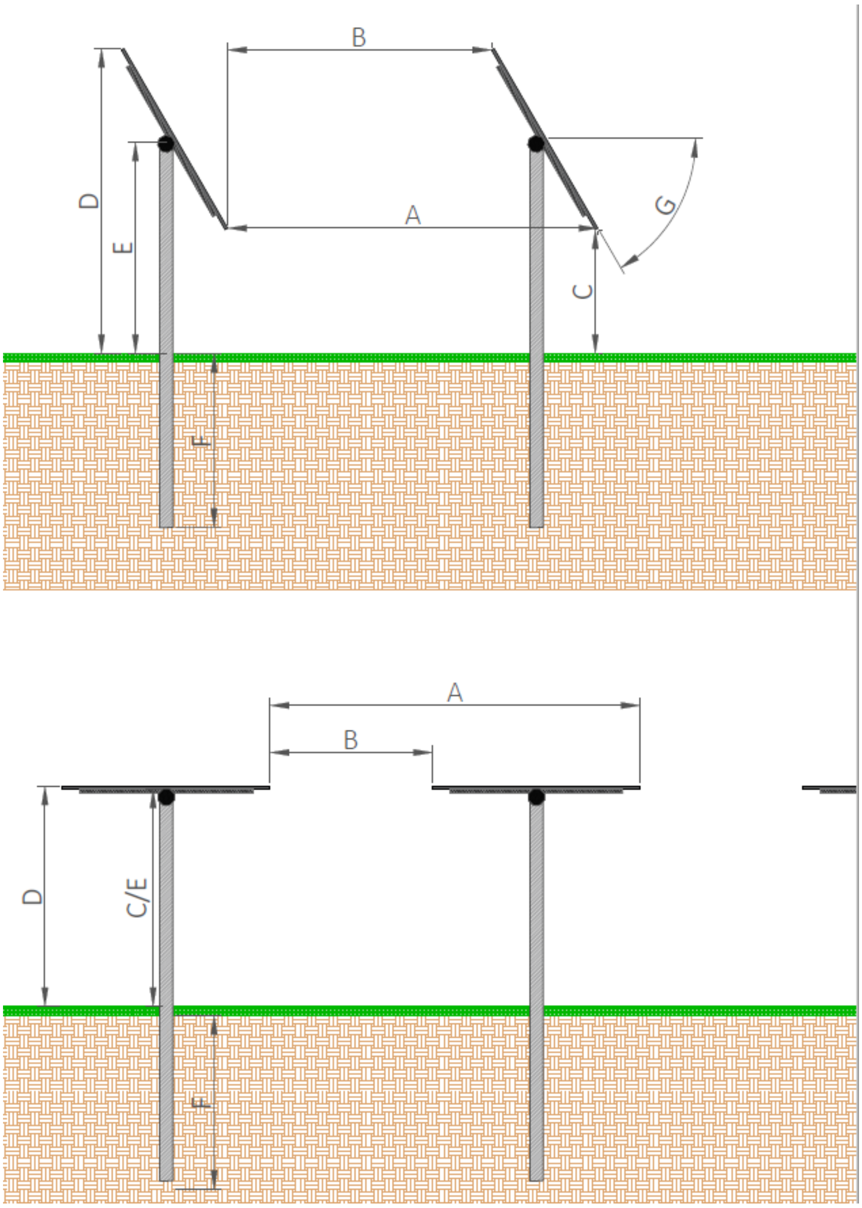
3.3.7 Each string of PV will be mounted on a rack. Minimum and maximum design parameters are shown in Table 3-1 and illustrated on Plate 3-3.

Table 3-1: Minimum and Maximum Parameters of String of PV

ID	Item	Minimum Value	Maximum Value	Unit
A	Pitch	4.0	5.0	M
B	Interrow distance	1.6	3.8	M
C	Clearance at maximum tilt	0.6	1.5	M
D	Height at maximum tilt	2.6	3.5	M
E	Axis height	1.5	2.5	M
F	Ground penetration	-	4.0	M

ID	Item	Minimum Value	Maximum Value	Unit
G	Tilt	-60	60	m

Plate 3-3: Illustrative Section of PV Strings



3.3.8 The clearance of the PV panels above the ground will generally be between 0.6m and 1.5m reflective of the tracker panel moving east to west during the day.

3.3.9 The height of the panels at maximum tilt above the ground will be 3.5m. Panels will be fitted with sensors, which during a storm event will enable the panels to be tilted to their maximum height above the ground.

Solar Stations (Inverter, transformer and switchgear)

3.3.10 A Solar Station (refer to Plate 3-4) comprises a DC/AC inverter and a LV/MV transformer, with switchgear. There will be around 140 Solar Stations within the Scheme. Solar Stations will be located across the Principal Site at generally regular intervals and will be typically externally finished in keeping with the prevailing surrounding environment. It is anticipated that Solar Stations would be installed on a concrete foundation slab with a maximum footprint of 48m by 30m.

Plate 3-4: Illustrative Solar Station DC/AC inverter, transformer and switchgear

Inverters

3.3.11 Inverters are required to convert the DC electricity generated by the solar PV panels into AC, which allows the electricity to be exported to the National Grid. Inverters are sized to approximately deal with the level of voltage and other electrical parameters generated by the solar PV panels. It is currently expected that the inverters will be around 3m in length by 2m in width by 3m in height.

LV/MV Transformers and Switchgear

3.3.12 LV/MV transformers are required to transform the low voltage electricity generated across the site to medium voltage within the Principal Site to allow onward transmission to the National Grid via two on-site sub-stations. Transformers are weather resistant and can be positioned outdoors without an outer casing, or are sometimes housed in containers. Indoor transformers are generally housed in container type housing, however outdoor transformers are currently preferred. The maximum dimensions of the transformer and switchgear will be 5.5m in length by 2.5m in width by 3m in height.

3.3.13 Switchgear are the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear are used to de-energise equipment to allow work to be done and to clear faults downstream. Switchgear are generally located within or next to the transformer housing.

Battery Energy Storage Facility (BESS)

3.3.14 The principal purpose of the Scheme is to seek consent for the development of a ground mounted solar photovoltaic generating station. The BESS is associated development to ensure that energy can be stored when it is generated and not demanded. The BESS will have a direct relationship with the solar PV and it will support the operation of this by storing electricity produced during times of peak capacity until it needs to be released. This increases the efficiency of the principal development as a renewable energy project aiding both its operation as a generation station and the export of electricity to the National Electricity Transmission System (NETS). The operation of the BESS is dependent on the operation of the solar generation capacity. The BESS will also include an import connection to support the grid, but this will be subordinate to the principal (solar) development.

