CHAPTER 7 - CONSTRUCTION, OPERATION AND DECOMMISSIONING

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INTRODUCTION

7.1 This chapter describes the construction, operation and decommissioning phases of the proposed East Stour Solar Farm.

7.2 Potential impacts associated with the respective phases of the development are addressed individually within the following ES assessment chapters.

THE SOLAR FARM CONSTRUCTION PHASE

Construction Process

7.3 The construction of a solar farm is a relatively straight forward process.

7.4 The principal phases to the construction are:

- site access tracks are built or upgraded and site fencing is erected;
- the combined inverter/transformer units and site cabinets are offloaded in situ;
- panel frames are push-driven into the ground and fixed in place;
- panels are mounted to the frames and wired together;
- cable trenches are dug to install the main cables;
- all electrical connections are made and the site is commissioned; and
- landscape mitigation planting takes place during the autumn.

7.5 It is envisaged that the proposed East Stour Solar Farm will take approximately nine months to construct, with multiple teams working in different areas of the site simultaneously. Most of the construction activity is involved with the track construction during the first six months of construction.

7.6 A typical construction programme for a project of the scale of the East Stour Solar Farm is shown in **Table 7.1 on page 112**.

7.7 **Plate 7.1 on page 113** provides an overview of the construction process as a photographic sequence.

Table 7.1 - *Typical Construction Programme*

Activity	Programme Month								
	1	2	3	4	5	6	7	8	9
Temporary construction compound, including gates, welfare and temporary surfacing, removal at the end of the construction period	■		■		■				
Security fencing and gates	■	■	■	■	■	■			
Site tracks (crushed stone over geogrid base)	■	■	■	■	■	■			
Foundation concrete for inverter/transformer units, customer cabin, welfare unit, store, substation and CCTV posts	■	■	■	■	■	■			
Frame mounting system and CCTV equipment		■	■	■	■	■	■	■	
Solar panels		■	■	■	■	■	■	■	
Cabling and cable trench sand	■	■	■	■	■	■	■	■	
Inverter/Transformer units			■	■	■	■			
Substation, Store and Welfare containers				■	■	■	■	■	■
Ecological works (wildflower/seed mix, hedging and woodland), subject to appropriate time of year									■
Site commissioning, testing and clearing									■

Plate 7.1 - *Photographic Sequence of Construction Process*

Groundworks

7.8 Works across the site will be staged as the construction teams progress through the various parcels of land comprising the site.

7.9 Two entrance points and one crossing of Church Lane will be used to access the three distinct sections of the proposed site from Church Lane (Unique Street Reference Number (USRN): 1300278 (One.Network, 2021)).

7.10 As described in **Chapter 6 - Development Proposal** and **Chapter 8 - Traffic and Access**, appropriate visibility from the junction is achieved in line with National Policy and Guidance. The solar farm site entrances, including proposed modifications, are shown in Figure 6.2 - Proposed Site Entrances with Visibility Splay (North Entrance - a, Central Entrance - b, Church Lane Crossing - c) **(ES Volume 3)**.

7.11 From the site entrances, access tracks follow field boundaries as far as possible. Access tracks are kept to a minimum to allow access to sub-sections of the site rather than weaving in and out of every row of solar panels. Wherever possible existing farm access tracks have been utilised as the site tracks for the proposed solar farm. Existing field entrances are also used so that no new breaks in hedgerows will be required for access through the proposed site, excepting for the Church Lane crossing point to the south where a defunct section of hedge will be opened.

7.12 Where new access tracks are required these will have a running width of 4m. As described in **Chapter 6 - Development Proposal**, the tracks will have the appearance of typical vernacular farm tracks with a crushed stone running surface built up over geotextile placed on top of prepared (scraped and levelled) topsoil at, or just below, existing ground level. The tracks will be allowed to grass over following completion of the construction phase. To minimise impacts on drainage across the site, tracks will be permeable as discussed further in **Chapter 9 - Hydrology and Hydrogeology**.

