Stonestreet Green Solar

Stonestreet Green Solar

Environmental Statement
Volume 2: Main Text
Chapter 15: Climate Change

PINS Ref: EN010135
Doc Ref. 5.2
Version 1
June 2024

APFP Regulation 5(2)(a)
Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Table of Contents

List of Tables

ES Volume 4, Figures (Doc Ref 5.3)

None.

ES Volume 4, Appendices (Doc Ref 5.4)

Appendix 15.1: Climate Change Legislation, Planning Policy and Guidance.

Appendix 15.2: GHG Footprint Methodology.

15 Climate Change

15.1 Introduction

15.1.1 This chapter of the ES was prepared by Ecolyse Ltd and provides an assessment of the potential effects of the Project on the climate during construction, operational phase and maintenance, and decommissioning. It also considers the resilience of the Project to the physical impacts of climate change.

15.1.2 The EIA Regulations include a requirement for the assessment of development on the environment in relation to climate change:

'A description of the likely significant effects of the development on the environment resulting from, inter alia: …(f) the impact of the Project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the Project to climate change'.[1]

15.1.3 To meet this requirement the assessment is required to assess a) the impact of the project on climate change, and b) the vulnerability, or resilience of the project to future climate change. The assessment is therefore presented in two parts:

- **Part A: Greenhouse gas ('GHG') assessment** - assesses the likely significant effects of the Project on climate change through an assessment of the Project's lifecycle GHG footprint and determines its significance in the context of local, regional and national climate change policy; and
- **Part B: Climate Change Resilience ('CCR') assessment – assesses** the resilience of the Project to future changes in climate projected to occur from climate change.

15.1.4 Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and / or enhance likely beneficial effects. The nature and significance of the likely residual effects are reported.

15.1.5 Potential effects associated with the combined impacts of the Project and climate change on environmental receptors are considered in the supporting documents that accompany the DCO Application, such as the **ES Volume 4, Appendix 10.2: Flood Risk Assessment (Doc Ref. 5.4)** and **Outline Operational Surface Water Drainage Strategy ('OSWDS') (Doc Ref. 7.14)**.

15.1.6 The Chapter is supported by the following appendices:

ES Volume 4 – Appendices (Doc Ref. 5.4)

- **Appendix 15.1**: Climate Change Legislation, Planning Policy and Guidance; and
- **Appendix 15.2**: GHG Footprint Methodology.

15.2 Legislation, Policy and Guidance

15.2.1 This section lists the legislation, policy and guidance relevant to the assessment methodology for climate change. **ES Volume 4, Appendix 15.1: Climate Change Legislation, Planning Policy and Guidance (Doc Ref. 5.4)** provides further detail.

Legislation

- The Climate Change Act 2008[2];
- The Climate Change Act 2008 (2050 Target Amendment) Order 2019[3];
- 4th Carbon Budget Order[4];
- 5th Carbon Budget Order[5]; and
- 6th Carbon Budget Order[6].

Planning Policy

National

- Overarching National Policy Statement ('NPS') for Energy EN-1 (EN-1) (2023)[7];
- NPS for Renewable Energy Infrastructure (EN-3) (2023)[8];
- NPS for Electricity Networks Infrastructure (EN-5) (2023)[9]; and
- National Planning Policy Framework ('NPPF') (2023)[10].

Regional

15.2.2 KCC declared a climate emergency in 2019 and committed to reducing GHG emissions for the whole county to net zero by 2050[11].

Local

15.2.3 The following ABC Local Plan (2019)[12] policies are relevant to the GHG and resilience assessment:

- Policy ENV6 – Flood Risk;
- Policy ENV9 – Sustainable Drainage;
- Policy ENV10 – Renewable and Low Carbon Energy; and
- Policy ENV11 – Sustainable Design and Construction – Non-residential.

15.2.4 ABC have set targets to have net zero carbon emissions on their own estate and services by 2030 and borough wide by 2050[13] but voted against declaring a climate emergency in July 2019.