3.3.15 The Scheme will be DC-coupled. Batteries will be located in individual containers or housed within a larger building or buildings, typically coming in containerised solutions. The precise number of individual battery storage containers will depend upon the level of power capacity and duration of energy storage that the Scheme will require; work is ongoing to determine this. **PEI Report Volume III Figure 3-1** comprises an Indicative Site Layout Plan and shows the potential number and distribution of BESS and Solar Stations across the Scheme. The compounds will be accessed via proposed internal access roads and are broadly located centrally within each PV field parcel. The general layout of the BESS and Solar Stations would be uniform across the Scheme, but each compound would comprise a differing number of BESS containers and Solar Stations to meet technical and operational requirements.

3.3.16 The footprint of each BESS container would be a maximum of 12.2m in length by 2.5m in width by 4m in height. The BESS would be placed on a concrete slab or raft foundation depending on ground conditions within a compound also containing the Solar Stations and associated car parking.

3.3.17 The overall compound housing the BESS and solar stations would be enclosed by security fencing. Fire safety would also be incorporated into the design. This would include the addition of water tanks and swales adjoining the concrete apron of the compound for dealing with general surface water runoff and to be deployed in an emergency fire event.

3.3.18 The exact locations (indicative locations are shown on the Indicative Site Layout Plan in **PEI Report Volume III Figure 3-1**) of the BESS are yet to be determined. As the BESS will be DC-coupled, it will be distributed across the Scheme and located alongside the Solar Stations, rather than an AC-coupled arrangement which is centralised in one or a few locations. An illustrative battery container is shown in Plate 3-5.

Plate 3-5: Illustrative Battery Container

3.3.19 Each BESS includes an inbuilt heating, ventilation and cooling (HVAC) system to ensure the efficiency of the batteries by preventing overheating. The HVAC system will be incorporated within the maximum parameters set out in **Error! Reference source not found.**.

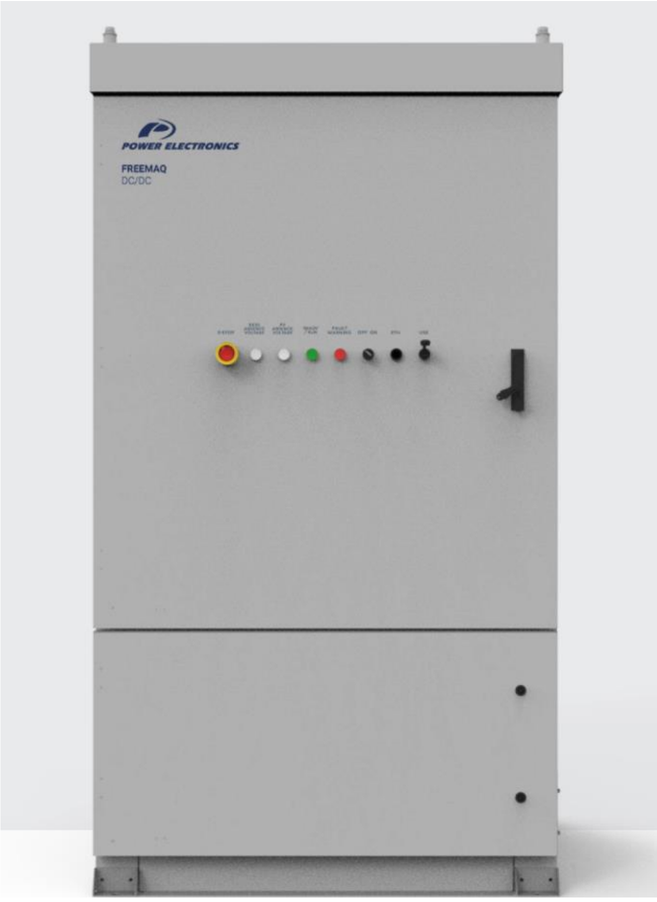
3.3.20 Every DC-coupled BESS will need an active electrical device which is the DC/DC converter (refer to Plate 3-6). The DC/DC converter manages the charge and discharge of the battery following the demand profile of the plant operator. It converts either the power to charge the battery from the solar PV panels or, for instance at night, from the grid. The DC/DC converter will also facilitate the discharge of the battery when required following specific demands by the network operator. A DC/DC converter will be installed next to every battery to keep cable runs as short and losses low. The maximum parameters of the DC/DC is set out in Table 3-1.

3.3.21 An Outline Battery Fire Safety Management Plan (OBFSMP) is provided in **PEI Report Volume II Appendix 3-3**. This sets out the parameters for the management of fire risk associated with the BESS. This management plan will form the basis for the preparation of a fully detailed fire safety management plan at a later stage to ensure the delivery of a robust fire safety strategy in relation to the BESS. The key principles with respect to the approach to risk mitigation contained within the OBFSMP are as follows:

- Fire safety design measures incorporated into the Scheme.
- Guards and protective devices such as BESS disconnection and shutdown controls.
- Information and training for end users.
- Risk mitigation and control measures including cell manufacturing, transport, installation and decommissioning, fire compartmentation and

fire service accessibility, fire detection, fire suppression, ventilation, cooling and heating and drainage.

Plate 3-6: Illustrative DC/DC Converter



On-site Cabling

3.3.22 Low voltage on-site electrical cabling is required to connect the solar PV panels and BESS to inverters (typically via 1.5 kV cables), and the inverters to the nearby transformers (typically via 0.6/1 kV cables). The dimension of the trenches will vary depending on the number of ducts they contain but would typically be around 4m in width and around 1.2m in depth. The worst-case dimensions will be assessed in the next stages of the EIA.

3.3.23 For string and DC cables, the trench will require a depth 0.7m or less, but can be as wide as 4m to 6m near the inverter DC inputs where several cables will be connected to the inverter (20 pairs of DC power cables).

3.3.24 Higher rated cables (likely 33 kV) are required between the transformers and the switchgear and from switchgear to the on-site sub-stations. The dimension of the trenches will vary depending on the number of ducts/cables they contain but would typically be around 1m in width and up to 1.7m in depth.

