# CLEVE HILL SOLAR PARK

**PRELIMINARY ENVIRONMENTAL INFORMATION REPORT**

Non-Technical Summary

May 2018

**www.clevehillsolar.com**

CLEVE HILL
SOLAR PARK

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# 1 INTRODUCTION

## 1.1 Background

This document is a Non-Technical Summary (NTS) of the Preliminary Environmental Information Report (PEIR) that has been prepared on behalf of Cleve Hill Solar Park Ltd (the Applicant) in relation to a Nationally Significant Infrastructure Project (NSIP) application (the Application) to be made to the Secretary of State (SoS) for Department for Business, Energy & Industrial Strategy (BEIS), under Section 37 of the Planning Act 2008.

The Application is for a Development Consent Order (DCO) for the construction, operation and maintenance, and decommissioning of Cleve Hill Solar Park, a solar photovoltaic (PV) array electricity generating facility and electrical storage facility, with a total capacity exceeding 50 MW, and an export connection to the National Grid (hereafter referred to as 'the Development').

The Development will be located approximately 2 km (1 mile) to the northeast of Faversham, and 5 km (3 miles) west of Whitstable on the north Kent coast. The Site Location is shown on Figure 1.1 of this NTS.

The Development site boundary encompasses land required for the Development, habitat management and flood defence. The area within the Development site boundary that would be subject to the construction, operation and maintenance and ultimate decommissioning of the infrastructure associated with the Development as set out above is referred to as the 'solar park site' in this NTS.

## 1.2 The Development

The Development will comprise an array of solar PV modules, battery storage and associated infrastructure. A description of the physical characteristics of the solar park site and the land-use requirements within the wider Development site boundary during the construction, operational and decommissioning phases is given in section 5: Development Description of this NTS. The Development Layout is shown on Figure 1.2 of this NTS.

## 1.3 The Applicant

Cleve Hill Solar Park Ltd is a joint venture formed by two solar industry specialists: Hive Energy Ltd and Wirsol Energy Ltd.

Founded in 2010, Hive Energy has established itself as the second largest developer of solar parks in the UK, responsible for the installation of over 300 MW of generating capacity across the country.

Wirsol is a highly experienced solar park developer, constructor and operator across the UK and Australia. Wirsol has built and operates 24 solar parks across the UK.

## 1.4 The Purpose of the PEIR

The PEIR is being published to accompany formal consultation under sections 42 and 47 of the Planning Act 2008.

The Environmental Impact Assessment (EIA) information contained within the PEIR is 'preliminary' and does not represent a final project design or include final environmental assessment conclusions. The Applicant is seeking consultation responses to the information presented in order to continue to refine the Development design. The Applicant will continue to obtain information that will inform the final assessment of impacts, which will then be contained within the Environmental Statement (ES) which will accompany the DCO application and report the findings of the EIA.

Environmental effects of the Development have been studied systematically in accordance with current industry good practice and relevant guidance. The results of the assessments undertaken to date are presented within the PEIR and are summarised in this NTS. These documents inform readers of the nature of the Development, likely environmental effects and measures proposed to protect the environment during construction, operation and decommissioning.

## 1.5 The Purpose of the NTS

The NTS presents a concise summary of the assessments undertaken in simple language.

# 2 EIA PROCESS AND METHODOLOGY

EIA is the process undertaken to identify and evaluate the likely significant effects of a proposed development on the environment and to identify measures to mitigate or manage any significant negative effects. The EIA should be informed by consultation with statutory consultees, other interested bodies and members of the public. The purpose of identifying significant effects is to ensure decision makers are able to make an informed judgement on the environmental impacts of a proposal.

The PEIR provides the latest environmental information obtained and assessed as part of the EIA.

An ES will be prepared to accompany the Application which will follow a similar systematic approach to EIA and project design as presented in the PEIR. The process of identifying environmental effects is both iterative and cyclical, running in tandem with the iterative design process.

The key elements in EIA for an NSIP are:

- Iterative project design, taking feedback from consultation and applying it to the Development design process on an ongoing basis throughout the EIA process;
- Scoping and ongoing consultation, including consideration of responses and how these should be addressed as part of the EIA;
- Technical environmental impact assessments, including baseline studies, input to the design process and identification of potential significant environmental effects;
- Consultation on PEIR; and
- Preparation and submission of the ES.

Mitigation is proposed where possible to reduce or prevent likely significant effects.

## 2.1 EIA Scoping

The aim of the scoping process is to identify key expected environmental issues at an early stage, to determine which elements of the Development are likely to result in likely significant effects on the environment and to establish the extent of survey and assessment requirements for the EIA.

The issues to be addressed within the ES were identified in the EIA Scoping Report submitted to the Planning Inspectorate in December 2017. The SoS's Scoping Opinion was received on 22nd January 2018, including the formal responses received by the Planning Inspectorate from consultees on the EIA Scoping Report.

Key issues raised in the Scoping Opinion are summarised at the start of each technical chapter of the PEIR and have been considered during the EIA process.

# 3 CONSULTATION

The main consultation activities undertaken so far include:

- Statement of Community Consultation;
- EIA Scoping;
- Public exhibitions;
- A series of meetings with the nearest neighbours to the Development; and
- Other meetings with a wide range of consultees and stakeholders.

As part of the consultation process, the Applicant is engaging with the local community in order to inform local people about the project, to explain the Development and its likely effects and to take on board any concerns or issues raised.

The Applicant has carried out a number of public exhibitions in December 2017 and will undertake further exhibitions in June 2018, following the publication of the PEIR. These events provide the opportunity to speak with representatives of the Applicant and their specialist consultants, learn about the Development and the findings of the EIA, and provide comment on the Development.

In addition to the public engagement there have also been various meetings with near neighbours of the Development, local planning authorities, statutory consultees and other interested parties.

# 4 SITE SELECTION, DEVELOPMENT DESIGN AND CONSIDERATION OF ALTERNATIVES

## 4.1 Site Selection

The Solar Park was identified through site search exercise undertaken by the Applicant. A large number of sites have been identified by a team of project developers via direct approaches and a network of land agents across the country. The south of England was of particular interest due to the higher levels of solar irradiation experienced relative to other parts of the UK.

A range of technical, environmental and economic factors are considered when investigating and assessing any potential site for NSIP-scale ground-mounted solar PV development. Key factors for consideration include:

- Solar irradiation levels;
- Proximity to an available grid connection;
- Proximity to local population;
- Topography;
- Field size / shading;
- Access to the site for construction;
- Archaeological interest;
- Agricultural land classification;
- Landscape designations;
- Nature conservation designations;
- Flood risk; and
- Commercial agreement with a landowner.

Following consideration of the above factors as set out in the following sections, the area in which the Solar Park has been located was identified as having very good potential for an NSIP-scale ground mounted solar PV array.

## 4.2 Development Design

The EIA process is iterative and the Development design will continue to be updated throughout the pre-application phase of the NSIP application process.

The Development design has evolved from an initial south facing layout design which filled all the available space within the area identified for development, to the scoping layout which was based on an east-west facing layout design and was subject to Scoping consultation in December 2017 and January 2018, and the PEIR candidate Development design presented in this document.

Constraints considered include:

- Landscape character and visual impact;
- Residential amenity including visual outlook from residential properties and potential noise effects from the operation of the Development;
- Existing land-use;
- Ecologically and archaeologically designated sites, and sensitive undesignated features; and
- Separation distances from overhead power lines.

The key changes from the scoping layout to the PEIR layout include:

- Removing the closest solar PV modules to residential properties from the design;
- Removing single tables and including half tables instead to promote a more coherent layout design and increase the separation distance between tables either side of ditches;
- Introduction of a landscaping scheme to provide screening and biodiversity enhancement;
- Refinement of buffers to overhead power lines which cross the solar park site; and
- Reorientation of the electrical compound to accommodate approximately 350 MWh of battery storage capacity.

## 4.3 Consideration of Alternatives

Sections 4.1 and 4.2 of this NTS set out the alternatives to the Development as currently proposed in terms of site selection criteria and Development design iterations. UK energy policy is supportive of renewable energy developments. The overarching National Policy Statement for Energy, EN-1[1] sets out the consideration of alternatives to new large-scale electricity generation capacity and although measures such as demand reduction, smart demand management and interconnections will have a role to play, the UK's legal obligations in respect of climate change targets are not achievable without new electricity generating capacity.

In addition, the battery storage element of the project addresses the requirement for smart demand management and further decarbonisation of the electricity sector through facilitating greater use of electricity generated by renewables during peak periods.

[1] Department of Energy and Climate Change, July 2011, " National Policy Statement for Energy (EN-1)", Available on line at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf [Accessed on 31/01/2018]

# 5 DEVELOPMENT DESCRIPTION

## 5.1 Existing Development Site

The Development site is coastal and the area is identified on Ordnance Survey maps as Nagden, Cleve and Graveney Marshes although the majority of the land within the Development site is used for arable farming.

The total area of the Development site shown on Plate 1 is 492.29 ha and can be divided into four distinct existing land use types:

- Arable land (387.55 ha);
- Freshwater grazing marsh (37.07 ha);
- Coastal Flood Defences (including areas of freshwater grazing marsh) (57.70 ha); and
- The Existing Cleve Hill Substation which serves the London Array Offshore Wind Farm (9.97 ha).

The solar park site is all situated on the arable land within the wider Development site boundary.