Guidance

15.2.5 The following guidance is relevant to the GHG assessment of the Project:

- Institute of Environmental Management and Assessment (IEMA). Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)[14] ('IEMA Guidance');

- The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard ('GHG Protocol')[15];
- Publicly Available Standard ('PAS') 2080: 2023 – Carbon Management in Buildings and Infrastructure[16];
- Climate Change Committee ('CCC'), Net Zero Technical Report (2019)[17];
- CCC, Sixth Carbon Budget (2021)[18];
- HM Government, Net Zero Strategy: Build Back Greener (2021)[19];
- HM Government, Carbon Budget Delivery Plan (2023)[20];
- Royal Institution of Chartered Surveyors ('RICS'): Whole life carbon assessment for the built environment (2017)[21];
- British Standard EN15978:2011 - Sustainability of Construction Works (2011)[22];
- ABC, Climate Change Strategy (2022)[23]; and
- Kent and Medway, Energy and Low Emission Strategy (2020)[24].

15.2.6 The following guidance is relevant to resilience of the Project to climate change:

- IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2020)[25];
- The UK Climate Projections 2018 ('UKCP18')[26];
- Met Office UK (2022) UK Climate Projections: Headline Findings and associated spreadsheet [27];
- The National Adaptation Programme ('NAP') and the Third Strategy for Climate Adaptation Reporting (2018)[28]; and
- UK Climate Change Risk Assessment (2022)[29].

15.3 Stakeholder Engagement

15.3.1 This section of the chapter summarises key stakeholder engagement undertaken to inform the assessment. It sets out the key matters raised by consultees in relation to the EIA on the topic of climate change. An explanation of how comments are addressed in ES is provided.

EIA Scoping

15.3.2 **Table 15.1** provides a summary of the responses to the EIA Scoping Report (**ES Volume 4, Appendix 1.1: EIA Scoping Report (Doc Ref. 5.4)**) of relevance to this assessment and how the assessment has responded to them.

Table 15.1: EIA Scoping Response Summary

Consultee and Comment	Response
PINS (30 May 2022)	
Climate Change Projections with respect to the Water Environment – PINS Ref 11.3.1 and 11.6.2. Collation of information on climate change is proposed for the baseline desk study but no further detail is provided on how this will be considered in the ES assessment, specifically on what Projections will be applied and why. For the avoidance of doubt, the ES and associated Flood Risk Assessment (FRA) should use the latest climate change Projections available and explain how they have been applied. Effort should be made to agree the approach with the relevant consultation bodies.	Hydraulic modelling undertaken to inform **ES Volume 4, Appendix 10.2: Flood Risk Assessment (Doc Ref. 5.4)** is based on the latest Environment Agency ('EA') climate change allowances. Details of the climate change assumptions are set out in Section 7 of **ES Volume 4, Appendix 10.2: Flood Risk Assessment (Doc Ref. 5.4)**. The latest Met Office climate projections (UKCP18)[27] were also used within this chapter at **Part B**: Climate Resilience Assessment. Specifically, **Section 15.10** of this Chapter and **Table 15.13** detail the future climate projections used and how they were used in the assessment.
Decommissioning Impacts – PINS Ref Section 15.7. Decommissioning impacts are anticipated to be similar to those at construction. Owing to future uncertainties this is proposed to be scoped out of the ES but there is no commitment to assess impacts during the decommissioning phase of the development. The Inspectorate would expect to see a Decommissioning Plan, agreed with the Local Authority, secured through the inclusion of an Outline Decommissioning Plan or similar with the Application. The ES should clearly set out if and how impacts to/from climate change are to be assessed for the decommissioning phase.	Impacts to/from climate change are assessed for the decommissioning phase in Part A and Part B of this Chapter. An **Outline Decommissioning Environmental Management Plan ('DEMP') (Doc Ref. 7.12)** has been submitted as part of the DCO Application. The detailed DEMP(s) will be secured via a DCO Requirement. This will include considerations around minimising GHG emissions during decommissioning and ensuring the Project is resilient to climate change during the decommissioning phase.
Vulnerability of the Project to climate change during construction – PINS Ref Section 15.7.4. This is proposed to be scoped out on the basis that climatic conditions are unlikely to change during the construction period.	Vulnerability of the Project to climate change during construction is scoped out on the basis that climatic conditions are unlikely to change during the construction period (12 months).

Consultee and Comment	Response
PINS (30 May 2022)	
Considering the short-term / temporary construction period of the Project (12 months anticipated) the Inspectorate agrees to scope this matter out.	

2022 Non-Statutory Consultation

15.3.3 Consultee responses were received from members of the local community stating that solar panels are not "green" as made from extracted resources and are not sustainable. Part A: GHG Assessment of this chapter provides a full assessment in response to this comment.

2022 Statutory Consultation

15.3.4 **Table 15.2** provides a summary of the responses to the 2022 Statutory Consultation of relevance to this assessment and how the assessment has responded to them.