7.13 Temporary construction compounds will be established. The compounds will provide a secure store for materials and equipment and welfare facilities and will be created following the same construction technique as for the access tracks. Construction of the temporary construction compounds may be staggered as the construction teams progress through the site.

7.14 Stock proof fencing providing security will be installed around the perimeter of each parcel of the site. Fence posts will be driven into the ground wherever ground conditions permit. No concrete or foundations are required for the posts. Wire mesh is then tensioned between the posts.

7.15 Concrete footings are cast for the site cabinets and distributed inverter/transformer units. Concrete will also be used to anchor the posts holding the CCTV cameras.

7.16 Cable trenches will be excavated from the array ‘table’ ends to the inverter/transformer unit pads, and from the inverter/transformer units to the substation and electrical and telecommunication cables installed. The cables will be installed as the trench is excavated, and the trench filled immediately afterwards. The grid connection will be similarly trenched. Works in the highway will be timed to as to minimise traffic disruption.

7.17 Inverter/transformers units are delivered directly on to their pads and installed.

7.18 The installation of the panel frame legs follows a similar approach to fencing installation, these are driven into the ground. Where concrete feet are to be used these are simply set out in place.

7.19 The frames are then assembled. Firstly the edges of the frames are installed at the inclination angle (in this case 20 degrees), and then the horizontal bars are bolted on to form a lattice onto which the panels are installed.

7.20 The panels are then mounted onto the frames, and electrically connected with the wires carried behind the panels.

7.21 The wiring is then fed to the transformer/inverter units.

7.22 The approximate number of deliveries and removals associated with the groundworks, solar panel and associated infrastructure delivery throughout the construction process for the East Stour Solar Farm are outlined in **Chapter 8 - Traffic and Access**.

OPERATIONAL PHASE

7.23 Following the installation of the solar panels and the completion of commissioning, the panels begin generating and exporting electricity to the local distribution network.

7.24 The solar panels will be mounted at a fixed angle of approximately 20 degrees and will be approximately south facing to maximise generation throughout the day and over the year. The array is carefully designed to consider the specific ground conditions and to minimise shading between panel rows and from nearby features such as trees and hedges. The equipment selected will be fit for purpose for the projected 40-year development lifetime.

7.25 The site is remotely monitored and operated with an automated system alerting an engineer in case of component or system errors or component failures.

7.26 The use of remote monitoring reduces the number of site visits required. However, regular checks will be undertaken to ensure the panels, frames, fittings, inverters and fencing are all in good working order.

7.27 The panels will be cleaned periodically to ensure maximum production, as shown at **Plate 7.2**. This involves the transportation of a tractor unit, de-ionised water bowser and cleaning team (generally 3-4 personnel) to site once or twice a year.

Plate 7.2 - *Typical Solar Farm Cleaning Unit*

7.28 Grass and wild flower meadow mix areas will be mown at the appropriate time of year, in accordance with a Landscape and Environment Management Plan, to be agreed with Ashford Borough Council.

7.29 During normal operations, personnel will visit the site approximately once a month, in a light van or four-wheel drive vehicle.

Predicted Electricity Generation

7.30 East Stour Solar Farm will connect directly in to the nearby Sellindge Converter Station Substation National Grid Supply Point (GSP). The GSP is where electricity transported from the National Grid is converted to the Distribution Network voltage for supply across the region. Whilst the site is generating it will supply electricity directly into the network and its serviced consumers.

7.31 As stated at **Chapter 1 - Introduction** it is predicted that the solar farm at this site would have a potential annual yield of approximately 69 600MWh.

7.32 In terms of household electricity usage this would be sufficient to offset the equivalent annual energy needs of 16 900 (to 3 S.F) average Ashford Borough homes (as noted in **Chapter 1**).

Emissions

7.33 It has been predicted that the proposed solar farm will generate an annual average of approximately 69 600 000kWh (net) of electricity (to 3 S.F.).

7.34 The generation of this electricity will offset electricity generated from other sources. The project is connected in to the National Grid substation and all electricity generated by the site will be transferred to the electricity network. This means that whilst the solar array is generating electricity, it in turn reduces demand on the large fossil fuel power stations.