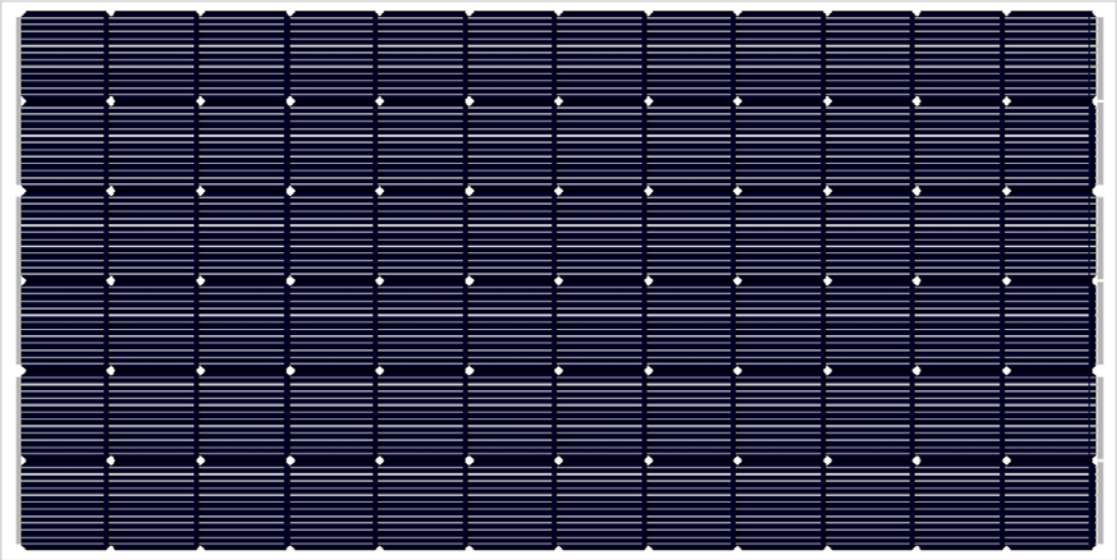
## 5.2 Description of the Development

A realistic and feasible Development design has been produced to provide a set of parameters against which the impacts of the Development can be assessed. This has resulted in the identification of a realistic worst-case design (the "candidate Development design") for the purposes of PEIR, using equipment from specific manufacturers such as solar PV modules, string inverters, transformers and battery packs.

The candidate Development design includes the following infrastructure, images of which are provided.

- Solar PV Arrays:
  - Solar PV modules (988,960);
  - PV module mounting structures (2,907 tables including 336 solar PV modules each and 109 tables including 112 solar PV modules each);
  - String inverters (3,532);
  - Transformers (72);
  - Onsite cabling;
  - Fencing and CCTV around the solar park site perimeter;
  - Lighting within the electrical compound;
  - Internal access tracks (a single spine road running through the centre of the solar park site parallel to the north of the 400 kV overhead lines);
  - Landscaping and habitat management;
  - Permissive accessways (subject to the outcome of consultation); and
  - A community orchard (subject to the outcome of consultation).
- Electrical Compound:
  - A flood protection bund (to provide an additional level of protection (and also visual screening) to the critical infrastructure within the electrical compound in the event that the existing flood defences were breached);
  - The Development substation (to a facilitate the export of electricity from the Development); and
  - An energy storage facility (formed of 7,440 battery packs storing electrical energy and other ancillary infrastructure).
- Associated Development:
  - Grid Connection to NGET infrastructure (to export and import electricity);
  - Site Access (during construction, operation and decommissioning);
  - Flood Defences (to enable Cleve Hill Solar Park Ltd to access and maintain the existing defences to continue to protect the solar park site from flooding if necessary); and
  - Habitat Management Area (to mitigated for the loss of arable habitats and provide biodiversity enhancement).

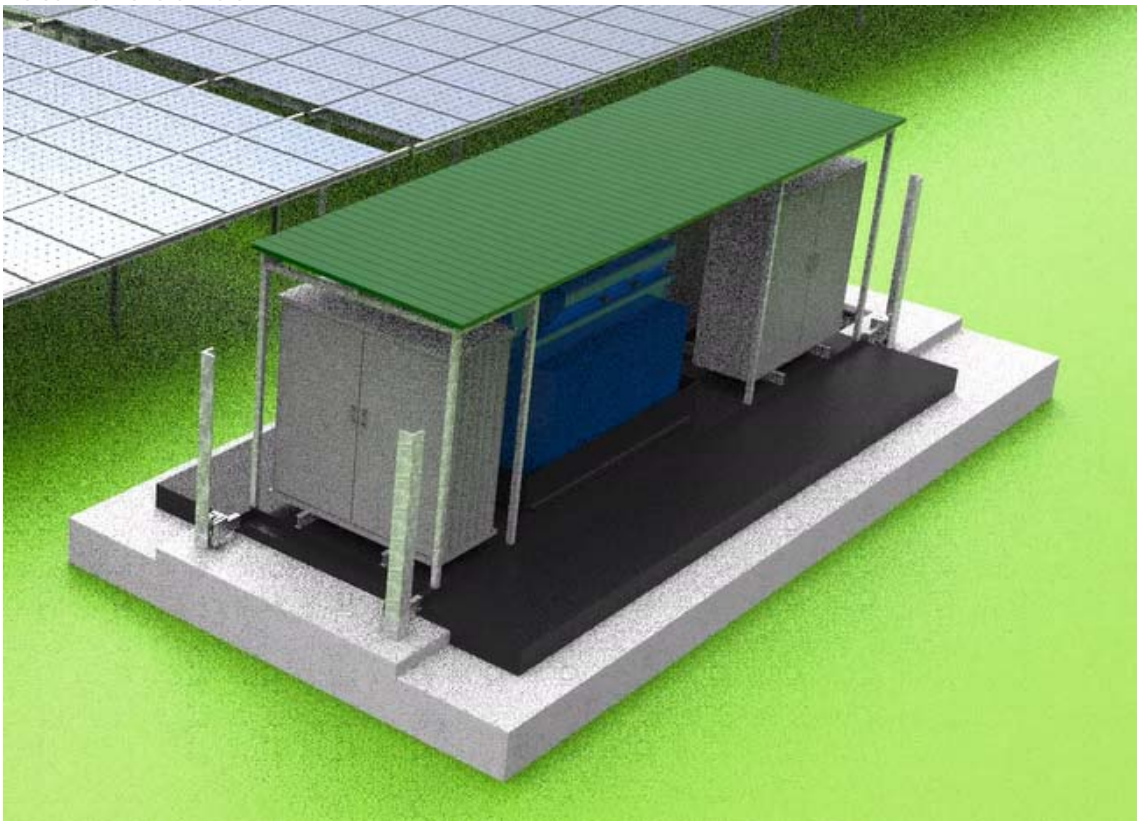
*Indicative Solar PV Module*



*Indicative Solar PV Module Mounting Structure*

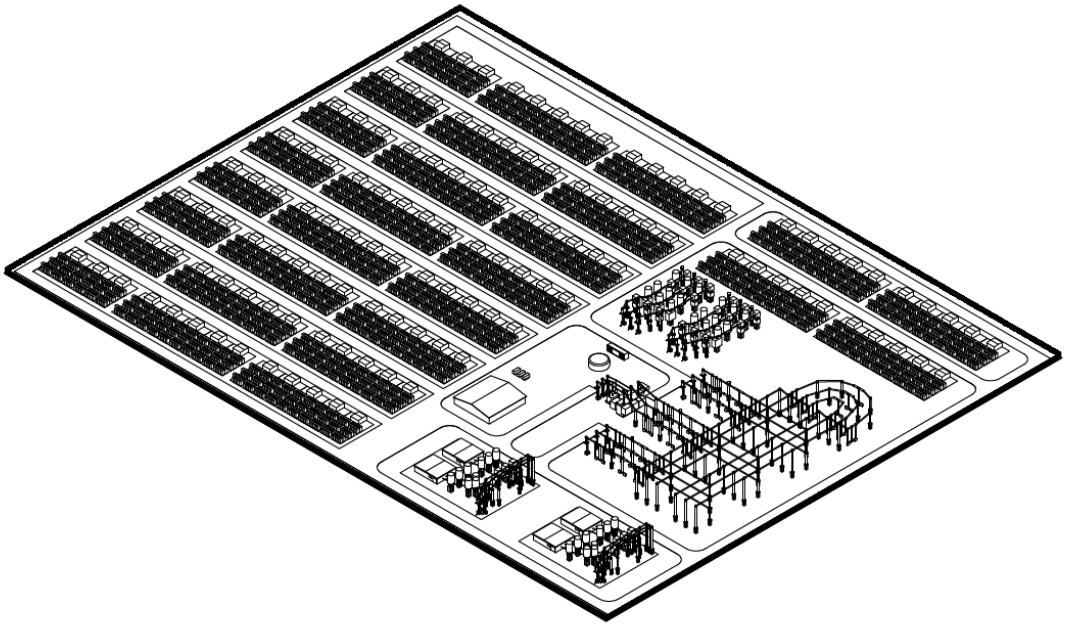
*Indicative String Inverters*

*Indicative Transformers*



*Indicative Fencing and CCTV*

*Indicative Electrical Compound Design*



A main spine road will be built at the start of construction parallel to the north of the 400 kV overhead line and the pylons which cross the solar park site. All the solar PV arrays will be accessed from this spine road via grassed tracks.

## 5.3 Other site areas

In addition to the area required for the solar park site, other areas have been included within the Development site boundary for the following reasons:

- Grid connection to the National Grid;
- Site access – land required to access the Development via the existing Cleve Hill Substation;
- Flood Defences – land required to access and maintain the existing defences to maintain the existing standard of protection throughout the operational phase of the Development; and
- Habitat Management Area – land required to mitigated for the loss of availability of arable habitats for over wintering birds associated with the Swale Special Protection Area.

## 5.4 Construction

The construction period is likely to be undertaken in at least two phases:

- Phase one will include the construction of all aspects of the Development except the energy storage facility; and
- Phase two will include the construction of the energy storage facility (phase two in itself could be undertaken in multiple phases (*e.g.*, phase two A to C) in order to deliver smaller amounts of energy storage capacity gradually).

### *5.4.1 Phase One*

Phase one of Development construction is currently anticipated to last approximately 12 to 18 months but will be dependent on the final Development design and potential environmental constraints on the timing of construction activities.

Subject to achieving the necessary consents, the indicative start date for construction is likely to be Spring 2021.

To build the solar PV array, each large field, or group of smaller fields will be completed before the construction team moves on to the next field(s). A small temporary field compound will be established in an adjacent field next to the field access point to serve the field under construction.