Table 15.2: 2022 Statutory Consultation Response Summary

Consultee and Comment	Response
Aldington and Bonnington Parish Council	
The PEIR does not address that the Project would remove arable land from production and fails to address the benefits of this to the UK. It does not address the fact that emissions that scientifically impact on the climate would occur during the construction and decommissioning phases of the Project. The consultation material does not consider the carbon footprint of the solar panels, in particular they are made in China and transported to the UK.	The GHG Assessment (Part A) identifies the greenhouse gas emissions resulting from the Project over its lifetime, including emissions during the construction, operational and decommissioning phases (see **Section 15.6** 'Assessment of Effects'). The assessment specifically considers the embodied carbon emissions resulting from the manufacture of the PV panels, and emissions from transport of PV panels and other construction materials to the Site for installation. The assessment assumes that the PV panels (and other key components) will be manufactured in and imported from China. The loss of arable land and its potential effect on UK crop/food production is not a climate change effect and is therefore not considered in this Chapter. **ES Volume 4, Appendix 16.1: Soils and Agricultural Report (Doc Ref. 5.4)** describes the impact on agricultural land as a result of the Project.

Consultee and Comment	Response
Folkestone & Hythe District Council	
FHDC is committed to supporting greener technology, including the use of solar energy, to reduce carbon emissions and assist in tackling climate change. The FHDC Development Plan, Policy CC6 seeks to promote solar farms, considering them acceptable where appropriate this policy is met.	Noted.
Community feedback	
Community feedback received during the 2022 Statutory Consultation on climate change was limited and included one comment (S47): "As over 80% solar panels are manufactured in China, there are questions about use of carbon fuels in production and for transport to the UK. Serious discussions about contributions to climate change should include full life cycle analysis".	Part A of this Chapter presents the GHG emissions resulting from the Project over its lifetime. This includes the embodied carbon emissions resulting from the manufacture of the PV panels and emissions from transport of PV panels and other construction materials to the Site for installation. The assessment assumes that the PV panels are manufactured in China and transported to the UK for installation. Embodied carbon emissions from PV panel manufacturing were estimated using data from a China-based panel manufacturer.

2023 Statutory Consultation

15.3.5 **Table 15.3** provides a summary of the responses to the 2023 Statutory Consultation of relevance to this assessment and how the assessment has responded to them.

Table 15.3: 2023 Statutory Consultation Response Summary

Consultee and Comment	Response
Aldington and Bonnington Parish Council	
Section 3 Flooding c. The proposal and consultation have failed to address specific concerns in relation to climate change, and the increasingly wetter winters experienced nationally as a result. Of key local interest is the flooding of country lanes which is now a regular occurrence. We consider that this is	**ES Volume 4, Appendix 10.2: Flood Risk Assessment, Section 7 (Doc Ref. 5.4)** details the climate change projections adopted. The latest Met Office climate projections (UKCP18) which also account for increasingly wetter winters were used within this chapter at Part B: Climate Change Resilience Assessment.

Consultee and Comment	Response
a significant material concern where solar panels are proposed on undulating land.	
Ashford Borough Council	
(A) As per the Council's response 08/12/2022 to the 1st s.42 consultation, the Council remains committed to reducing the reliance on fossil fuels and accepts that there is a compelling need, as a matter of principle, to increase renewable energy generation in order to support the Government's national agenda to reach net zero carbon by 2050. The Council, therefore, does not raise objection to the principle of large-scale solar photovoltaic generation within the Borough subject to: - (i) such development being appropriately sited and well-designed (design including matters of scheme layout and scheme extents with each being tailored specifically to matters of location and associated context) in order to help minimise the landscape, visual and experiential impacts of such development as far as possible, and (ii) any significantly harmful impacts arising from such development being appropriately mitigated and that mitigation being able to be secured.	In terms of (i), **ES Chapter 5: Alternatives and Design Evolution (Doc Ref. 5.2)** and the **Design Approach Document (Doc Ref. 7.4)** describe the design evolution and approach for the Project. **ES Volume 2, Chapter 8: Landscape and Views, Section 8.6** 'Embedded Design Mitigation' **(Doc Ref. 5.2)** describes Embedded Mitigation with regard to landscape and visual impacts. In terms of (ii) mitigation has been proposed where required and secured where necessary through layout, landscape design and design principles which are all secured through the **Draft Development Consent Order (Doc Ref. 3.1)**.
Community feedback	
Climate change and carbon emission are raised in a number of community feedback responses, predominately raising concern that the location of the solar farm should not use agricultural land.	**ES Chapter 5: Alternatives and Design Evolution (Doc Ref. 5.2)** and the supporting **ES Volume 4, Appendix 5.2: Site Selection Influencing Factors (Doc Ref. 5.4)** considers issues around the selection of land for this Project. The loss of arable land and its potential effect on UK crop/food production is not a climate change effect and is therefore not considered in this Chapter. **ES Volume 4, Appendix 16.1: Soils and Agricultural Report (Doc Ref. 5.4)** describes the impact on agricultural land as a result of the Project.