3.3.25 Low voltage cables between solar PV panels and the inverters will typically be fixed to the rear of the mounting structure and gathered together at the ends of rows. The grouped cables will then be inserted in underground ducting between racks and the Solar Stations. All other on-site cabling is anticipated to be underground.

3.3.26 Data / fibre optic cables will also be installed, typically alongside electrical cables to allow for monitoring during operation, communications, and the collection of data such as solar data from pyranometers.

On-site Sub-stations

3.3.27 There will be up to two sub-stations on the Principal Site, operating at 400kV/33kV. Each sub-station compound would have a footprint of around 120m in length by 106m in width by 10m in height. It is noted that the tallest point of each sub-station would be 10m, but to allow flexibility for this to occur anywhere within the compound, a consistent maximum height of 10m is applied for the purposes of assessment in the PEI Report.

3.3.28 The sub-stations will consist of electrical infrastructure, including transformers and switchgear. There will then be ancillary equipment used to facilitate the export/import of electricity from/to the Principal Site to/from the National Grid. This will include distribution boards and metering panels. Within each sub-station compound there will be a 400kV switchgear building, a 33kV switch room building, a control building and a backup generator. The 400kV switchgear building will be up to 40m in length by 20m in width by 10m in height. It is likely to be a portal steel structure with coloured profile steel cladding, selected to minimise visual impact. The 33kV switch room will be up to 30m in length by 10m in width by 6m in height. The control building would be around 20m in length by 10m in width by 6m in height.

3.3.29 The 33kV switch and control room for the sub-station will be housed in a building and each sub-station will need to be enclosed in a security fence, that is a maximum of 3m in height. Car parking will be provided within the sub-station fenced area for staff parking associated with routine and emergency maintenance.

3.3.30 The parameters for the on-site sub-stations are also considered in **Error! Reference source not found.**.

Solar Farm Control Centre

3.3.31 A Solar Farm Control Centre will be included within the Scheme and will allow around 10 to 12 staff to operate and maintain the plant, in day-shifts only. The Solar Farm Control Centre will consist of:

- Central Control Room where all operational data of the whole plant will be controlled and monitored;
- Central CCTV and security control of the whole plant including access gates to fenced areas;
- Welfare facility for staff and subcontractors;
- Parking area for staff and visitors; and
- Own power supply including emergency power supply.

3.3.32 The Solar Farm Control Centre will be a maximum of 20m in length by 15m in width by 6m in height. Ancillary and associated parking and servicing areas to the Solar Farm Control Centre will be located adjacent to the building. The indicative site layout plan contained in **PEI Report Volume III Figure 3-1** suggests three possible locations within the Principal Site where the Solar Farm Control Centre could be located. Each option would be accessed by either Site Access 1 or 3 described in paragraph 3.4.16 below. One option accessed via Access 1 would involve the Solar Farm Control Centre being located adjacent to one of the sub-stations. The other two options would involve the Solar Farm Control Centre being located adjacent to existing agricultural buildings and an existing slurry pit.

Equipment Storage

3.3.33 The Scheme will require spare parts for operation over time. Storage will be provided for spare solar PV panels, trackers, inverters, spare parts for the transformer, switchyard, BESS, CCTV, metrological stations spare parts, as well as extra spare cable reels. This will require an overall site area of approximately 1,200m^2. This area will comprise secure storage containers to store spare parts, a new building or the re-use of an existing, vacant building within a suitable location within the Principal Site. Should storage containers be used as an option they will measure a maximum of 12m in length, 2.5m in width and 3m in height. The Scheme would require the provision of a maximum of 40 storage containers for use. Alternatively, an open storage area may be used for some spare parts, such as cable drums and solar modules. The open storage area may be covered by an open-sided 3.2m high canopy for weather protection.

Fencing, Security and Lighting (Principal Site and Solar Stations)

3.3.34 A security fence will enclose the PV panel areas of the Principal Site. The fence is likely to be a ‘deer fence’ type, up to 2.5m in height measured from the ground (refer to Plate 3-7). Pole mounted CCTV systems are also likely to be deployed around the perimeter of the operational areas of the Scheme. It is anticipated that these would be a maximum of 3m in height. CCTV cameras would have fixed views and will be aligned to face along the fence.

Plate 3-7: Illustrative Image of a Deer fence

3.3.35 The Solar Stations will be enclosed by metal security fencing that is a maximum of 2.5m in height. This is to comply with British Standard (BS) EN 62271-1:2017 (Ref. 3-2).

3.3.36 During operation, permanent security lights with motion detectors will be used for security purposes around the electrical infrastructure, emergency access points to facilities within the Scheme and potentially at other pieces of critical infrastructure. No areas are proposed to be permanently lit. During overnight maintenance personnel will use portable lighting sources.

Site Access and Access Tracks

3.3.37 The Principal Site will have four points of access, three located along the A631 Harpswell Lane and one located on the B1398 Middle Street. A Framework Construction Traffic Management Plan (CTMP) sets out the Applicant's proposals to manage construction traffic and staff vehicles within the vicinity of the Scheme along the local highway network during the construction period of the works, in order to limit any potential disruptions and implications on the wider transport network (refer to **PEI Report Volume II Appendix 15-2**). In terms of operational access, it is assumed at this stage that all four Principal Site Accesses used during the construction phase will remain open. Activity on-site during the operational phase will be minimal, principally routine maintenance, servicing and repairs, and monitoring to ensure the continued effective operation of the Scheme.

3.3.38 Internal access tracks within the Principal Site will facilitate construction and the operation of the Scheme. The majority of these will utilise existing farm tracks, upgrading surfaces as required. The creation of new access tracks will be minimised. The proposed access tracks will be compacted stone tracks up to 3.5m wide with 1:2 gradient slopes on either side. The primary access points will be wider, up to a maximum of 6m to facilitate two-way Heavy Goods Vehicles (HGVs) traffic, and passing bays will be provided along internal access roads to ensure traffic does not impact the local highway network.