The types of construction activities that may be required include during phase one (not necessarily in order) are likely to include:

- Site preparation and civil engineering works
  - Preparation of arable land for construction;
  - Import of construction materials, plant and equipment to site;
  - Establishment of the perimeter fence;
  - The establishment of the main construction compound;
  - Construction of the spine road; construction of new tracks;
  - The upgrade or construction of crossing points (culverts) over drainage ditches; and
  - Marking out the location of the Development infrastructure.
- Solar PV array construction:
  - Import of components to site;
  - Piling of module mount verticals;
  - Erection of module mounting structures;
  - Mounting of modules and inverters;
  - Trenching and installation of electric cabling;
  - Transformer foundation excavation and construction; and
  - Installation of transformers.
- Construction of onsite electrical infrastructure to facilitate the export of generated electricity.
  - Construction of the flood protection bund;
  - Site preparation and civils for the Development substation;
  - Trenching and installation of electric cabling;
  - Import of components to site; and
  - Installation of the Development substation.

- Testing and commissioning;
- Landscaping; and
- Habitat creation.

### *5.4.2 Phase Two*

Construction phase two of the Development is expected to last 3 to 6 months but this could be dependent on any potential additional phasing of phase two.

Provision for the energy storage facility will be made during phase one of construction while the battery storage area will be used as a construction compound and therefore most of the site preparation will have already taken place. The types of construction activities that may be required include during phase two (not necessarily in order) are therefore likely to include:

- Energy storage facility construction:
  - Installation of electric cabling;
  - Foundation construction;
  - Import of components to site;
  - Installation of transformers; and
  - Installation of battery pack cabinets, inverters and controllers.

### *5.4.3 Construction Controls*

The construction phase will be subject to control documents which will limit and control activities. The outline documentation, which is included in the PEIR in draft form, will include an:

- Outline Construction Traffic Management Plan; and
- Outline Construction Environmental Management Plan.

## 5.5 Operation

During the operational phase, activity on the solar park site will be minimal and would be restricted principally to vegetation and land management, equipment maintenance and servicing, replacement of any components that fail, and monitoring to ensure the continued effective operation of the Development.

## 5.6 Decommissioning

When the operational phase ends, the Development will require decommissioning. All PV modules, mounting poles, cabling, inverters and transformers would be removed from the solar park site and recycled or disposed of in accordance with good practice and market conditions at that time. The future of the substation and control building would be agreed with the local planning authority prior to commencement of decommissioning.

# 6 LEGISLATIVE AND PLANNING POLICY CONTEXT

## 6.1 National Policy Statements

National Policy Statements (NPS) describe the national case and establish the need for certain types of infrastructure development, as well as identifying potential key issues that should be considered by the decision maker when considering an application for a DCO. Although there is no NPS which provides specific policy in relation to solar photovoltaic (PV) and energy storage development, in previous applications where no NPS applies, the Secretary of State has applied relevant related NPSs as if the NPS governed the development in question. Further consideration of this is set out in Chapter 6: Legislation and Planning Policy Context of the PEIR.

The overarching NPS for Energy (EN-1)[2] was adopted in July 2011 and sets out the overall national energy policy for delivering major energy infrastructure.

Part 2 of the statement sets out the Central Government policy context for major energy infrastructure. It comprises the need to meet legally binding targets to cut greenhouse gas emissions; transition to a low carbon economy; decarbonise the power sector; reform the electricity market; secure energy supplies; replace outdated energy infrastructure; and widen objectives of sustainable development.

Part 3 also outlines that considerations of need should be given considerable weight when determining applications for energy developments.

The National Policy Statement on Renewable Energy Infrastructure (EN-3)[3] was adopted in July 2011 and provides national planning policy in respect of renewable energy infrastructure.

Paragraph 1.1.1 of EN-3 underlines the importance of the generation of electricity from renewable sources by stating:

> *"Electricity generation from renewable sources of energy is an important element in the Government's transition to a low-carbon economy. There are ambitious renewable energy targets in place and a significant increase in generation from large-scale renewable energy infrastructure is necessary".*

The National Policy Statement on Electricity Networks Infrastructure (EN-5)[4] was adopted in July 2011. Whilst EN-5 principally covers above ground electricity lines of 132 kV, paragraph 1.8.2 confirms that EN-5 will also be relevant if the electricity network constitutes an associated development for which consent is sought, such as a generating station. EN-5 is therefore relevant to the Development, as a grid connection is proposed.

## 6.2 National Planning Policy Framework

Although reference to the NPS should be sufficient in principle for compliance purposes, NPS EN-3 states that applicants and the Secretary of State should still have regard to existing planning policy guidance specifically related to renewable energy projects.

The National Planning Policy Framework[5] ("the NPPF") was published on 27th March 2012 and is a material consideration in planning decisions.

Whilst the NPPF does not contain any specific policies for NSIP development, paragraph 3 of the NPPF states that:

> *"These are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements for major infrastructure, as well as any other matters that are considered both important and relevant (which may include the National Planning Policy Framework)."*

[2] Department of Energy and Climate Change, July 2011, " National Policy Statement for Energy (EN-1)", Available on line at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf [Accessed on 31/01/2018]
[3] Department of Energy and Climate Change, July 2011, " National Policy Statement for Renewable Energy Infrastructure (EN-3)", Available on line at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf [Accessed on 31/01/2018]
[4] Department of Energy and Climate Change, July 2011, " National Policy Statement for Electricity Networks Infrastructure (EN-5)", Available on line at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf [Accessed on 31/01/2018]
[5] Department of Communities and Local Government, March 2012, "National Planning Policy Framework" Available online at http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf [Accessed on 31/01/2018]

The NPPF sets out that the purpose of the planning system is to contribute to the achievement of sustainable development, identifying that sustainable development consists of economic, social and environmental roles.

On the 5th of March 2018 the Government published a draft revised text of the NPPF for consultation.

## 6.3 Energy Policy

The UK is subject to the following legally binding targets in respect of reduction of carbon emissions and use of renewable energy:

- Climate Change Act 2008[6] (as amended) sets a legally binding target to reduce UK carbon emissions by 80% by 2050 and at least 34% by 2020, against a 1990 baseline; and
- Renewable Energy Directive 2009/28/EC[7] sets targets for Member States in respect of the use of energy from renewable resources. The UK's obligation is 15% of energy consumption from renewable energy resources by 2020.

The European Council 2030 Climate and Energy Framework[8] has set a further target of at least a 40% reduction in greenhouse gas emissions by 2030. The target is binding and all Member States are required to participate in this effort to further combat climate change.

The UK Solar PV Strategy Part One: Roadmap to a Brighter Future (2013)[9] and Part Two: Roadmap to a Brighter Future (2014)[10] set out the role of solar development to increase the use of renewable energy. These is a recognition in these documents that agricultural land will be used for solar development and that biodiversity benefits can arise, if developments are well planned.

The Annual Energy Statement (2014)[11] provides the most recent update from Central Government on progress against energy policy, recognises the significant level of investment and employment which has resulted from renewable energy development, and that investment and employment is likely to reach into the supply chain in all parts of the UK.

## 6.4 The Development Plan

Under the Planning Act 2008 the Development Plan is classed as a relevant material planning consideration. The NPSs are instead the primary consideration for NSIP applications. Nevertheless, the Development Plan is still a matter which can be considered important for the consideration of DCO applications and has been considered for the Development.

The relevant Development Plan comprises of:

- 'Bearing Fruits 2031: The Swale Borough Local Plan' ("the Swale Local Plan");
- The related Swale Proposals Map ("the Proposals Map") adopted 26th of July 2017;
- The Kent Minerals and Waste Local Plan; and
- The Canterbury District Local Plan 2017 ("the Canterbury Local Plan") – this was included following consultation during the Scoping stage.

[6] Climate Change Act 2008 as amended by the Climate Change Act 2008 (2020 Target, Credit Limit and Definitions) Order 2009
[7] Directive 2009/28/EC (Renewable Energy)
[8] European Council, 24 October 2014, Conclusions on 2030 Climate and Energy Policy Framework, Available on line at http://data.consilium.europa.eu/doc/document/ST-169-2014-INIT/en/pdf [Accessed on 31/01/2018].
[9] Department of Energy and Climate Change, October 2013, "UK Solar PV Strategy Part 1: Roadmap to a Brighter Future", Available online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249277/UK_Solar_PV_Strategy_Part_1_Roadmap_to_a_Brighter_Future_08.10.pdf [Accessed on 31/01/2018]
[10] Department of Energy and Climate Change, April 2014, "UK Solar PV Strategy Part 2: Delivering a Brighter Future" , Available on line at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/302049/uk_solar_pv_strategy_part_2.pdf [Accessed on 31/01/2018]
[11] Department of Energy and Climate Change, October 2014, "Annual Energy Statement 2014" Available on line at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/371388/43586_Cm_8945_print_ready.pdf [Accessed on 31/01/2018]

# 7 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

A Landscape and Visual Impact Assessment (LVIA) has been undertaken for the candidate layout design and is contained in Chapter 7: Landscape and Visual Impact Assessment. The LVIA includes the following:

- Consultation;
- Baseline surveys and site visits;
- Desk-top analysis and computer modelling;
- Viewpoint photography during winter and summer;
- Production of photomontage visualisations to inform the assessment;
- Assessment surveys and site visits;
- Residential visual amenity survey and assessment; and
- Written analysis of the landscape and visual impact of the Development.

## 7.1 Designations

The solar park site has no specific landscape designation. The nearest site with a landscape designation is Kent Downs Area of Outstanding Natural Beauty (AONB), which is located approximately 4 km to the south.

The solar park site lies within an 'Area of High Landscape Value - Kent Level'[12], as referred to within Policy DM24 of The Swale Borough Council Local Plan.