2023 and 2024 Targeted Consultations

15.3.6 No specific consultation comments were received in relation to climate change or GHG in either the 2023 or 2024 Targeted Consultations.

Part A: Greenhouse Gas Assessment

15.4 Assessment Methodology

Study Area and Scope

15.4.1 GHGs are gaseous compounds that have been identified as contributing to a warming effect in the earth's atmosphere. The primary GHG of concern with respect to the Project is carbon dioxide (CO_2) which is emitted from combustion sources such as vehicular transport and heating and energy plant. Other GHGs also contribute to climate change and these are accounted for based on their Global Warming Potential ('GWP'). The combined effect of all GHG emissions will be presented as carbon dioxide equivalent (CO_2e) and will account for the seven GHGs included in the United Nations Framework Convention on Climate Change's ('UNFCCC') Kyoto Protocol. These are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons ('HFC's), perfluorocarbons ('PFC's), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).

15.4.2 The scope of the GHG assessment within this Chapter is defined through its:

- Geographic scope;
- Temporal scope; and
- The activities contributing to GHG emissions.

15.4.3 Each is described further below.

Geographic Scope

15.4.4 GHGs contribute to climate change, which is a global environmental effect and as such the geographic area for the assessment is not limited by any specific geographical scope or defined by specific sensitive receptors.

15.4.5 The scope of the assessment is determined through its temporal scope and the activities contributing to direct and indirect GHG emissions of the Project, detailed further below.

Temporal Scope

15.4.6 The temporal scope was consistent with assessing the whole lifecycle GHG emissions from the Project.

15.4.7 The construction, operational and decommissioning phases of the Project were considered as follows:

- **Construction Phase:** Direct and indirect GHG emissions resulting from the Project over the construction period. The construction period is expected to commence in 2026 and be fully complete in 2027. Construction activities are likely to take place continuously over a 12 month period. For the purposes of this assessment the modelling of construction related activity will be based on current day emission factors thereby ensuring a conservative worst-case assessment.

- **Operational Phase:** Direct and indirect GHG emissions resulting from the operational phase of the completed Project is assumed to start in 2027 which is taken to be the assessment year. GHG emissions in the assessment year represent the highest annual GHG emissions for the Project over its lifetime since the economy will be decarbonising over time, consistent with meeting the UK's climate change target to be net zero by 2050. Consideration was given to Project's GHG emissions over its whole 40 year lifetime, the proposed operational period for the Project.
- **Decommissioning Phase:** Direct and indirect GHG emissions resulting from decommissioning the Project at the end of its life, assumed to be in 2067. A conservative worst-case approach will be adopted that assumes current day emission factors, even though the economy is expected to be decarbonised before the Project is decommissioned.

Activities Contributing to direct and indirect GHG Emissions

15.4.8 The following activities contribute to GHG emissions from the construction of the Project and are included in the scope of the assessment:

- Emissions embodied in the materials used to construct the Project;
- Construction transport including shipping and delivery of raw materials, other service vehicle movements, and staff transport; and
- On-site machinery during construction of the Project.

15.4.9 The following activities contribute to GHG emissions from the operational phase of the completed Project and are included in the scope of the assessment:

- Operational transport associated with service vehicles accessing the Project;
- The net energy generated and exported by the Project, accounting for any energy used in transmission and on-site for example from heating, ventilation and air conditioning ('HVAC') systems; and
- The operational repair and maintenance of the Project.

15.4.10 The following activities contribute to GHG emissions from the decommissioning of the Project and are included in the scope of the assessment:

- On-site decommissioning activity;
- Transportation and disposal of waste materials; and
- Staff transport.