7.35 Different organisations have, historically, made differing assumptions for calculating the emissions offset associated with renewable energy generation, varying in their view of the power generation technology that is actually offset.

7.36 For carbon dioxide these assumptions range from 860gCO_2/kWh (based upon coal generation) to 355gCO_2/kWh (based upon gas generation).

7.37 The National Grid itself is dynamic and electricity is sourced from a variety of generators including coal, gas, oil, nuclear and renewable energy. As shown in **Table 7.3 on page 117** (as also discussed in **Chapter 2 - Development Rationale**), electricity is also imported from overseas.

7.38 It would therefore be incorrect to base any emissions offset calculation upon a single source of energy, particularly given the shifting energy mix as identified in **Table 7.3**.

7.39 A conservative approach is to utilise the UK Government Greenhouse Gas Conversion Factors (DBEIS, 2021c) for company reporting of annual carbon emissions.

7.40 It is a legal requirement for all UK quoted companies (listed on London Stock Exchange, EEA market, New York Stock Exchange or NASDAQ, unquoted large companies and large LLPs) to report on their global energy use in addition to greenhouse gas emissions.

7.41 The Government update the Greenhouse Gas Conversion Factors on an annual basis, and these include the average carbon emissions for UK electricity generation and UK transmission and distribution. The Government also require quoted Companies to use these conversion factors to calculate the emissions offset associated with their own renewable energy generators.

7.42 These conversion factors are therefore entirely appropriate as the basis for calculating the emissions offset associated with this proposal. As they are based upon the mix of generation sources (as shown in **Table 7.3**) they can be considered conservative as this mix includes for renewable energy sources and renewable energy generation is not used to offset itself.

7.43 The conversion factors for 2020, published in June 2021, provide the most up to date figures as shown in **Table 7.2**.

Table 7.2 - *2021 GHG Conversion Factors (DBEIS, 2021c)*

	$kgCO_2e/kWh$
Electricity Generation	0.21233

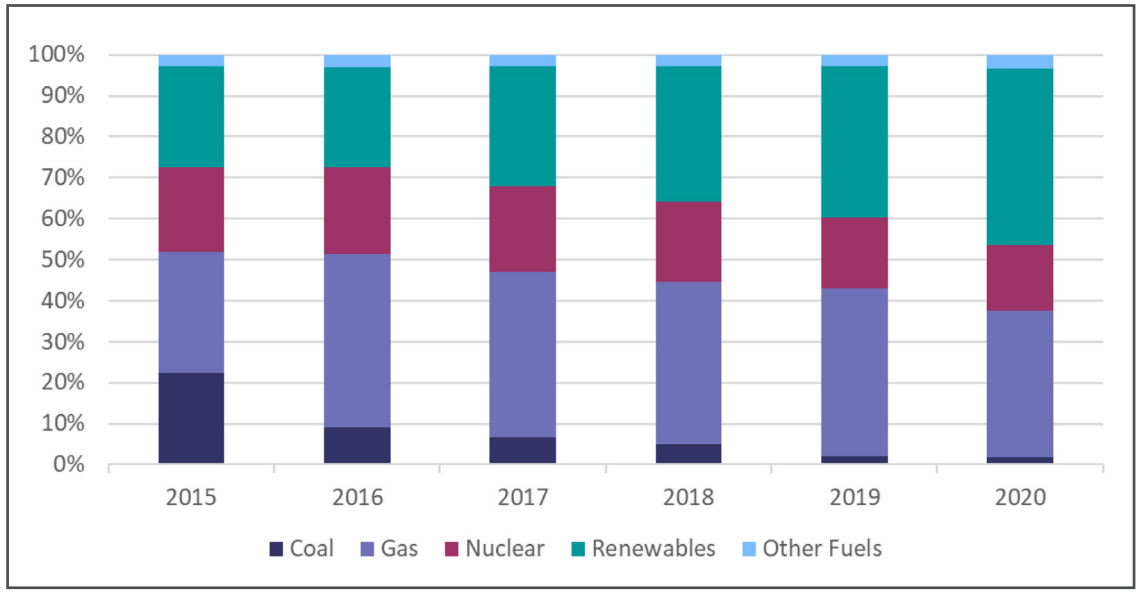

Table 7.3 - *2015 Electricity Fuel Mix Compared to 2020 Electricity Fuel Mix (Source: Digest of UK Energy Statistics (DBEIS, 2021)*