## 7.2 Landscape Character

### *7.2.1 Regional Landscape Character*

Landscape character is described at regional level in the Landscape Assessment of Kent (October 2004)[13]. The solar park site is located in the Eastern Swale Marshes Character Area[14] which is described as having the following characteristic features:

- *"Remote, wild and exposed;*
- *Broad skies. Pervasive influence of sea and sky. Creeks, diches, sea walls. Grazing marsh, wild birds and grazing animals;*
- *Creekside townscape and waterside buildings; and*
- *Poorly managed fences. Intrusion of power lines."*

Part of the solar park site also lies within the Eastern Fruit Belt Character Area[15] (southwest and southeast of the CLS Area) which is described as having the following characteristic features:

- *"Rural character, sense of remoteness and privacy.*
- *Enclosed and diverse.*
- *Strong woodland blocks.*
- *Orchards and hops, shelterbelts. Large pockets of open farmland. Undulating landform."*

### *7.2.2 Local Landscape Character*

The solar park site is predominantly located in the Graveney Marshes Landscape Character Area 5 of the Swale Landscape Character and Biodiversity Appraisal (SLCBA) Supplementary Planning Document[16] the key characteristics of which include:

- *"Large open area of alluvial marshland;*
- *Large scale arable fields divided by long straight drainage ditches;*

[12] Bearing Fruits 2031: The Swale Borough Local Plan, Full Council Item, 26th July 2017 and Technical Paper No.6
[13] KCC (2004). The Landscape Assessment of Kent. Available at: https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/countryside-policies-and-reports/kents-landscape-assessment [accessed 01/12/2017]
[14] SBC (2011) Swale Landscape Character and Biodiversity Appraisal SPD. Available at: http://www.swale.gov.uk/assets/Planning-General/Planning-Policy/Landscape-Character-Appraisal-Final-Sept-2011/Marshland-Landscape-Types-reduced-size.pdf [accessed 01/12/2017]
[15] Ibid.
[16] [16] SBC (2011) Swale Landscape Character and Biodiversity Appraisal SPD. Available at: http://www.swale.gov.uk/assets/Planning-General/Planning-Policy/Landscape-Character-Appraisal-Final-Sept-2011/Marshland-Landscape-Types-reduced-size.pdf [accessed 01/12/2017]

- *Typical features ditches, sea wall, estuarine saltmarsh, sand and mudflats; and*
- *Atmospheric and tranquil landscape with large open and often dramatic skies."*

The SLCBA describes landscape condition within the seawall as being in poorer condition than that on the outside of the sea wall which is in good condition. The reason for its poor condition lies in the intensive agricultural land use that has produced a featureless monoculture extending over a large area. In addition, the high voltage transmission line on large lattice pylons that cross from east to west introduces large scale vertical structures into a landscape with a predominantly horizontal emphasis.

The solar park site lies within the Kent Level Area of High Landscape Value (Policy DM24) in the Swale Borough Council Local Plan. It is designated for its significance to Kent. There will be a loss of agricultural land use which will be replaced by solar PV development. The horizontal and low-lying nature of the Development would be seen in relation to the existing substation already present on site. The existing overhead line is another prominent vertical feature within this area of high landscape value.

Land beneath and around the panels will be used for grazing following the introduction of grazing marsh meadows. All existing (non-arable) vegetation would remain and the panels would be sited within the existing field pattern which are divided by the drainage ditches. Additional planting and enhancements measures are being introduced to the scheme. The Development will affect the openness of the landscape but this effect is primarily within the solar park site. The magnitude of change would be Moderate due to the extent to which the Development would occupy the area of high landscape value. Combined with a medium sensitivity, this would result in effects of Moderate significance. The nature of effect would be negative but turning positive overtime with the introduction of proposed mitigation measures. The duration of the Development is long-term but fully reversible.

## 7.3 Landscaping

The solar park site is set within an open landscape with limited vegetation within the solar park site itself and to the north, east and western boundaries. On the southern boundary of the solar park site there is more vegetation which includes hedgerows, individual trees and tree lined blocks. Within the solar park site there are tall reeds within the drainage ditches which divide the fields and define their boundaries. Beyond the solar park site there are there are small blocks of woodland and a network of hedgerows. The solar park site will therefore benefit from hedgerow and hedgerow tree planting to assist in screening the Development whilst also trying to maintain the open views across the solar park site towards The Swale to the north. The proposed planting will bring additional amenity and biodiversity value to the local area.

The substation and battery storage compound will be enclosed in a bund, for protection from potential flood risk. On the northern, eastern, western, and south western edges of the bund there will be native species buffer planting. On the south eastern edge of the bund a native species shelterbelt will be planted which is taller in size to assist with the screening of the taller substation equipment in this part of the compound. The proposed buffer planting consists of trees and shrubs which will create informal and natural landscape features.

The landscape and biodiversity enhancement measures set out in the Landscape and Biodiversity Management Plan, which forms Technical Appendix 5.2 of the PEIR, are designed to complement and enhance existing landscape character at the solar park site and in the surrounding area. The landscape enhancement measures also aim to improve integration of the Development in to the landscape and to minimise visual effects.

## 7.4 Assessment of Landscape and Visual Effects

The LVIA includes consideration of the following groups of receptors:

- Residential areas;
- Roads, recreational routes and public rights of way; and
- Assessment viewpoints selected through consultation to reflect visual amenity impacts on a range of receptors from across the study areas.

The LVIA concludes that the Development would have the most influence on the landscape and visual amenity within a short distance of 1 km from the solar park site. Long distance views of the Development may be restricted, due to intervening built form, polytunnels and tall vertical infrastructure and the horizontal nature of the Development. The low-lying character of the Development restricts the overall visibility of the Development and its potential for wider landscape and visual effects. The Development is contained by the sea wall which runs to the north and west of the CLS Area. The enhancement measures proposed will enhance existing landscape structure along the solar park site boundaries to soften the appearance of the Development edges allowing integration with existing landscape context beyond the solar park site.

The landscape character of the solar park site, which is situated in LCA 5 Graveney Marshes, would be directly affected due to the extent that the CLS Area covers LCA 5, where there would be effects of Major significance from the Development. There would be limited effects on other local landscape character areas and the landscape enhancement measures will add and improve the condition of the landscape for these LCAs.

There would be effects of Moderate significance on Kent Level Area of High Landscape Value. The Development will not give rise to any significant effects on any National Designations.

The significant effects of the Development arise primarily from the fact that it will change the appearance of the land at the solar park site from agricultural and grazing land to that of solar panels and a substation compound. The presence of lattice pylons, wooden pole lines and an existing 400 kV substation already give a modified character to the land within the solar park site. The Development will be seen in the context of these large features within the landscape.

Effects on visual amenity would be greatest closest to the solar park site, particularly on users of the Saxon Shore Way and other public rights of way (PRoWs) within the solar park site and immediately in the vicinity. PRoW ZR485 which runs through the solar park site would experience the most change due to the proximity of the panels and giving the feeling of enclosure created by the height of the panels. The sense of openness would be lost given the sense of enclosure created by the panels, around PRoW ZR485.

From the Saxon Shore Way, panels would be visible due to the elevated position along the sea wall which visually contains the solar park site. The lower level grazing marsh planting will begin to integrate the Development but the panels would be visible. From more eastern locations along the Saxon Shore Way, the taller substation equipment would be visible above the bund, but would be seen in context with the existing substation and two large agricultural buildings. Users of PRoW ZR488 will experience some degree of change due to the proximity of the Development to the PRoW and when seen from the elevated position in the landform on Graveney Hill. However, over time the mitigation planting will reduce the effects. Due to the low lying horizontal nature of the Development and the low lying landform, the Development does not restrict the wider distant views towards the Kent Downs AONB, Whitstable, Faversham, The Swale and beyond to the Isle of Sheppey.

Cyclists on the section of National Cycle Network Route 1 (NCN 1) along Faversham/Seasalter Road would have distant views across to the solar park site. The section of NCN 1 along Sandbanks Road would have no views for the majority of the section. There is potential for distant views as it approaches Nagden Cottages but this would reduce over time due to the planting maturing, which would screen the Development. The road users of the Faversham/Seasalter Road and Sandbanks Road would be similar to the above. On the eastern part of Broom Street, the views towards the Development open up offering open views towards the solar park site but over time views of the Development will be restricted by vegetation planting.

Some of the properties adjacent to the solar park site will experience effects from the Development, the properties that will experience the most impact from the Development would be the properties at Nagden and Warm House, where after Year 10 mitigation it is likely that there would be Major/Moderate significant effects. The properties are mostly affected due to the short distance between the properties and the solar park infrastructure where there are direct, uninterrupted views across the solar park site. The mitigation measures proposed assist to some degree but are balanced with the respect given for the surrounding landscape and visual character, which results in the continued allowance for open views across towards The Swale and beyond.

Cumulative effects on visual amenity are restricted to receptors to the west of the solar park site, mostly that of recreational users of the Saxon Shore Way, but no significant cumulative effects are predicted upon footpaths, roads and residential properties.

The overall effects of the Development on landscape and visual amenity are limited to a small geographical area and a small number of visual receptors. Proposed hedge and shelterbelt planting will enhance the southern, south western and south eastern edges of the Development where the nearest residential properties and footpaths are located. The introduction of grazing marsh grasses to the scheme will assist in the integration of the Development to the existing landscape character of the area. On the northern, north western and south eastern boundaries, vegetation has been kept naturalistic with the grazing marsh grasses and areas low density scrub mixture to maintain the open nature of the landscape character and allow wider distant views to be maintained.

# 8 ECOLOGY

The ecological characteristics of the solar park site have been determined through desk study, consultation, and habitat and species surveys.

As well as considering existing usage of the solar park site itself, the ecology assessment specifically focuses on the effects arising from the construction, operation and decommissioning of the Development on The Swale, which is designated as a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar site. The Swale Estuary is also a Marine Conservation Zone (MCZ) and National Nature Reserve (NNR). The solar park site is also immediately adjacent to the South Bank of the Swale Local Nature Reserve (LNR).

Important ecological features have been identified for detailed assessment, including:

- The Swale SSSI/SPA/Ramsar Wetland;
- Other designated sites;
- Invertebrates;
- Great crested newt;
- Bats (all species);
- Water vole; and
- Other species.

The Development has been designed to minimise potential effects on these important ecological features including the inclusion of mitigation and enhancement measures within a Landscape and Biodiversity Management Plan (LBMP; Technical Appendix A5.2 to the PEIR). No significant ecological effects have been identified following the application of mitigation measures. In most cases, following the application of the enhancement measures in the LBMP, a minor beneficial effect on important ecological features has been predicted.

# 9 ORNITHOLOGY

The approach to the assessment of effects of the Development on birds at the Development site and in the surrounding area have been determined through a combination of professional judgement, the scoping opinion collated by the Planning Inspectorate and ongoing consultations with Natural England, Kent Wildlife Trust (KWT) and the Royal Society for the Protection of Birds (RSPB) through the Habitat Management Steering Group established in February 2018. Three meetings of the HMSG have been held to date to discuss the ecology and ornithology assessment process and the mitigation and enhancement measures that could be utilised at the Development site.