Surface Water Drainage

3.3.39 The Preliminary Drainage Strategy (refer to **PEI Report Volume II Appendix 10-3**) has been informed by the findings of a Preliminary Flood Risk Assessment (refer to **PEI Report Volume II Appendix 10-2**) and available online geological mapping. The design will ensure compliance with planning policy with the Scheme draining to greenfield run-off rates and accommodating allowances for climate change. Surface water is proposed to be directed to and captured within swales before discharging to ordinary watercourses (field ditches). In terms of potential polluted runoff associated with a fire event, the principles of this are outlined within the OBFSMP contained within **PEI Report Volume II Appendix 3-3**. The OBFSMP confirms that a fire water management plan will be developed including the containment, monitoring and disposal of contaminated fire water where the runoff will be contained, and tested/treated before being discharged to local watercourses. It is proposed to contain the fire water runoff within swales surrounding the BESS. The swales will be used for firewater storage as well as surface water storage. The Preliminary Drainage Strategy will evolve as the Scheme progresses in consultation with the Lead Local Flood Authorities, Internal Drainage Boards and the Environment Agency, as appropriate.

3.3.40 A detailed Drainage Strategy will be designed and implemented in accordance with the Preliminary Drainage Strategy prior to the commencement of development. Where potential infiltration is proposed, infiltration drainage design will be in accordance with Building Research Establishment (BRE) Digest 365: Soakaway Design (Ref. 3-3).

3.3.41 The majority of the Scheme falls within Flood Zone 1, with a low probability of flooding from fluvial sources. There are some small areas within Flood Zones 2 and 3. These fluvial risk locations are in proximity to the River Trent, as a main river, which the Cable Route Corridor crosses, and the River Till and Yawthorpe Beck, which are ordinary watercourses, and which fall within the Principal Site. The Preliminary Flood Risk Assessment considers these areas of flood risk. Only solar PV panels will be located within Flood Zones 2 and 3, with the more sensitive elements of the Scheme, such as sub-stations, Solar Stations and BESS, to all be located within Flood Zone 1.

3.3.42 **PEI Report Volume I Chapter 10: Flood Risk, Drainage and Surface Water** provides a description of the flood risk and drainage design and associated figures.

Electricity Connection to National Grid via Cable Route Corridor

3.3.43 The electricity generated by the Scheme is expected to be exported via interface cables from the on-site sub-stations to National Grid Cottam sub-station. The Cable Route Corridor will require crossings over roads (single track and main roads), watercourses (Upper Witham and River Trent and their associated tributaries), the former railway line associated with the de-commissioned Cottam Power Station, land drains, East Midlands Railway providing services between Doncaster and Lincoln and potential utilities/statutory undertaker assets. A desktop study has been carried out of the Cable Route Corridor and a suitably sized cable proposed with installation depths and spacing of the cables to meet the civil and thermal rating requirements for each crossing.

3.3.44 To connect the Principal Site to Cottam sub-station, 400kV cables would be installed between the two. The total length of the cable run within the Cable Route Corridor is approximately 16km (approximate distance between the Principal Site and Cottam sub-station). A further 400kV underground cable circuit approximately 8km long will be required within the Principal Site to interconnect the two 400kV/33kV sub-stations.

3.3.45 In terms of installation, the three single-core cables will either be laid directly into trenches or into ducting that will be installed with the cables pulled through the ducting. The cables will be installed within a corridor, including both the permanent installation area and temporary working area. At this stage, a 200 to 250 metre wide corridor has been identified to form part of the Order limits to accommodate the cable route and temporary construction corridor (which will be approximately 30 metres in width). The intention is that the Cable Route Corridor will be further refined at the ES stage following further consideration of matters relating to technical design, access strategy and the results of environmental surveys. The refined Cable Route Corridor will still require sufficient flexibility to be able to respond to unexpected localised issues during construction, including but not limited to archaeological finds, implications with respect to protected species and reducing impacts upon trees and hedgerows, for example.

3.3.46 In the case of cables laid in an open cut trench, a typical trench depth of around 2m and trench width of around 3.5m is expected. Where the Cable Route Corridor has a risk of encountering obstacles such as tree root systems, the width of the cable route (both permanent and temporary) may change locally. Where the Cable Route Corridor crosses other infrastructure and natural features such as rivers or streams, the cables will need to be installed deeper, with occasional use of Horizontal Directional Drilling (HDD) techniques or other similar trenchless techniques to cross these obstacles when open trenching is not practical. A figure indicating the current assumptions for HDD crossings is included in **PEI Report Volume III Figure 3-2**.

3.3.47 At this stage, it is anticipated that HDD will be required to cross the former Cottam Power Station railway line, the River Trent, Stow Park Road and the

East Midlands Railway. The cables associated with the majority of the route will be laid in open trenches that will then be backfilled. A figure indicating the current assumptions for HDD crossings is included in **PEI Report Volume III Figure 3-2**.

3.3.48 It is likely that jointing pits will be required every 800m to 1,000m to join sections of cable together. For the single 400kV circuit from Cottam Substation to the proposed Substation indicated within the south part of the Principal Site, the dimensions of the jointing pit would be around 19m in length x 3m in width x 2.5m in depth (there will be a second circuit connecting the two sub-stations within the Principal Site). A link box pit of around 2m in length x 2m in width would also be required situated within a few metres of the joint bay. The distance between jointing pits will be determined through the design process and is dependent on existing infrastructure along the Cable Route Corridor, the cable specification and cable manufacturing length limitations.

3.3.49 As part of the cable route construction, a series of temporary Contractors' compounds will be required along the Cable Route Corridor. Cable drums will be delivered to these compounds to be laid along the route. At this stage, we do not have sufficient information on the proposed Cable Route Corridor access points to understand how materials will be transported and distributed. As assessment of the impacts associated with the construction of the Cable Route Corridor will be included in the ES.

3.3.50 The Cable Route Corridor is subject to an iterative design process. A range of likely constraints will determine the final optimal cable routing, with options being explored currently. These include: technical engineering, environmental, land referencing, legal and commercial considerations.

3.4 Construction

3.4.1 Subject to the DCO being granted, the earliest construction could start is Q3 2025, with planned operation by Q4 2027. Operation in 2027 is the earliest date that the Scheme could be connected under the proposed agreement with National Grid.

3.4.2 At this stage, it is considered that a construction programme of approximately 24 months could be achieved if the Scheme was built in one continuous phase. This has been assessed in the PEI Report as it is considered a worst-case scenario in terms of environmental effects. The final programme will be dependent on the final Scheme design and potential environmental constraints on the timing of the construction activities.