7.44 On this basis the electricity produced by the East Stour Solar Farm will offset approximately **14 800 000kgCO_2/ annum or 14 800 tonnes CO_2 per annum** (to 3 S.F.). This can be considered a conservative estimate of the carbon offset by the East Stour Solar Farm.

7.45 DBEIS report that the CO_2 emissions associated with the average Ashford resident was 1.41 tonnes of CO_2 per annum based upon per capita emissions in 2019 (DBEIS, 2021d). The 14 800 tonnes of CO_2 offset by the solar array would therefore compare to the total equivalent domestic emissions of some 10 500 (to 3 S.F.) average Ashford Borough residents.

7.46 This project therefore provides a material contribution to the net zero target by 2050 at both National (through the Climate Change Act) and Local level. Whilst Ashford Borough elected not to declare a 'Climate

Emergency', the Council has elected to commit to carbon neutrality by 2030.

DECOMMISSIONING PHASE

7.47 At the end of the operating life of the solar farm, the panels and associated infrastructure will be fully decommissioned unless a new application for a replacement solar energy development is made to, and granted by, the Local Planning Authority.

7.48 If a replacement development is both applied for and consented, then a partial decommissioning will be undertaken, typically involving the removal of the existing solar panels. This process would be analysed within an Environmental Impact Assessment or Environmental Report for the replacement site application against the baseline environment at that time.

7.49 If a replacement development is neither applied for nor consented, then the decommissioning of the solar farm would follow the reverse of the construction phase over a shortened time period.

7.50 It is likely that temporary compounds similar in size and nature to the main temporary construction compound will be required for the secure storage of equipment and for worker welfare facilities during decommissioning. The compounds will be in situ for the duration of the decommissioning process, after which the compound area will be reinstated to agricultural land.

7.51 The solar panels and frames will be removed. The site will be reinstated with electrical connections isolated and made safe and left in situ, below agricultural depth or removed for recycling.

7.52 The inverter/transformers, site containers and cabinets will be removed from the site and foundations removed down to a level where they would have no impact upon reintroduction of farming use of the site.

7.53 Fencing and CCTV equipment will be removed.

7.54 New site tracks would be left in place for use by the landowner for their farming practices, if required. Otherwise materials would be removed and the land returned for full agricultural use.

7.55 A Waste Management Plan will be agreed with Ashford Borough Council and will include measures for the treatment of waste arising during the decommissioning phase. This plan will maximise re-use and recycling in accordance with the waste management hierarchy.

PROTECTION MEASURES THROUGH CONSTRUCTION AND DECOMMISSIONING PHASES

7.56 A Construction Environment Management Plan (CEMP) will be agreed with the Local Planning Authority prior to construction commencing. This will include details of all mitigation measures proposed for the safe and environmentally sensitive construction of the proposed East Stour Solar Farm. The CEMP overall sets out the management measures which all contractors on site will be required to adhere to at all times to control the construction effects on the environment and

surrounding receptors, as well as the safety of construction personnel. It will outline how environmental issues will be handled to ensure compliance with relevant legislation. The CEMP can be secured through a Planning Condition should permission be granted.

Geology and Soils

7.57 Potential impacts on geology and soils from the construction of the civil works associated with the solar farm (the solar panels and frames, inverter/ transformer units and other site containers, foundations, and access track) are avoided through considered design of these elements and in the design of the site layout.

7.58 Wherever possible, the access track utilises existing farm tracks. Where new access tracks are required, a membrane layer at the base of the track will minimise the volumes of stone required. Locally sourced construction materials will be used in construction works where possible. The site is well located to receive construction materials from the nearby A-road network as discussed further in **Chapter 8 - Traffic and Access**.