15.4.11 A small number of minor activities were scoped out, consistent with the IEMA Guidance[17]. IEMA recommends that activities with emissions that individually are less than 1% and in total equal less than 5% of the lifecycle emissions of the Project are scoped out of the assessment. These are as follows:

- GHG emissions from the treatment and disposal of construction waste. These are a small component of the GHG emissions of the Project and will be minimised through standard best practice including the implementation of operational waste management plans;
- Any change in the sequestration capacity of the habitats on the land to be used. The Site is currently used as agricultural land and will have net GHG emissions associated with the grazing of livestock or cultivation of arable crops. The Project will retain most of the existing grassland on the Site and the DCO Application includes a range of measures to retain and enhance habitats and biodiversity as discussed in **ES Volume 2, Chapter 9: Biodiversity (Doc Ref. 5.2)**. The result of these measures will be to help improve the carbon sequestration potential of the Site, although the net change relative to the baseline will be very small. Overall, the net change in emissions from land use will be inconsequential in the overall context of the whole life GHG emissions from the Project; and
- GHG emissions associated with water use (including water treatment and supply) – these are expected to result in very small contributions to lifetime GHG emissions.

Establishing Baseline Conditions

15.4.12 The Site is presently greenfield and there are no material activities that result in GHG emissions. Baseline emissions are therefore assumed to be zero.

Identifying Likely Significant Effects

15.4.13 The assessment considered the whole life GHG emissions from the Project. This included GHG emissions during the construction, operational and decommissioning phases of the Project.

15.4.14 The GHG assessment of effects is structured as follows:

- Quantification of whole life GHG emissions from the Project;
- Assessment of the likely significant effects (following the 2-step process described in **Paragraphs 15.4.33 to 15.4.39**); and
- Assessment of residual effects.

Construction Phase

15.4.15 The assessment of GHG emissions during construction followed the following approaches:

- The embodied GHG emissions from the construction of the Project were calculated using emission factors obtained from a number of sources including relevant Environmental Performance Declarations ('EPD's), the University of Bath's Inventory of Carbon and Energy (v3.0)[30], and RICS guidance on the methodology for the calculation of embodied carbon in materials[31]. Data relating to the quantity, mass, area and volume of key construction components and materials (e.g. concrete, steel, PV panels, inverters, battery systems) were provided by the Applicant; and
- GHG emissions from construction transport were calculated based on

predicted construction traffic movements provided by the Applicant, average distances to the nearest UK commercial ports, average shipping distances for products from China to the UK (assuming use of the Suez Canal), and latest government published[32] GHG emission factors for construction vehicles.

Operational Phase

15.4.16 The assessment of operational effects of the completed Project adopted the following approaches:

- Calculation of the net energy export from the Project has been calculated by the Applicant using a detailed solar performance model and estimated for the 40-year Project lifetime assuming a degradation in energy generation for the PV panels of 0.45% per annum.
- The whole life emissions from energy use were modelled using BEIS green book emission factors[33] to account for grid decarbonisation as detailed in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)**.
- Emissions from repair and maintenance during the lifetime of the Project have been calculated using the same resources as used to calculate the embodied carbon. Based on information provided by the Applicant, it has been assumed that during the 40-year lifetime of the Project, there will be:

i) two replacements of the inverters.

ii) an average of 1.5 replacement of battery cells (this assumes all batteries being replaced once during the lifetime of the Project with an additional 50% of batteries replaced twice).

iii) one replacement of HVAC systems, DC-DC converters, transformers and switchgear, and

iv) 10% replacement of all other infrastructure including PV panels and frames, cables, fencing and hard surfacing.

Decommissioning Phase

15.4.17 The assessment of decommissioning effects of the Project adopted the following approaches:

- The GHG emissions from staff transport and on-site plant and machinery used for decommissioning is assumed to be the same as for the construction phase. This is a highly conservative assumption since the economy is expected to have decarbonised by 2050 before the Project is decommissioned; and
- The GHG emission from transportation and disposal of waste materials were calculated assuming 25% of the waste materials are landfilled and 75% recycled using present day emission factors. This is a highly conservative assumption since the economy is expected to have decarbonised by 2050 before the Project is decommissioned, and it is anticipated that measures and strategies will be implemented to minimise waste to landfill as far as possible.

15.4.18 The net change in GHG emissions from the Project was calculated by comparison to the future baseline emissions and is presented for:

- The construction phase;
- The completed Project in the assessment year (2027);
- The decommissioning phase; and
- Over the whole life of the Project.