A key document in the success of the mitigation and enhancement proposals is the LBMP, which is appended to the PEIR as Technical Appendix A5.2.

## 9.1 Baseline Bird Surveys

Baseline bird surveys have been undertaken at the Development site between winter 2013/14 and winter 2017/18.

Breeding bird surveys were undertaken over three seasons between 2014 and 2016. The aim of the surveys was to establish the breeding bird populations and spatial distribution within the solar park site and immediately adjacent habitats.

Surveys of birds using the Development site and surrounding terrestrial and intertidal areas during the non-breeding season were undertaken during four passage/winter seasons in 2013/14, 2014/15, 2015/16 and 2017/18. The aim of the surveys was to establish the non-breeding bird populations and spatial distribution within the Core Survey Area and immediately adjacent habitats.

Flight Activity Survey (FAS) was carried out between November 2015 and October 2016 using the vantage point watch method usually carried out in relation to wind energy development. The survey used two vantage points providing excellent visual coverage of the majority of the solar park site. The aim of the survey in this case was to quantify and map the use of the Development site by birds such as marsh harrier, which forage aerially over the ground when hunting for birds and other small animals.

## 9.2 Types of Effects

There are several potential effects on birds of the development of agricultural land for solar energy production that may occur during the construction, operation and decommissioning phases of development. These are primarily concerned with:

- Disturbance caused by personnel, machinery and lighting during construction and decommissioning, including potential damage to bird species;
- Disturbance caused by maintenance activities or lighting during the operation of the solar park;
- Loss/change of habitats, which can be adverse through loss of habitats used by birds or positive through creation of enhanced conditions for wildlife through sensitive management of undeveloped areas;
- Fragmentation of habitats hindering the movement of birds and preventing access to favoured foraging or breeding grounds;
- Hydrological changes, which alter the character of habitats or the availability of water;
- Collision of birds if they fly into the solar panels, for example if mistaking them for water; and
- Indirect effects through changes in recreational access to areas used by birds.

## 9.3 Assessment of Effects

The assessment considers each IEF in turn, providing a description of the likely effects identified above.

### *9.3.1 The Swale*

Other than the management prescriptions set out in the LBMP for the grazing marsh at the east end of the solar park site, no direct effects on the habitats within the Swale SSSI/SPA/Ramsar (including all other designations contained within this) will occur.

The potential effects on The Swale SSSI/SPA/Ramsar are also considered in terms of the important qualifying features that demonstrate connectivity with the solar park site. This comprises 22 component wintering waterbird species forming the non-breeding assemblage and breeding marsh harrier.

Eighteen of the qualifying species of the Swale were either not recorded within the solar park site or were rarely recorded during surveys and therefore no or negligible effects are predicted.

Important qualifying species of the Swale that were recorded in numbers requiring more detailed consideration included:

- Dark-bellied brent goose
- Lapwing
- Golden plover
- Breeding marsh harrier

A summary of the effects on these species is provided in the following sections.

### *9.3.2 Dark-bellied Brent Goose*

Brent geese were recorded frequently during the non-breeding season in all years of survey, although use of the solar park site was limited in extent and duration within any one season.

The effects on brent geese are likely to include:

- Construction disturbance resulting in short-term displacement; and
- Operational infrastructure resulting in long-term displacement.

These potential adverse effects were recognised at an early stage in the project, therefore an undeveloped area of the solar park site was identified for habitat management to provide foraging and resting/roosting opportunities for geese and other waterbirds. Prior to the start of construction, the Development will include the reversion of approximately 40 ha of arable fields to grassland in the Habitat Management Area (HMA) north of the Cleve Hill substation.

The HMA may not be able to replace entirely the loss of foraging provision for brent geese, therefore this would be a long-term negative effect.

The baseline data show that the solar park site is unsuitable for foraging brent geese in some winter seasons. During these conditions, brent geese forage in other areas around the Swale, including on winter cereal fields, intertidal areas and within the protected areas of grazing marsh on the Isle of Sheppey and in other areas on the south side of the Swale.

The provision of the HMA will provide certainty in the availability of resources for brent geese and this mitigation reduces the magnitude of effect to low and the effect is not significant.

### *9.3.3 Lapwing and Golden Plover*

Lapwings were recorded frequently during the non-breeding season in all years of survey.

Golden plovers were recorded frequently, often associating with lapwing, during the non-breeding season in all years of survey. Use of the site by both species was sometimes limited in extent and duration within any one season.

Disturbance to birds in the intertidal area of the Swale is not predicted to occur.

The effects on lapwing and golden plover are likely to include:

- Construction disturbance resulting in short-term displacement; and
- Operational infrastructure resulting in long-term displacement.

The same undeveloped area of the solar park site identified for habitat management to provide foraging and resting/roosting opportunities brent geese will provide these opportunities for other waterbirds. This is expected to provide a refuge area for lapwing and golden plover.

It is possible that not all of the HMA will be available to lapwing and golden plover if birds would not approach within for example, 100 m of the solar array. If that displacement effect operated, there could be approximately 7.5 ha unavailable to them. Under this scenario, there would be approximately 32.5 ha of new grassland managed for their benefit, which would be capable of providing resources for them between October and March.

The HMA should be able to replace entirely the loss of foraging provision for lapwing and golden plover and would provide the space needed for lapwing to roost. However, it is evident from the baseline data that in any one season, lapwing make use of a large proportion of the fields within the solar park site and the geographic location of fields relative to the adjacent intertidal habitats may be important. The baseline data show that use of the solar park site varies between seasons and it is known that alternative areas are also abundantly available around the Swale. The effects of habitat loss/change on lapwing and golden plover is therefore considered to be of negligible to low magnitude and not significant.

### *9.3.4 Breeding Marsh Harrier*

Marsh harriers form part of the breeding assemblage qualification of The Swale SPA. The JNCC SPA Review in 2001 states that based on a count in 1995, there were 24 pairs representing 15% of the GB breeding population. This is likely to have changed considerably in the last 23 years as the marsh harrier populations nationally and in Kent have increased. The most recent estimate reported in Musgrove *et al.* (2013)[17] is of 320-380 breeding females. In Kent, the breeding population is estimated to be 80-100 breeding females, with 40-50 of these on Sheppey[18].

Disturbance during construction is likely to cause displacement of foraging marsh harriers from areas near the construction works. The disturbance effect is likely to be localised near the point of works and would not extend over the whole solar park site.

It is considered likely that marsh harriers will continue to forage in undisturbed areas beyond 100 m from any source of construction works. It is not considered that construction disturbance will cause displacement of marsh harriers to the extent that it would affect their ability to survive and reproduce.

Without mitigation, there is a risk that construction disturbance could lead to the failure of nesting attempts by marsh harriers. Mitigation is therefore proposed to be included in a Breeding Bird Protection Plan forming part of the CEMP to avoid disturbance to nesting marsh harriers.

The Development includes measures to improve the quality of the ditches throughout the solar park site, with further enhancements made specifically for marsh harrier ditch bank and ditch margin habitats between the solar panel arrays.

The habitat management measures implemented with the Development will improve conditions for foraging marsh harrier and improvements made in the Aquatic Habitat Management Plan could also improve conditions for nesting marsh harrier. This would provide a positive effect.

If marsh harriers are displaced from nesting within the KWT South Swale nature reserve, this would be a potentially significant effect. Conversely, if birds are not dissuaded from nesting near the solar arrays and they

[17] Musgrove, A.J., Aebischer, N.J., Eaton, M.A., Hearn, R.D., Newson, S.E., Noble, D.G., Parson, M., Risely, K. and Stroud, D.A. (2013). Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106: 64–100.
[18] Clements, R., Orchard, M., McCanch, N. and Wood, S. (2015). *Kent Breeding Bird Atlas 2008-13.* Kent Ornithological Society.

are not displaced from hunting in the wide, managed areas between the solar panel arrays, then there is a potential positive effect.

### *9.3.5 Breeding Farmland Bird Community*

The breeding bird community within the survey area comprising the solar park site and adjacent habitats outside the boundary of the solar park site have been assessed as of local importance due to the diversity of breeding species present. The local breeding bird community includes a number of species of conservation concern, including (other than marsh harrier) two WCA Schedule 1 species: Cetti's warbler and bearded tit.

Construction works are likely to cause localised disturbance to breeding birds resulting in temporary displacement across one or two breeding seasons depending on the scheduling and duration of the construction phase

The majority of the solar park site will experience change when arable fields are replaced with solar panels surrounded by grassland between the tables and arrays and part of the HMA will be converted from arable to grassland. The LBMP includes measures to improve the quality of the ditches throughout the solar park site, with further enhancements made including planting of hedgerows, scrub and trees.

The habitat management measures implemented with the Development will improve conditions for breeding species associated with the field margin and boundary habitats. This would provide a positive effect for those species as a result of additional nesting opportunities and supporting habitats. It is considered that breeding birds such as reed bunting, reed warbler and sedge warbler will continue to utilise the ditch habitats in the wide networks between the solar panel arrays. The hedgerow, scrub and tree enhancements will provide additional resources for species such as song thrush, dunnock, whitethroat, linnet and yellowhammer. Ditch enhancements and other measures set out in the Aquatic Habitats Management Plan may enhance conditions for Cetti's warbler.

Open habitat species that breed within or at the edges of the arable fields include lapwing, skylark and yellow wagtail. These species are expected to be displaced by the installation of solar panels. However, the LBMP includes measures for the management of habitats around the solar panel arrays as well as in some of the undeveloped blocks of land within the solar park site (other than the HMA at the east end of the solar park site). The HMA includes the conversion of approximately 40 ha of arable land to grassland, as well as improved wetland marsh habitat in the existing grazing marsh at the eastern extent of the solar park site. These measures are expected to provide enhanced conditions for breeding lapwing, skylark and yellow wagtail, as well as other wading birds such as redshank. There is some uncertainty with regards to the breeding opportunities in the areas between the solar arrays, as these species prefer more open habitats than the grassland between the arrays might provide. Lapwings are unlikely to nest in those areas between arrays, whereas in some areas, the extents between the edges of the arrays might be large enough to accommodate skylark and yellow wagtail. However, the HMA will provide better conditions, particularly for nesting lapwing.