Principal Site Preparation and Civil Engineering Works

3.4.3 The following activities would be required as part of these works:

- Preparation of land for construction, including localised site levelling;
- Import of construction materials, plant and equipment to site to a centralised location within the Principal Site to then be distributed to construction locations;
- Establishment of the perimeter fence;

- Establishment of five temporary construction compounds;
- Construction of the internal access roads; and
- Marking out the location of the Scheme infrastructure.

Solar PV Array Construction

3.4.4 The following activities would be required to install the solar PV panels:

- Import of components to site;
- Piling and erection of mounting structures, with the panel struts/frames rammed/piled to a maximum depth of 4m;
- Mounting of panels (this will be undertaken by hand);
- Trenching and installation of electric cabling;
- Transformer, inverter and switchgear foundation excavation and construction;
- Installation of transformers, inverters and switchgears (cranes will be used to lift equipment into position); and
- Installation of control systems, monitoring and communication equipment.

Construction of Onsite Electrical Infrastructure

3.4.5 The following activities would be required to construct the onsite electrical infrastructure:

- Site preparation and civils for the onsite substations;
- Trenching and installation of electric cabling;
- Pouring of the concrete foundation base;
- Import of components to site - cranes will be used to lift the components into position; and
- Installation of the substations.

Construction of Cable Route

3.4.6 The following activities would be required to construct the cable route:

- Site preparation including the setting up of temporary storage compounds and loading bays; and
- Trenching and installation of electric cabling.

Cottam Substation

3.4.7 A bay has been identified by National Grid as the point of entry, however, equipment modification work and outdoor termination structures outside of the bay will need to be installed to make it suitable for use.

BESS Construction:

3.4.8 The following activities would be required to construct the BESS:

- Import of components to site;
- Installation of electric cabling;

- Construction of foundations; and
- Installation of batteries.

Testing and Commissioning

3.4.9 Commissioning of the Scheme will include testing and commissioning of the processing equipment including the PV and BESS infrastructure. This will involve mechanical and visual inspection, electrical and equipment testing, and commencement of electricity supply into the grid. The 400 kV cable system will require testing and commissioning. For the circuit testing a mobile transformer will be required at one end of each circuit to carry out the High Voltage power testing. In addition, access to the link box pits situated at the joint bay will be required for the duration of the tests.

Landscaping and Habitat Creation

3.4.10 The Indicative Site Layout Plan (refer to **PEI Report Volume III Figure 3-1**) sets out the broad location of key components of the Scheme alongside an initial indication of the provision of green infrastructure. This includes proposed areas for planting mitigation, potential areas for ecological enhancement (including habitat connectivity) and the provision of new hedgerows for mitigation. The Indicative Site Layout Plan also shows those areas within the Principal Site where existing woodland and hedgerows will be retained. Existing and forthcoming ecological surveys will also be used to inform a Biodiversity Net Gain (BNG) report, which will be prepared to inform the ES and submitted as part of the DCO application.

Construction Staff

3.4.11 At the peak of construction, which is expected to be around 3 to 6 months after the start of construction, the Principal Site will accommodate a maximum of 1,250 construction staff per day. On average this revolves around 500 to 800 staff per day.

Construction Hours of Work

3.4.12 Working hours onsite will run from 7am until 7pm Monday to Saturday. Working days will be one 12-hour shift. Therefore, construction staff are expected to travel to the site pre-07:00 and depart the site post-19:00.

Construction Traffic, Plant and Site Access

3.4.13 The main construction and decommissioning access points to the Principal Site will be off the A631, which forms the northern boundary and a single point of access off Middle Street (B1398). Three potential access points are available off the A631 and one off the B1398. The strategy will be to utilise existing accesses.

3.4.14 Construction vehicles would enter the Principal Site through these existing access points. There would be a need for vehicles to cross both Common Lane and Kexby Road that run in an east-west direction through the Principal Site to enable the construction of the southern part of the Scheme. Construction traffic will be managed by the use of a banksman/banksmen.

3.4.15 The two sub-stations proposed would require the use of Abnormal Indivisible Loads (AILs).

3.4.16 The four proposed site accesses for the Principal Site referred to above are as follows (refer to **PEI Report Volume III Figure 3-1**)**Error! Reference source not found.**:

- Principal Site Access 1 - A631 Harpswell Lane/ School Lane T-junction;
- Principal Site Access 2 - A631 Harpswell Lane/ Unnamed road leading to Harpswell Low Farm (T-Junction);
- Principal Site Access 3 - A631 Harpswell Lane/ Unnamed road leading to Harpswell Grange (T-junction); and
- Principal Site Access 4 - B1398 Middle Street / Unnamed road T-Junction (located between Coachroad Hill and Harpswell).

3.4.17 The construction access routes for the Cable Route Corridor are not yet fully known and the detail is still under development. Assessment of the accesses for the Cable Route Corridor have therefore not been carried out as part of the PEI Report, but will be assessed as part of the ES.

3.4.18 Daily peak staff and HGV movements are provided within **PEI Report Volume I Chapter 15: Transport and Access** and within the Transport Assessment in **PEI Report Volume II Appendix 15-1**.

3.4.19 The Scheme will include the provision for a total of 500 car parking spaces based on a peak number of 1,250 construction staff, for works related to the Principal Site. Four separate car parks providing the capped total of 500 car parking spaces for construction staff will be provided and accessed via the three existing accesses on the A631 and on via the B1398 (Middle Street). The proposed number of car parking spaces across the four access points will be as follows:

- Site Access 1: 150 spaces (30%);
- Site Access 2: 100 spaces (20%);
- Site Access 3: 100 spaces (20%); and
- Site Access 4: 150 spaces (30%).

3.4.20 To ensure the cap on the car parking spaces is not exceeded, a mini-bus/coach service will be provided to pick-up and drop-off construction staff to transport them to/from the site. It is assumed that existing bus stops would be used for the pick-up and drop-off construction staff to/from site. In addition, an average construction staff vehicle occupancy of 1.3 persons per vehicle is assumed for the purposes of this assessment and will be managed by the Contractor. Car sharing will be encouraged to reduce the number of construction staff cars travelling to/from the site. The Scheme will accommodate a daily peak of 1,250 construction staff, which is based on the following transport mode share for this assessment:

- 500 (40%): Construction staff vehicles;
- 150 (12%): Car passengers; and
- 600 (48%): Construction staff by mini-bus / coach.