15.4.19 The assessment also presents the GHG mitigation being proposed, which follows the principles of the GHG management hierarchy (avoid, reduce, off-set) to minimise, as far as reasonably practicable, the anticipated GHG emissions over the Project's lifecycle.

Cumulative Effects

15.4.20 IEMA Guidance[17] makes clear that climate change is *"the largest interrelated cumulative environmental effect"* and therefore the assessment of GHG emissions which contribute to climate is intrinsically cumulative.

15.4.21 On this point IEMA state that,

"The atmospheric concentration of GHGs and resulting effect on climate change is affected by all sources and sinks globally, anthropogenic and otherwise. As GHG emission impacts and resulting effects are global rather than affecting one localised area, the approach to cumulative effects assessment for GHGs differs from that for many EIA topics where only Projects within a geographically bounded study area of, for example, 10km would be included".

15.4.22 In terms of this assessment the following are therefore relevant:

- The assessment will consider the effects of the Project in the context of national and local cumulative totals. Since the national totals assume that other developments will contribute GHGs, the assessment will consider their implications in determining significance; and
- The geographical location of emissions has no relevance to the assessment. Therefore, the effects of the Project are independent of any local cumulative emissions.

15.4.23 Taking this into account, an assessment of the GHG emissions associated with cumulative developments was not undertaken and the cumulative GHG effects are considered to be the same as those for the completed Project.

15.4.24 This is consistent with IEMA Guidance which states that,

"Effects of GHG emissions from specific cumulative Projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative Project that has GHG emissions for assessment over any other".

Determining Effect Significance

15.4.25 For GHG emissions there are no recognised significance criteria and thresholds that relate to the quantum of GHG emissions released.

15.4.26 The approach to classifying and defining likely significant effects therefore relies on IEMA Guidance[17] and applying expert judgment on the significance of the Project's lifecycle GHG emissions taking into account their context, compliance with policy, and mitigation measures.

15.4.27 The IEMA Guidance defines five distinct levels of significance (see **Table 15.4** later in this Section) which are not solely based on whether a Project emits GHG emissions alone, but the degree to which the Project's GHG emissions are consistent with science-based 1.5°C aligned emission trajectories towards net zero. For the UK these trajectories are effectively defined by carbon budgets, including any sectoral pathways that are designed to achieve the UK's 2050 net zero target.

15.4.28 IEMA established three underlying principles, which informed its approach to significance, as follows:

- The GHG emissions from all developments will contribute to climate change, the largest interrelated cumulative environmental effect;
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive, e.g., population, fauna and soil; and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a Project might be considered to be significant.

15.4.29 Based on these principles, IEMA conclude that:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some Projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a Project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible.
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the Project's residual emissions at all stages.
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the Project's remaining emissions should be considered.

15.4.30 In advising on the significance of any net change in GHG emission resulting from a development, IEMA identify that, to limit the adverse effects from climate change, global temperature change needs to be limited to well below 2ºC, aiming for 1.5ºC. The implication of this objective is that global emissions need to fall to net zero by 2050.

15.4.31 The UK's response to limiting climate change is enshrined in law through the Climate Change Act which requires the UK economy to be net zero by 2050 following a trajectory set through 5 yearly carbon budgets. The 2050 target (and interim budgets set to date) are, according to the CCC, compatible with the required magnitude and rate of GHG emissions reductions required in the UK to meet the goals of the Paris Agreement[1], thereby limiting severe adverse effects.

15.4.32 It follows that the significance of any net change of GHG resulting from a development is not so much whether a Project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions consistent with a trajectory towards net zero by 2050.

15.4.33 To establish the significance of the GHG emissions from the Project, judgements were made on:

- the Project's consistency with policy requirements, since these are specified to ensure the economy decarbonises in line with the UK's net zero target; and
- the degree to which the Project has sought to mitigate its emissions.

15.4.34 Examining each of these dimensions allows the assessment to make professional judgement on the likely significance of effects based on a set of significance criteria established in the IEMA Guidance, summarised in **Table 15.4**.

Table 15.4: GHG Significance Criteria (based on IEMA Guidance[14])

Significance Rating	Description	Criteria to determine significance of net GHG emissions
Major Adverse	A Project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero	The Project's net GHG impacts are: ▪ not mitigated or are only compliant with do-minimum standards set through regulation; and ▪ do not provide further reductions required by existing local, regional and national policy for Projects of this type.
Moderate adverse	A Project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.	The Project's net GHG impacts are: ▪ partially mitigated; and ▪ may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local, regional and national policy goals for Projects of this type.
Minor Adverse	A Project with minor adverse effects is fully in line with measures	The Project's net GHG impacts are:

[1] International treaty adopted at the Conference of Parties 21 in Paris in December 2015 setting global goal to limit climate change to less than 2 degrees Celsius, preferably to 1.5 degrees Celsius compared to pre-industrial levels.