One of the aims of the Development is to provide improved conditions where possible for breeding birds. This will be a positive effect on the breeding bird community, although due to a degree of uncertainty regarding how birds will react to the presence of the solar panels in the landscape, it is not certain to occur.

### *9.3.6 Wintering Farmland Bird Community*

The arable fields within the solar park site hosted large numbers of some farmland bird species, such as skylark and starling for short periods during the non-breeding seasons that were surveyed. This was especially prevalent during the periods after harvesting and cultivating the land. Other large flocks included carrion crow, stock dove and woodpigeon and occasionally fieldfare and redwing.

Construction works are likely to cause localised disturbance to foraging birds resulting in temporary displacement across one or two winter seasons depending on the scheduling and duration of the construction phase.

The installation of solar panels and the change in management of the majority of the land from arable to grassland is likely to result in displacement of flocks of winter foraging birds.

Some benefits to wintering farmland birds are likely to occur through the implementation of the habitats management measures detailed in the LBMP, including the provision of grassland and structural habitats such as the scrub, hedgerow and trees.

Overall, it is considered that there will be a change in the wintering farmland bird community. The large numbers of flocking species that use the solar park site are not likely to be attracted because the temporarily rich resources they favour at and after harvest of crops will no longer be available. However, the habitat management measures set out in the LBMP might improve conditions for some other wintering seed-eating species that can forage in the grassland habitats.

### 9.3.7 Barn Owl

There are six monitored barn owl nest sites within 2 km of the solar park site. None are actually within the solar park site; however, at least some of these birds make use of the solar park site for foraging, as barn owls have often been observed hunting there.

Construction activities and lighting could displace barn owls from foraging close to the areas of works. However, the works will be localised at any one time and there will be substantial remaining areas within the solar park site available for barn owls to forage in.

It is not considered that there will be any direct disturbance to nest sites of barn owls.

The Barn Owl Trust states:

"…solar PV 'farms' have the potential to be of great benefit to Barn Owls as the array frameworks are typically at a height from which Barn Owls can perch-hunt. In order to benefit Barn Owls, the grass below and around the arrays should be allowed to develop into good Barn Owl foraging habitat – rough tussocky grassland with a litter-layer not less than 70mm deep."[19]

There will therefore likely to be a positive effect of habitat change for barn owls.

### 9.3.8 Peregrine

A pair of peregrines has been recorded frequently at the solar park site, usually perching on the pylons that run across the solar park site. The pylons presumably provide an ideal perch from which to observe prey and initiate hunting. No territorial or breeding behaviour has been observed and it is not known if and where the birds have bred.

The construction activities are likely to disturb peregrines where they perch on the pylons. If disturbed by construction activities, the effect will be localised and the birds are predicted to fly to another location along the string of pylons across the solar park site. The energetic consequences of this are minimal and no material effects on peregrine are predicted to occur.

[19] https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-ground-mounted-solar-panels/

# 10 HYDROLOGY, HYDROGEOLOGY, FLOOD RISK AND GROUND CONDITIONS

The hydrological characteristics of the solar park site have been determined through desk study, site visits, consultation, computer modelling and intrusive geotechnical survey.

The assessment includes consideration of:

- Watercourses and drainage ditches;
- Near-surface water;
- Soils; and
- Private water supplies.

The assessment has proposed a series of construction mitigation measures in an outline Construction Environmental Management Plan. All construction effects are predicted to be negligible with the incorporation of these measures. Decommissioning effects are predicted to be similar to construction effects. The effects assessed includes:

- Potential chemical pollution effects on the hydrological environment;
- Potential erosion and sedimentation effects on the hydrological environment;
- Potential impediments to stream flow;
- Potential effects on private water supplies;
- Potential changes in soil and interflow patterns;
- Potential for the compaction of soils; and
- Potential for an increase in runoff and flood risk.

During operation land under the PV arrays would be allowed to naturally vegetate following seeding with a wildflower or grass mix and be grazed by livestock. As vegetation becomes established under and around the PV arrays there is likely to be a decrease in surface water runoff rates and a reduction in the potential for sediment and agricultural pesticides (phosphates and nitrates) to transfer into the wider hydrological catchment compared to the baseline scenario, where agricultural fields remain tilled for substantial parts of the year. All operational effects are predicted to be negligible.

The Development is located in Flood Zone 3a but in an area that benefits from flood defences, in the form of a raised embankment with a concrete wall which offers protection up to the 1 in 1,000 year tidal event.

A Flood Risk Assessment has been carried out for the Development which concludes that with the implementation of design measures, such as a bund around the critical infrastructure and the raising of the bottom edge of the PV arrays, the Development will be safe for its operation lifetime (allowing for sea level rise as a result of climate change), even in the event of a breach in the flood defences to the north.

# 11 CULTURAL HERITAGE AND ARCHAEOLOGY

The cultural heritage and archaeological impacts of the Development have been assessed through a combination of desk-based assessment, consultation, site survey (geoarchaeological borehole survey and watching brief on geotechnical site investigation) and site visits.

The assessment considers:

- Built heritage (*e.g.*, listed buildings, conservation areas, some scheduled monuments *etc.*)
- Archaeology (*e.g.*, certain scheduled monuments, non-designated heritage assets etc.); and
- Historic Landscape Character.

There are no designated heritage assets within the solar park site. Within 1 km of the solar park site there is one Grade I listed building, ten Grade II listed buildings and three Conservation Areas. Heritage assets within 5 km have also been considered in the assessment.

## 11.1 Built Heritage

The undesignated WWII Pillbox located within the solar park site is not expected to incur any direct effects as a result of the Development as the pillbox will be preserved in situ. There will however be a significant indirect effect resulting from a fundamental change in its setting and a consequent reduction in the contribution of the setting leading to a loss of significance for this asset.

Effects of minor significance have been identified from a loss of significance at The Church of All Saints in Graveney (Grade I), Graveney Court Farm (Grade II) and Sparrow Court (Grade II). The effects to setting will be reversible after the decommissioning of the Development negating the effects incurred during the construction and operational phases.

## 11.2 Archaeology

Through a programme of archaeological mitigation in accordance with an approved Written Scheme of Investigation it is anticipated that archaeological remains can be preserved by record resulting in a minor adverse effect to archaeological remains. If remains of high significance are encountered during further investigations it is anticipated that the Development design could be altered to preserve these remains in situ, and/or further agreed investigation can be carried out leading to preservation by record.

The Development is anticipated to result in a minor adverse effect to the setting of the scheduled monuments of Sayes Court and the six medieval salterns located to the east of the solar park site. No mitigation measures are proposed and this is considered to be a non-significant effect.

## 11.3 Historic Landscape Character

The Historic Landscape Character of the solar park site will be temporarily altered as a result of the Development. This is expected to result in a minor effect during the construction and operational phases. The Development design has incorporated measures to mitigate effects to the Historic Landscape Character such as the preservation of drainage ditches and the exclusion of large parts of the sloping parts of Cleve Hill / Graveney Hill within the southeast of the solar park site from the Development, which will create a distinction between the lower lying marshland and the higher settled ground at Cleve Hill and Graveney. In historic landscape terms both direct and indirect effects to the Historic Landscape Character will be temporary and reversible after the decommissioning of the Development.

# 12 NOISE AND VIBRATION

The noise and vibration impacts of the Development have been assessed through a combination of consultation, background noise survey and computer modelling.

Background noise monitoring was carried out at three properties following consultation with Swale Borough Council:

- 3 Nagden Cottage;
- Warm House; and
- 1 Crown Cottage.

The noise emissions of all the plant and machinery required during construction and operation have been considered, to inform an assessment of construction noise and vibration, construction traffic and operational noise effects on:

- Human receptors; and
- Non-human receptors (ecological designations).

Mitigation measures such as acoustic barriers and screening have been proposed where necessary, as well as an Ecological Clerk of Works to oversee construction within areas close to the ecological designations north of the solar park site.

Following the adoption of these mitigation measures, no significant noise and vibration effects are predicted as a result of the Development.

# 13 SOCIOECONOMICS, TOURISM, RECREATION AND LAND USE

An assessment of socio-economic, tourism, recreation and land-use effects has been undertaken informed by consultation, desk-based research and site survey. The assessment has included consideration of:

- Current socio-economic conditions in Swale and the wider Kent area;
- Tourism in the area;
- Onsite and nearby recreational resources; and
- Land use within the solar park site.

Positive socioeconomic effects of the Development include those on local employment during the construction and decommissioning phases and to a lesser extent during the operational phase.

The effect of the Development on tourism during the construction and operational phases is a negligible adverse effect, which would be short term during the construction phase. Neither of these effects are significant.

Negative effects have been identified during construction on the locally important public rights of way which cross the Development. These effects were found to be significant in the absence of mitigation. Following the successful implementation of appropriate mitigation, these effects are considered not significant. This assessment was arrived at with consideration given to the local importance of the routes affected and the availability of alternative routes.

The effect of the Development on land use will be negligible; whilst there will be a change of land use from arable to solar park and sheep grazing the sensitivity of the land is low, being predominantly Grade 3b which is not classified as being the best and most versatile land. In addition, habitat creation and enhancement is also proposed as part of the Development. Following mitigation, no significant adverse socio-economic, tourism, recreation or land use effects are predicted as a result of the Development.

# 14 ACCESS AND TRAFFIC

An assessment of access and traffic effects associated with the construction and operation of the Development has been undertaken informed by consultation, desk-based research and site survey.

Information has been obtained from specialist solar farm and civil contractors with regards to the level of vehicular movements which will be associated with each construction activity and the extent of phasing of construction activities. The total construction programme is expected to span 12 to 24 months. The refinement of this information is ongoing and the Applicant is seeking to reduce traffic movements wherever possible through embedded changes to the Development design.

The construction access route is from the A299 via Head Hill Road and Seasalter Road to the existing Cleve Hill Substation site entrance. All vehicles during construction, operation and decommissioning will access the solar park site via this existing entry point.

Sensitive receptors identified and included in the assessment include:

- Bus route 660 along Seasalter Road;
- Properties along Seasalter Road;
- Properties set back from Seasalter Road;
- Graveney Primary School;
- All Saints Church, Graveney;
- Country View Park;
- Public Rights of Way through site;
- National Cycle Route; and
- Congestion at Junction 5, M2.