3.4.21 The Framework CTMP (**PEI Report Volume II Appendix 15-2**) ensures the proper management of construction related vehicles across the Scheme. This includes:

- Lift-Sharing;
- Staff Routeing;
- Staff Arrival and Departure Times;
- Car parking strategy and parking permit scheme;
- Mini-Buses/coaches; and
- Cap on Vehicle Numbers.

3.4.22 A self-contained wheel wash for the Principal Site will be installed to be used by vehicles prior to exiting the site onto the public highway if there is mud or debris on the construction site. For loads unable to use the fixed wheel wash, a localised wheel washing facility would be set up to cater for these individually and as required to ensure no detrimental effect to the highway.

3.4.23 Further details relating to the distribution and assignment of construction staff vehicle movements and HGV movements on the local highway network is provided within the Transport Assessment within **PEI Report Volume II Appendix 15-1**.

Construction Compounds

3.4.24 Five temporary construction compounds will be located within the Principal Site. The construction compounds will contain offices, mobile welfare units, canteens, storage and waste skips, construction staff car parking areas and space for storage, download and turning area.

3.4.25 Several construction compounds will also be required along the cable route to facilitate its construction. This details is still under development and will be available for assessment at the ES stage.

Storage of Construction Plant and Materials

3.4.26 No long-term onsite storage of materials is required during the construction phase. Materials will be delivered via HGVs at regular intervals to the construction compounds and transported directly to where it is required within the site using smaller Light Goods Vehicles (LGVs). Short term storage of materials and plant can be accommodated within the construction compound until it is required.

Spoil Management

3.4.27 There will be no site wide reprofiling required; however, there may be a need to level some areas within the Principal Site. This is unlikely to create excess spoil and it is not expected that this would need to be removed from the Scheme. Limited spoil material is only expected to be generated from cable trenches, temporary and permanent compounds, internal roads, BESS and substation compounds, and Solar Stations. During construction, the 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, reinstate the temporary construction compounds and any temporary access roads. Any excess spoil will be utilised across the Scheme.

Construction Lighting

3.4.28 During winter months, mobile lighting towers will be used during construction.

Energy Consumption

3.4.29 An estimated 500m^3 of fuel will be required during construction. Fuel for machinery and generators will be delivered to site by a fuel truck and stored in an above ground fuel storage tank of 10-20m^3 capacity. The fuel storage tank will be sheltered, secured from unauthorised access and equipped with a spill protection bund.

Water Consumption

3.4.30 An estimated 250-1000m^3 of water will be required during construction to support welfare facilities onsite and other uses. The water will either be transported to the Scheme by road from an existing nearby licenced water abstraction source or will supplied directly from a mains water connection and stored on site in one or more tanks with a total capacity of 10-20 m^3.

Waste

3.4.31 Solid waste materials generated during construction will be segregated and stored onsite in containers prior to transport to an approved, licensed third party landfill and recycling facilities. The largest waste numbers are likely to be the removal of pallets and recyclable cardboard during delivery of the PV panels.

Framework Construction Environmental Management Plan (CEMP) and Construction Resource Management Plan

3.4.32 A Framework CEMP has been prepared in **PEI Report Volume II Appendix 3-1**. This describes the framework of mitigation measures to be followed during construction, to be carried forward to a detailed CEMP prior to construction. The aim of the CEMP is to reduce nuisance impacts from:

- Use of land for temporary laydown areas, accommodation, etc;
- Noise and vibration;
- Utilities diversion;
- Dust generation;
- Soil removal;
- Lighting; and
- Waste generation.

3.4.33 The detailed CEMP will be produced by the Contractor following granting of the DCO and prior to the start of construction (as part of a Requirement attached to the DCO). The CEMP will identify the procedures to be adhered to and managed by the Contractor throughout construction. Contracts with companies involved in the construction works will incorporate environmental control, health and safety regulations, and current guidance and will ensure that construction activities are sustainable and that all contractors involved with the construction stages are committed to agreed best practice and meet all relevant environmental legislation including: Control of Pollution Act 1974 (COPA) (Ref. 3-4), Environment Act 1995 (Ref. 3-5), Hazardous Waste Regulations 2005 (as amended) (Ref. 3-6) and the Waste (England and Wales) Regulations 2011 (Ref. 3-7)

Site Reinstatement and Habitat Creation

3.4.34 Following construction, a programme of site reinstatement and habitat creation will commence. It is anticipated that the areas under the solar panels and areas outside of the developable areas will be planted with semi improved or species rich grassland where suitable, and hedgerows and woodland will be planted in strategic locations to provide visual screening and to enhance the biodiversity value of the site. An Outline Landscape and Ecology Management Plan (LEMP) has been prepared in **PEI Report Volume II Appendix 3-2**. This document sets out the principles for how the land will be managed throughout the operational phase following the completion of construction. A detailed Landscape and Ecology Management Plan (LEMP) will be produced following the granting of the DCO and prior to the start of construction (this will be secured by a Requirement attached to the DCO).

3.5 Operational Activities

3.5.1 During the operational phase, activity within the Scheme will be minimal and will be restricted principally to vegetation management, equipment maintenance and servicing, replacement of any components that fail, solar PV panel cleaning and monitoring. It is anticipated that maintenance and servicing would include the inspection and, if required, removal, reconstruction, refurbishment or replacement of faulty or broken equipment.

3.5.2 Operational access will primarily be taken from the A631 Harpswell Lane Principal Site accesses via the existing T-Junctions (Principal Site Access 2 and 3) but will also be achievable via Principal Site Access 1 on the A631 Harpswell Lane and Principal Site Access 4 on B1398 Middle Street when access to the on-site substations are required. The existing Cottam Power Station T-junction with Cottam Road will also be utilised to access the National Grid Cottam Substation if required. The majority of routine visits during the operational phase will be via vans and four-wheel drive vehicles. If larger vehicles are required, they are expected to utilise the existing site accesses from the A631.

3.5.3 Along the cable route, operational activity will consist of routine inspections (schedule to be determined) and any reactive maintenance such as where a cable has been damaged.

3.5.4 It is anticipated that there will be up to 10-12 permanent staff onsite during the operational phase. It is anticipated that there could be an average of 10 to 20 visits per year with four-wheel drive vehicles, HGVs or transit vans for maintenance purposes.

3.5.5 The operational life of the Scheme will be approximately 40-60 years.

3.5.6 A Framework Operation Environmental Management Plan (FOEMP) will be produced as part of the ES to demonstrate how the mitigation measures will be implemented. It will also set out the monitoring and auditing activities designed to ensure that such mitigation measures are carried out, and that they are effective. This will be secured by a Requirement attached to the DCO.