7.59 The volumes of all footings and foundations are inherently designed to minimise the volumes of stone and concrete required within safe engineering margins.

7.60 A suitable drainage scheme at the site entrance will be designed in discussion with the Local Planning Authority, and incorporated into the CEMP to avoid the potential for water to leave the construction site and enter the highway. Wheel washing facilities, road cleaning and drain clearing will also be in place to avoid debris exiting site onto the public highway.

7.61 Pollution prevention guidance published by DEFRA and the Environment Agency (2019) will be adhered to throughout the construction, operation and decommissioning phases of the project. The guidance includes consideration of polluting substances, the correct use of drains, and the appropriate storage of materials and wastes.

7.62 The soils and materials excavated during the construction and decommissioning phases of the proposed development will be stored in accordance with The Site Waste Management Plans Regulations, 2008 (Act of Parliament) which states at 6(5) that:

'(a) all waste from the site is dealt with in accordance with the waste duty of care in section 34 of the Environmental Protection Act 1990(a) and the Environmental Protection (Duty of Care) Regulations 1991(b); and

(b) materials will be handled efficiently and waste managed appropriately.'

7.63 In 2009 DEFRA published the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, for overarching guidance on soil use and management at each stage of the construction process. Alongside this, there is the Good Practice Guidelines as published by MAFF in 2000, for guidance on appropriate handling and storage of soils.

7.64 Wastes arising will be used wherever possible in the reinstatement of the site. Any excess stored material will be disposed of off-site in full accordance with Environment Agency guidance to minimise the risk of pollution and degradation of habitats. Waste

handling procedures will be detailed in the Site Waste Management Plan.

7.65 Locally sourced sub-soils and top-soils will be used in all reinstatement works where any are necessary.

7.66 Wheel washing facilities will be put in place for vehicles exiting the site to minimise potential for soil and debris to be transferred to the local highway.

Health and Safety

7.67 Health and safety regulations and best practice guidelines will be followed during the construction of the proposed development to ensure that risks to personal safety and equipment on site are minimised.

7.68 Risk assessments will be conducted prior to all phases of the development. These would include, but would not be limited to: travel to the site; working on agricultural land in a rural environment; use of heavy tools and machinery; working around electrical equipment; working around highways and rail infrastructure; site visits to the operational solar farm; and contagious diseases (such as SARS-Cov-2).

7.69 All construction personnel will be informed of the potential risks to health and safety upon arrival to site via a site induction and regular toolbox talks during the construction process. Site hazard and safety reminder signs will be located in and around the welfare areas during construction and, where appropriate, at electrical infrastructure during operation. All persons on site will be required to wear appropriate protective equipment at all times.

7.70 A tidy construction site will be maintained to minimise risk of personal injury. The correct equipment will be available for the required tasks, and equipment will be regularly checked and stored safely to minimise risks to personal safety.

7.71 All site work for the East Stour Solar Farm would comply with the Construction (Design and Management) Regulations 2007, and its associated approved code of practice (HSE, 2007). A transparent reporting process will be in place to monitor on-site safety and potential risks to health.

Hazardous Substances

7.72 Any substances classed by regulation as hazardous that are used during the construction, operation (either during normal operations, scheduled maintenance or on the occasion of a major component replacement or repair) and decommissioning phases of the proposed solar farm development will be used and disposed of responsibly off site, in accordance with manufacturer's guidance and regulations governing use of the material. Materials with potential to be classified as hazardous are most likely to be coolants, oils, fuels and lubricants.

7.73 Fuels and oils kept in temporary construction and decommissioning site compounds will be stored in double-walled containers or lined bunds in accordance with Environmental Protection and Control of Pollution regulations.

7.74 Any hazardous materials stored on site during construction or decommissioning will be stored securely and in accordance to regulations and manufacturer/ supplier's guidelines.

7.75 No hazardous materials will be stored on site during the operational phase of the proposed development.

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