It is anticipated that, during the peak of construction, up to 75 HGVs and 48 LGVs could be required to access the site per day. The peak is expected to last 16 weeks.

A strategy to manage the effect of traffic generated during construction has been created. An outline Construction Traffic Management Plan (CTMP) has been included in the PEIR which details the measures to be implemented to mitigate for the effects of the additional traffic generated during the construction phase.

The outline CTMP details the routing of HGVs, and control measures ensuring the effect of construction traffic on the surrounding network is kept as low as possible. This includes:

- Traffic timing and routing strategies;
- Staff routing and minibuses;
- Staff travel planning;
- PROW Management;
- Vehicle cleaning;
- Highways conditions surveys;
- Speed restrictions;
- Delivery management systems;
- Temporary signage;
- Traffic marshals;
- Where possible construction traffic will be restricted to outside school opening and closing timings; and
- Temporary traffic management.

Through extensive mitigation in the surrounding area, particularly along construction route and PRoWs, it is likely that the level of effect will be reduced. However, there is a level of residual adverse environmental effects that cannot be completely mitigated against. These are likely to include:

- Severance;
- Driver, pedestrian, cyclist delay; and
- Fear and intimidation.

Measures in the final CTMP will mitigate the above, reducing the significance of the effect, and in addition these effects are only likely to be temporary during the construction works and are not associated with the operation of the Development.

Traffic effects as a result of decommissioning works are likely to be the same or of lesser magnitude than those during construction.

Once operational it is envisaged that the Development will generate very few vehicle movements and therefore operation effects in regards to access and traffic are expected to be negligible.

# 15 CLIMATE CHANGE

## 15.1 Influences of Climate Change on the Development

A climate change impact assessment has been undertaken in respect of the Development. This considers:

- The vulnerability of the Development to climate change;
- The influence of the Development on climate change; and
- A summary of effects on environmental receptors sensitive to climate change.

The vulnerability of the Development to climate change considers effects on the Development as a receptor. In contrast the other two assessments consider effects on environmental receptors as a result of the Development.

Solar PV cells are designed to capture the sun's energy. Solar PV cells are therefore built to withstand extreme climatic conditions, and are purposefully located in open locations. However, solar energy developments could potentially be sensitive to significant changes in climatic variables, including atmospheric circulation and land cover changes as well as changes in sea level rise and storm surges, given the coastal location of the Development. The Development could also be sensitive to the frequency of extreme events (*e.g.*, storms) which could damage solar panels or alter their efficiency.

Modelling of flooding of the solar park site under various disaster scenarios has been carried out, in consultation with the Environment Agency. These have taken account of climate change in line with consultee requests. As a result, the panel height has been increased to avoid a breach of the sea wall, combined with worst-case storm scenarios, leading to the solar panels being reached by flood water. The inverters will be "string" type, mounted above the ground underneath the panels, and will similarly be above flood water. The transformer stations will be of a floating design, such that, in the unlikely event of a disastrous flood, they would remain above the water level. In addition, the substation/battery storage area has been designed to be within a bund of height c. 4.6 m, to prevent flood water damaging sensitive equipment. These design features ensure that the Development is not vulnerable to increases in sea level, storm surges or catastrophic failures in flood defences.

Following the design measures set out above, the susceptibility of the Development to climatic changes in wind speed, sea level and storm surges is very low, and sensitivity overall is negligible.

Cloud cover will most likely decrease in a future climate change baseline relative to the current baseline. This would improve the performance of the solar farm, providing increased energy from solar irradiation. This constitutes a minor beneficial effect.

No significant effect is predicted as a result of increased wind speeds, sea level rise, storm surges and cloud amount during the operational phase of the Development, nor from other climatic changes.

## 15.2 Influences of the Development on Climate Change

The influences of the Development on climate change are estimated through the emission or reduction in emissions of carbon dioxide ($CO_2$).

When operational, the Development will generate electricity from a renewable source and export this to the national grid. The Development is proposed to have an installed capacity of 375 MWp, a capacity factor[20] currently estimated at 10.7%. This would mean it could generate approximately 350,000 MWh of renewable electricity per year.

The $CO_2$ emissions of the manufacture and construction of the Development would be cancelled out within an estimated 4.5 years, and all savings beyond that would a net benefit of the Development to reducing climate change, relative to the baseline. Over 40 years, for example, the saving is estimated as 3.15 million tonnes of $CO_2$.

In addition, the type of electricity storage services which could be offered by the battery storage element of the Development will help to facilitate greater use of renewable electricity. This could potentially allow electricity generated during times of low demand to be used during times of peak demand, and also to improve National Grid's ability to respond to quickly and economically to fluctuations in electricity supply and demand.

These factors are considered to be a material, but non-fundamental, change to the UK's emissions of climate-changing gases and is therefore a moderate, positive environmental effect that is significant.

[20] The capacity factor is the average power output across a year as a percentage of the total installed capacity.

## 15.3 Effects of Future Climate Change Scenario on Environmental Receptors Sensitive to Climate Change

The potential for environmental receptors to be impacted by the Development differently under an altered-climate scenario is considered throughout the PEIR where appropriate. In particular, the flowing scenarios are considered:

- Landscape and Visual Impact – rising sea levels;
- Ecology – increasing temperatures;
- Ornithology – rising sea levels and increasing temperatures; and
- Hydrology and flood risk - Rise in sea levels and increased surface water flooding.

Given the relatively limited magnitude of change in climate parameters predicted over the operational period of the Development, the baseline for environmental receptors is anticipated to change either imperceptibly, or with high uncertainty, during this period, and the effect of the Development on that altered baseline is negligible.

No additional significant effects will occur as a result of climate change during the operational phase of the Development.

# 16 AIR QUALITY

An air quality assessment has been undertaken to evaluate the effects of the Development upon local air quality. The assessment considers potential emissions of fugitive dust during construction activities and the effects of vehicle exhaust emissions associated with the construction phase of the Development.

## 16.1 Construction Dust

Construction dust emissions may have an effect on the short-term particulate matter (typically less than or equal to 10microns) ($PM_{10}$) objective in close proximity of dust raising activities. However, existing baseline $PM_{10}$ concentrations are well below the annual mean $PM_{10}$ objective, which is unlikely to be exceeded during the temporary construction period.

## 16.2 Vehicle Exhaust Emissions

There are not predicted to be any exceedances of the annual mean nitrogen dioxide ($NO_2$) and $PM_{10}$ air quality objectives at any identified receptor as a result of construction traffic vehicle emissions. The additional construction traffic generated by the Development is predicted to lead to a maximum addition of 0.47 µg/m$^3$ to the annual mean $NO_2$ concentration for the worst-case receptor. This equates to a 'negligible' magnitude of change. It is also predicted that the increase in construction traffic will have an 'imperceptible' magnitude of change, in terms of annual mean $PM_{10}$ concentrations at the same worst-case receptor.

Engine exhaust emissions from off-road vehicles known as non-road mobile machinery (NRMM) have the potential to affect local air quality. The main pollutants of concern from these emissions are those relating to fuel combustion such as $NO_2$, $PM_{10}$, carbon monoxide (CO), and sulphur dioxide ($SO_2$).

Air quality in close proximity to the access track, spine road and electrical compound and its bund is likely to be affected by emissions from NRMM operating during construction of the Development. However, the effect will be local and short term, lasting for the duration of activities within that locality, and only when plant and machinery are being operated. In the absence of mitigation, emissions from NRMM used during construction are predicted to have a slight adverse and not significant effect on local air quality impacts in terms of $NO_2$, $PM_{10}$, CO and $SO_2$.

## 16.3 Mitigation

### *16.3.1 Construction Dust*

A number of best practice mitigation measures could be employed to minimise dust emissions during construction. Measures such as, but not limited to, the following should be considered:

- Develop a Dust Management Plan;
- Regular inspection and wet suppression of material/soil stockpiles where necessary (including wind shielding or complete enclosure, storage away from site boundaries and restricted height of

stockpiles), with increased frequency when activities with high potential to generate dust are carried out during prolonged dry or windy conditions;
- Appropriate orientation of material stockpiles;
- Provision of wheel washing and wet suppression during loading of wagons/vehicles;
- Covering vehicles carrying dry spoil and other wastes to prevent escape of materials;
- Shielding of dust-generating construction activities;
- Use cutting or grinding equipment fitted with suitable dust suppression techniques;
- Use enclosed chutes, conveyors and covered skips;
- Avoid site run-off of mud or water; and
- Provision of suitable site hoarding.

A contractor will be commissioned prior beginning works to produce a Construction Method Statement (CMS), which will present a comprehensive list of mitigation measures for agreement with the LPA.

Such measures are routinely and successfully applied to construction projects throughout the UK. They are capable of significantly reducing the potential for adverse nuisance dust effects associated with the various stages of construction work.

Recommended mitigation measures in relation to NRMM include the use of ultra-low sulphur diesel modern machinery and maintaining equipment in good working order.

Successful implementation of the above mitigation measures would ensure that emissions from NRMM used during construction are not significant as predicted. Implementation of the measures recommended for the mitigation of impacts from NRMM, will reduce the effect on air quality at sensitive receptors to negligible and not significant.

# 17 MISCELLANEOUS ISSUES

## 17.1 Glint and Glare

A glint and glare assessment has been undertaken to assess the likely impact of solar reflection on receptors within the Development's surrounding environment. This assessment considered road users and residential receptors.

Effects on users of Seasalter Road would last for up to approximately 20 minutes per day but in practice they would be fleeting for a moving receptor. Seasalter Road runs approximately north-south to the east of the solar park site and any reflections would occur from the west, which is not the direction a driver would be facing. The reflecting area is likely to be partially or fully obscured by undulating terrain and vegetation. The intensity of any reflection would be comparable to the intensity of a reflection from still water and there is also a relatively large separation between the panels and a vehicular receptor. Traffic volumes on Seasalter Road are also unlikely to be high.