3.6 Decommissioning

3.6.1 In view of the operational life of the Scheme being approximately 40-60 years, this would allow the land (that has previously been intensively farmed) to recover ultimately safeguarding the agricultural usage of this land for future generations.

3.6.2 When the operational phase ends, the Scheme will require decommissioning. All PV panels, mounting poles, on-site cabling, inverters, transformers and concrete foundations to those elements not remaining would be removed from the Principal Site and recycled or disposed of in accordance with good practice and market conditions at that time.

3.6.3 It is to be determined whether the 400kV cable will remain in situ or removed as part of decommissioning. The future of the sub-station and control building would be agreed with the relevant Local Planning Authority prior to commencement of decommissioning.

3.6.4 Decommissioning is expected to take between 12 and 24 months in phases. There would be two main phases associated with this operation. The first phase would remove the above ground structures followed by the removal of below ground elements of the Scheme.

3.6.5 The effects of decommissioning are often similar to, or of a lesser magnitude than, construction effects and will be considered in the relevant sections of the PEI Report.

3.6.6 A Framework Decommissioning Environmental Management Plan (FDEMP) will be produced as part of the ES to demonstrate how the mitigation measures will be implemented. It will also set out the monitoring and auditing activities designed to ensure that such mitigation measures are carried out, and that they are effective This will be secured by a Requirement attached to the DCO.

Land Reinstatement

3.6.7 The drainage of the land within the Scheme will be checked and grassed after decommissioning. Should any agricultural drains be altered or removed, they will be restored such that agricultural activities could continue after decommissioning of the Scheme.

3.6.8 Areas of habitat and biodiversity mitigation and enhancement delivered as part of the Scheme would remain up until the land is returned to the previous landowners. Following this, the landowners would choose how the land is to be used and managed.

3.7 Summary of Design Parameters considered in the PEI Report

3.7.1 The design of the Scheme is an iterative process, based on preliminary environmental assessments and informal engagement with key stakeholders at this PEI Report stage. **PEI Report Volume I Chapter 4: Alternatives and Design Evolution** describes this process further, including options that have been considered and discounted or amendments made to the Scheme design to date.

3.7.2 A number of the design aspects and features of the Scheme cannot be confirmed until the tendering process for the design and construction of the Scheme has been completed. For example, the sizes of buildings or enclosures may vary, depending on the Contractor selected and their specific configuration and selection of plant.

3.7.3 Through use of the Rochdale Envelope approach, a likely worst-case assessment of potential environmental effects is presented to take into account different parameters of the Scheme that cannot yet be fixed. Wherever an element of flexibility is maintained, alternatives have been assessed and the likely worst-case impacts have been reported in this PEI Report. Work will continue to further refine the proposed options within the Scheme Boundary prior to submission of the DCO application, where possible.

3.7.4 **Error! Reference source not found.** sets out the parameters that have been assessed within this PEI Report. Each technical topic has assessed the design considered to be the likely worst-case scenario for that discipline to determine significance.

Table 3-2: Indicative details of the design parameters used for the PEI Report assessment

Scheme Component	Parameter Type	Applicable Design Principle
Solar PV panels	Indicative number of panels	It is estimated that the Scheme will contain between 1.2 and 1.5 million PV panels.
	Panel generating capacity	Each panel is expected to have a watt-peak capacity of between 400-1000 watts as technology evolves.
	Dimensions	Individual panels are typically between 2-2.5m in length and 1-1.4m in width.
	Indicative panel colour	Typically, black or dark blue.
	Frame type	Anodised Aluminium.
	Indicative panel orientation	It is anticipated that the strings of PV will be secured on single axis trackers that are configured north-south with varying azimuths (azimuth between -40° degrees and 40° degrees) and will track 60 degrees

Scheme Component	Parameter Type	Applicable Design Principle
		east-west, where the panels will turn from east to west during the course of the day.
PV panel mounting structures	Rack	Each string of panels will be mounted on a rack made with galvanized steel and/or Magnelis®
	Indicative Foundations	Galvanised steel poles driven into the ground. Subject to ground conditions or the presence of archaeology, these may require concrete foundations of concrete ballasts.
	Indicative Separation distance between rows	Indicative inter row distances of a minimum of 1.6m and a maximum of 3.8m.
	Maximum height above ground level (agl)	The height of the bottom of the panel above ground level will be between 0.6m and 1.5m. The 0.6m height is when the panel is at maximum tilt.
Solar Station	Type	The Solar Station will comprise of a DC/AC inverter and a LV/MV transformer, including switchgear.
	Indicative Number	The indicative number of solar stations range from 130 to 140 solar stations
	Indicative Dimensions	The maximum dimensions of the solar station will be 48m in length by 30m in width and 4m in height.
	Colour	Externally finished in keeping with the prevailing surrounding environment. The solution proposed has an option to change the equipment colour.
	Foundations	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be submitted and secured via a requirement associated with the Order.
Inverters, Transformers and Switchgear	Type of Inverter	Decentralised inverters.
	Indicative dimensions of inverters	Inverters will be around 3m in length by 2m in width by 3m in height.
	Type of Transformer	Depending on whether or not the components are housed within a container, the transformer will either be outdoor or within container type housing

Scheme Component	Parameter Type	Applicable Design Principle
	Colour of Transformers	Externally finished in keeping with the prevailing surrounding environment. The solution proposed has an option to change the equipment colour.
	Type of Switchgear	Depending on whether the components are housed within a container, the switchgear will either be outdoor or sitting inside the Solar Station.
	Indicative dimensions of switchgear and transformer	The switchgear together with the transformer housing will have a maximum dimension of 5.5m in length by 2.5m in width by 3m in height.
	Colour of switchgear	Externally finished in keeping with the prevailing surrounding environment. The solution proposed has an option to change the equipment colour.
	Foundations for inverters, transformers and switchgear	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be submitted and secured via a requirement associated with the Order.
On-site cabling (between PV panels and inverters)	Type	Low voltage within Principal Site electrical cabling is required to connect the PV panels to the combiner boxes and the combiner boxes and BESS to the inverters (typically via 1.5 kV cables). Cabling between PV panels and the inverters will be along the racks, fixed to the mounting structure, and then buried underground in trenches (between racks and in the inverter's input).
	Indicative Cable dimensions	To be determined on completion of cables sizing calculations (detailed engineering).
	Indicative Cable trench dimensions	The dimension of the trenches will vary depending on the number of ducts they contain but would typically be around 4m in width and around 1.2m in depth.
		For string and DC cables, the trench will not be required to go deeper than 0.7m, but could be as wide as 4-6m near the inverter DC inputs where several cables will be connected to the inverter (20 pairs of DC power cables).
	Type	33kV power cables single-core.