Significance Rating	Description	Criteria to determine significance of net GHG emissions
	necessary to achieve the UK's trajectory towards net zero.	▪ fully consistent with applicable existing and emerging policy requirements; and ▪ in line good practice design standards for Projects of this type.
Negligible	A Project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.	The Project's net GHG impacts are: ▪ reduced through measures that go well beyond existing and emerging policy; and ▪ better than good practice design standards for Projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.
Beneficial	A Project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.	The Project's net GHG impacts are: ▪ below zero; and ▪ it causes a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-Project baseline.

15.4.35 IEMA Guidance also advise that:

- Major adverse, moderate adverse and beneficial effects should be considered significant in the context of EIA. Consequently, negligible and minor adverse are considered not significant;
- In the case of large-scale developments, irrespective of the level of mitigation if net GHG emissions exceed 5% of UK or devolved administrations carbon budget, that this is a level of change that is considered significant;
- Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect, and it is recommended therefore that the assessment also considers emerging policy / standards and the guidance of expert bodies such as the CCC on necessary policy developments, particularly for multi-phased Projects with long timescales; and
- To aid decision making, it is important to inform the decision maker about the relative severity of environmental effects such that they can be weighed in a planning balance. Therefore, it is essential to provide context for the magnitude of GHG emissions reported in the EIA in way that aids evaluation of these effects by the decision maker. IEMA advise that context can be provided through comparison of the whole life GHG emissions resulting from the Project with national, local and carbon budgets.

15.4.36 Therefore, the assessment of significance is established over two steps as follows:

Step 1: Establish Context of GHG Emissions

15.4.37 Context for decision making is provided by comparing the net change in the whole life GHG emissions resulting from the Project with local and national GHG emissions totals, and carbon budgets.

Step 2: Determine Significance of Effects

15.4.38 Significance of effects is established through applying the criteria detailed in **Table 15.4** based on professional judgement that considers:

- Step 2a: The consistency of the Project with national, regional and local policies designed to limit GHG emissions and meet the UK's net zero target; and
- Step 2b: The robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG emissions.

15.4.39 In terms of mitigation, IEMA recommends that mitigation should in the first instance seek to avoid GHG emissions. Where GHG emissions cannot be avoided, the development should aim to reduce the residual significance of its emissions at all stages. Where additional GHG emissions remain but cannot be further reduced at source, approaches should be considered that compensate for the Project's remaining emissions, for example through offsetting.

Sensitivity of Receptor

15.4.40 The assessment of climate change does not include identification of sensitive receptors, as GHG emissions do not directly affect specific locations, but lead to indirect effects by contributing to climate change.

Assumptions and Limitations

15.4.41 It is necessary to make a number of assumptions when carrying out a GHG assessment, although assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- A number of emission sources were scoped out as detailed in **Paragraph 15.4.11** although these are all minor and would not affect the conclusions of the assessment;
- Some of the materials data used to calculate embodied GHG emissions requires some characteristics to calculate the emissions to be estimated, such as material thicknesses and densities, or specific material types. In these cases, assumptions based on industry standards have been made;
- Shipping of a range of key products and materials have been assumed to be imported from China via the Suez Canal including PV panels, cables, inverters, transformers, and the BESS;
- In relation to construction traffic movements (trips and distances) assumptions have been made based on the average distances to the nearest UK ports;
- Assumptions have been made in relation to the number and activity of site

plant and equipment during construction, from a list of required construction plant included in **Outline Construction Environmental Management Plan ('CEMP') (Doc Ref. 7.8)**;

- Assumptions have been made on the rate of future decarbonisation electricity generation;
- GHG emissions from staff transport and on-site activities during decommissioning has been conservatively assumed to be equal to the emissions from those activities in the construction phase; and
- Assumptions have been made on the proportion of materials that would be recycled and sent to landfill during the decommissioning phase.

15.4.42 **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)** provides full details of all assumptions used.