Reflections at residential receptors would generally coincide with direct sunlight, such that an observer looking towards a reflecting panel would also be looking towards the sun. Direct sunlight is significantly more intense than a solar reflection from a panel. Effects would last for up to 40 minutes per day under worst-case conditions (full visibility of all reflecting panels on a sunny day). However, the reflecting area is likely to be partially or fully obscured due to the separation distance and existing features of the environment (trees and other buildings).

Overall, the impact on road users is considered low and at worst case residential receptors is considered moderate. No mitigation requirement has been identified.

## 17.2 Human Health

A Human Health Impact Assessment (HHIA) has been undertaken to consider key determinants to protect human health. HHIAs are designed to determine whether a proposal might improve health inequalities or negatively affect people's health and wellbeing in its widest sense.

As a result of the experience of the project team, the EIA Scoping Opinion and subsequent consultation with the public and other organisations, this section draws together and considers the findings from the following assessments:

- Air Quality;
- Traffic and Transport;
- Noise;
- Residential amenity (from the LVIA);
- Security; and
- Health and safety at work.

Overall no significant effects on human health are predicted.

## 17.3 Electric, magnetic and electromagnetic fields (EMFs)

Power frequency EMFs arise from generation, transmission, distribution and use of electricity and occur around power lines and electric cables and around domestic, office or industrial equipment that uses electricity. Electric fields are the result of voltages applied to electrical conductors and equipment. Fences, shrubs and buildings can block electric fields. Magnetic fields are produced by the flow of electric current; however most materials do not readily block magnetic fields. The intensity of both electric fields and magnetic fields diminishes with increasing distance from the source.

The scope of the assessment of EMFs is limited to consideration of any cables associated with the Development which exceed 132 kV. The only part of the Development to exceed this voltage is the underground export cable between the Development Substation and the existing Cleve Hill Substation which will likely be a 400 kV cable.

The exact cable route is not known but the nearest residential receptor is located more than 100 m from the likely route of the underground cable. Due to the magnitude of effect upon the receptors, in accordance with ICNIRP exposure limit values, EMFs will have negligible effect on local residents.

## 17.4 Telecommunications, Television Reception and Utilities

To identify any existing infrastructure constraints, both consultation and a desk-based study has been undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of solar development and consultees include water, gas and electricity utilities providers and telecommunications providers as appropriate.

The potential exists for utilities to be affected during the construction of the Development through damage caused as a result of excavation and engineering operations. In the absence of precautionary measures to avoid damage to utilities, this could lead to a short-term adverse effect. However this risk has been mitigated by mapping infrastructure that crosses the Development and avoiding it through the design of the Development.

## 17.5 Waste

Given the nature of the Development and the construction process no significant quantities of waste are anticipated. The majority of construction equipment will be delivered to the solar park site for assembly and installation (mounting structures) and connection (solar panels). There will be no waste activities undertaken on the solar park site and so the principal area of concern regards the transportation of waste from the solar park site during construction.

The number of vehicles associated with the removal of waste material associated with decommissioning and construction are considered within the Access and Traffic assessment. During the operational phase of the Development waste arising are expected to be negligible, and so effects are not assessed.

## 17.6 Major Accidents or Disasters

### *17.6.1 Vulnerability of the Development*

It is considered that the Development is only potentially vulnerable to one type of major accident or disaster; inundation from the sea. This has been assessed in Chapter 10: Hydrology, Hydrogeology, Flood Risk and Ground Conditions of the PEIR and the associated Flood Risk Assessment in Technical Appendix A10.1.

The Development has incorporated flood resilience and resistance measures into the design to ensure that the Development would be safe and able to return to operation in the event of a flood defence breach or overtopping event, including accounting for sea level rise as a result of climate change.

### *17.6.2 Potential for the Development to Cause Major Accidents or Disasters*

The Development is not considered likely to cause a significant accident or disaster risk during either the construction or operational phases.

When operational the majority of the Development comprises solar PV modules which are inert. Electrical infrastructure will be located across the Development, in the form of inverters and cabling, all of which will be subject to routine maintenance such that it is not considered to pose a significant risk to creating an accident or disaster.

There will be a concentration of electrical infrastructure at the bunded substation compound which will include the substation and transformers all of which will be subject to routine maintenance such that it is not considered to pose a significant risk of creating an accident or disaster.

There is a potential fire risk associated with lithium ion batteries although the cooling systems which are installed on the cabinets are designed to regulate temperatures to within safe conditions to minimise the risk of fire.

The manufacturer's guidance will be followed in respect of fire protection and secondary fire detection and suppression systems could be installed where considered necessary, subject to the final battery storage system procured.

# FIGURES

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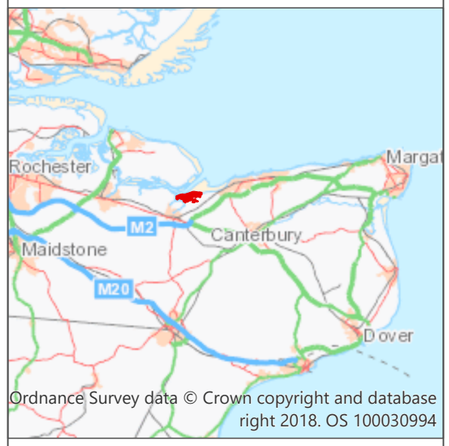
P:\Projects\Environment\Environment EIA\2238 Cleve Hill.aprx\2238-REP-052 Fig01.1 Site Location

CLEVE HILL SOLAR PARK

ARCUS

Development Site Boundary

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1:75,000 Scale @ A3

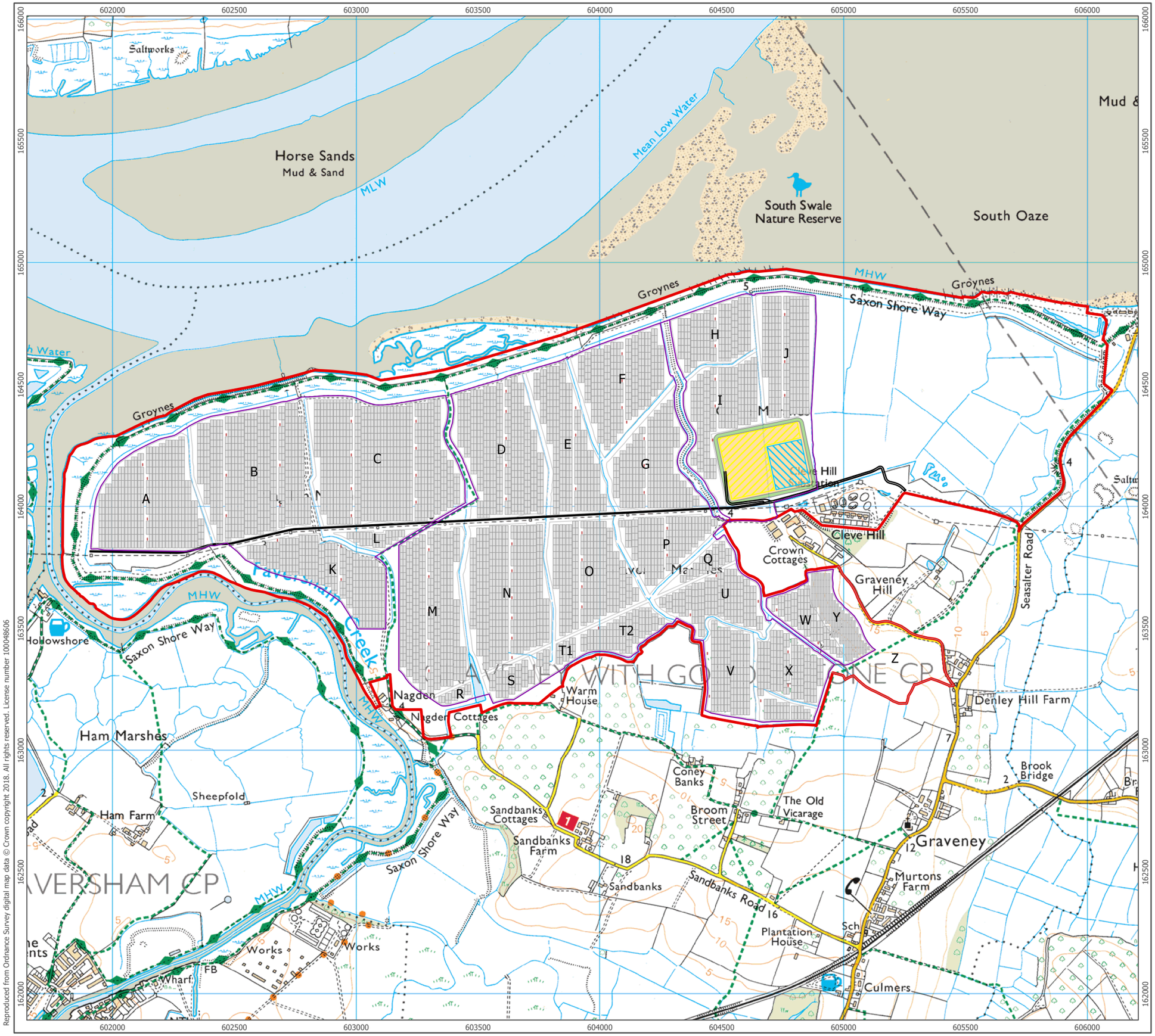
0 1.5 3 km

NORTH

| | |
|---|---|
| Produced By: SC | Ref: 2238-REP-052 |
| Checked By: AM | Date: 22/05/2018 |

**Site Location**
Figure 1.1

**Cleve Hill Solar Park**
**Preliminary Environmental Information Report**

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N:\Projects\Environment\Environment EIA\2238 Cleve Hill.aprx\2238-REP-053 Fig01.2 Site Layout

CLEVE HILL SOLAR PARK

ARCUS

- Development Site Boundary
- Fencing
- Access Road
- Battery Array
- Substation
- Solar Panels
- Bund
- Substation Compound
- Transformers

1:15,000 Scale @ A3

0 0.25 0.5 km

NORTH

| | |
|---|---|
| Produced By: SC | Ref: 2238-REP-053 |
| Checked By: AM | Date: 29/05/2018 |

**Proposed Development Layout**
Figure 1.2

**Cleve Hill Solar Park**
**Preliminary Environmental Information Report**

CLEVE HILL
SOLAR PARK

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