Scheme Component	Parameter Type	Applicable Design Principle
On-site (underground) cabling (between transformers and on-site substation)	Indicative Cable dimensions	The approximate overall diameter of each power cable will be 70mm.
	Indicative Cable trench dimensions	The 33 kV cable trenches will be approximately 1m wide and 1.7m deep for general installation. This will be varied at crossing points for short lengths as necessary. 56 circuits will be required in total with 28 from each of the two substations.
Battery Energy Storage System (BESS) Battery container	Type	The exact locations of the BESS, transformers, and dedicated switchgear are yet to be determined but the BESS configuration will be DC-coupled. This means they will be spread across the site and located alongside the Solar Stations prioritising the cable length to minimise losses.
	Indicative Dimensions	The footprint for each battery energy storage container would be around 12.2m in length by 2.5m in width by 4m in height.
	HVAC	Each battery energy storage container will include a heating, ventilation and cooling (HVAC) system to ensure the efficiency of the batteries, which are integrated into the containers. Liquid cooling of the container is likely to be the chosen solution.
	Fire Management	Refer to Outline Battery Fire Safety Management Plan in **PEI Report Volume II Appendix 3-3**.
	Foundation	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be submitted and secured via a requirement associated with the Order.
DC / DC converter (DC-coupled BESS only)	Indicative Dimensions	The DC/DC converter will be installed alongside every battery energy storage container to keep cabling as short as possible and losses low. The footprint for each DC/DC converter would be around 2.5m in length by 1m in width by 2.8m in height.
		The battery will utilise the inverter, transformer and switchgear within the Solar Station to operate, isolate and control the imported and exported power to and from the BESS.

Scheme Component	Parameter Type	Applicable Design Principle
	Foundation	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be submitted and secured via a requirement associated with the Order.
Electrical Compound (substation)	Location	There will be a total of 2 substations located within the Principal Site. One will serve the one half of the Scheme and the other will serve the other half of the Scheme.
	Components	Each substation will contain the following main components: • 400kV GIS Switchgear. • 400kV Cable Sealing End. • 400kV Surge Arrester. • 400kV Post-Insulator. • 400/33kV, 150/75/75MVA Transformer. • 33kV Switchgear.
		Apart from the above main equipment, there will be some auxiliary equipment such as: • Low Voltage AC distribution board. • Low Voltage DC distribution board. • Battery and Charger panel. • The power panel for security lighting. • Protection and Control Panel. • Telecom and Metering Panel.
		The following building will be located inside the substation boundary: • GIS building to accommodate switchgear. • 33kV building to accommodate 33kV switchgear. • Control room building to accommodate all Protection and Controls cabinets and auxiliary boards and panels. • Diesel Generator.
	Indicative Dimensions	The substation footprint is approximately 106m Width by 120m length by 10m in height.
	Number of parking spaces	Substations A and B will have 4 parking spaces each to meet the needs of operational parking requirements.
	Foundations	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be

Scheme Component	Parameter Type	Applicable Design Principle
		submitted and secured via a requirement associated with the Order.
Solar Farm Control Centre	Type	The Solar Farm Control Centre will allow around 10 to 12 staff to operate and maintain the plant, in day-shifts only. The plant staff will also grant access to parts of the plant for operations and maintenance works which are typically CCTV surveyed to prevent unauthorized access.
	Dimensions	Around 20m in length by 15m in width by 6m in height.
	Materials	Painted block construction (detailed design to be approved, including proposed materials prior to construction).
	Foundations	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be submitted and secured via a requirement associated with the Order.
Equipment Storage	Indicative Dimensions	Around 12m in length by 2.5m in width by 3m in height or equivalent shaded open storage area using a 3.2m high shade. A total area of around 1,200m^2 is anticipated.
	Foundations	Foundation design and depth to be confirmed by Phase 2 Site Investigation post consent. Details of foundations to be submitted and secured via a requirement associated with the Order.
Construction compounds	Number of compounds	It is anticipated that five temporary compounds will be placed across the Principal Site.
Fencing and security	Maximum Height	A security fence will enclose the operational areas of the Principal Site. This will be a deer fence, approximately 1.8m to 2.5m in height. Pole mounted internal facing closed CCTV systems are also likely to be deployed around the perimeter of the operational areas of the Principal Site. It is anticipated that these would be around 3m high.
Cable route	Length of cable route	To connect the Principal Site to Cottam Sub-station, 400kV cables would be installed. The total length of the cable run within the Cable Route Corridor is approximately 16km.
	Cable dimensions	400 kV Cottam to Substation B Circuit: the power cable will be approximately 115mm (nominal) in diameter.

Scheme Component	Parameter Type	Applicable Design Principle
	Number of circuits	One single circuit for each of the above with 3No. cables.
	Number of trenches	One trench is required for each of the circuits above.
	Trench depth / width (permanent)	Approximately 800mm to 1m width trench by 1.7m deep for general installation, this may increase for civil and thermal ratings reasons at crossing points for the required length of the crossing of utilities or other obstacles. For HDDs this will be deeper for construction purposes.
	Trench depth / width (temporary)	The trench could be temporarily wider (benched) for slope on the trench sides to ensure operatives' safety. The slope size will be defined by temporary works design.
	Jointing pits	It is likely that jointing pits will be required every 800m to 1,000m to join sections of cable together. The dimensions of the jointing pit would be around 19m in length by 3m in width by 2.5m in depth. A link box pit of around 2m in length by 2m in width would also be required.
	Crossing types	There are several crossings required throughout the Scheme. For major crossing points across main rivers and railway lines and other locations which require a trenchless solution, a HDD method will be applied. For minor roads and tracks, hedgerows and field drains, an open cut method will be applied.

3.8 References

Ref 3-1 PINS (2018). Planning Inspectorate's Advice Note 9: Using the 'Rochdale Envelope'. https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/

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