Baseline Conditions

15.4.43 Baseline GHG emissions for the Site are assumed to be zero.

Future Baseline

15.4.44 Future baseline emissions for the Site are assumed to remain as zero the same as in the baseline.

15.5 Embedded Design Mitigation

Construction Phase

15.5.1 An **Outline CEMP (Doc Ref. 7.8)** and **Outline Construction Traffic Management Plan ('CTMP') (Doc Ref. 7.9)** are submitted with the DCO Application. Both documents are submitted in outline, with final, detailed versions being subject to approval by ABC and secured by a DCO Requirement. These documents set out measures included to codify best-practice working measures to reduce environmental impacts and includes the principles of the Considerate Constructors Scheme ('CCS') and its Code of Considerate Practice, as well as measures to minimise the creation of waste and the use of energy.

15.5.2 With respect to minimising the number of vehicle movements and subsequent emissions, the **Outline CTMP (Doc Ref. 7.9)** will provide for measures to consolidate the delivery of materials on-site, as well as ways to promote the most sustainable methods of construction workers to get to the Site.

Operational Phase

15.5.3 The **Outline Operational Management Plan ('OMP') (Doc Ref 7.11)**, Table 3.9 sets out measures to minimise GHG emissions during the operational phase. The OMP is submitted in outline at the time of application, with final, detailed versions being subject to approval by ABC and secured by a DCO Requirement.

Decommissioning Phase

15.5.4 The detailed DEMP(s) will be developed in accordance with the **Outline DEMP (Doc Ref. 7.12)** and will be submitted to ABC for approval as secured by a requirement within the **Draft Development Consent Order (Doc Ref. 3.1)**. The Detailed DTMP(s) will also be developed in accordance with the **Outline DTMP (Doc Ref. 7.13)** and will be submitted to ABC for approval as secured by a requirement within the **Draft Development Consent Order (Doc Ref. 3.1)**. The DEMP will provide management procedures for the removal and treatment of materials on-Site during decommissioning and the DTMP will assist with the minimisation of traffic movements during decommissioning.

15.6 Assessment of Effects

15.6.1 The climate change assessment considers the net GHG emissions resulting from the Project and is structured as follows:

- Quantification of the net GHG emissions from the Project over:
  A) The construction phase;
  B) The operational phase;
  C) The decommissioning phase; and
  D) Over the whole lifetime of the Project;
- Assessment of the likely significant effects; and
- Assessment of mitigation and residual effects.

Quantification of Whole Life GHG Emissions from the Project

A: Construction Phase

Land Use Change

15.6.2 The Site is currently used as agricultural land and will have net GHG emissions associated with the grazing of livestock or cultivation of arable crops, albeit these are considered minimal in the context of the whole life emissions from the Project. The Project will retain most of the existing grassland on the Site and the DCO Application includes a range of measures to retain and enhance habitats and biodiversity as discussed in **Section 9.6** 'Embedded Design Mitigation' of **ES Volume 2, Chapter 9: Biodiversity (Doc Ref. 5.2)** and the **Outline Landscape and Ecological Management Plan ('LEMP') (Doc Ref. 7.10)**. The result of these measures will be to help improve the carbon sequestration potential of the Site, although the net change relative to the baseline will be very small. Overall, the net change in emissions from land use will be inconsequential.

Construction Transport

15.6.3 Emissions from construction transport including shipping of goods and materials, shipping, and construction staff travel are 4,460 tonnes CO_2e. Further details of the calculation of construction transport emissions are provided in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)**.

Construction Site Emissions

15.6.4 Emissions from construction plant and machinery used during construction are 2,908 tonnes CO_2e. Further details of the calculation of construction site emissions are provided in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)**.

Embodied in the materials used in the construction of the Project

15.6.5 Embodied carbon emissions in the materials used for construction of the Project are 119,375 tonnes CO_2e. A breakdown of embodied carbon by source is shown in **Table 15.5**. The major contributors to the Project's embodied carbon are the PV panels, frames and BESS. Further details of the calculation of embodied emissions are provided in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4).**

Summary Construction Phase GHG Emissions

15.6.6 A summary of the construction phase GHG emissions is provided in **Table 15.5**.

Table 15.5: Construction Phase GHG Emissions Summary

Component	GHG Emissions (TCO_2e)	% of Construction Phase Emissions
Embodied Carbon		
PV Panels	41,856	33.0%
PV Mounting Structures	22,838	18.0%
Cabling	8,857	7.0%
HV Infrastructure (Inverters, Transformers and Switchgear)	13,163	10.4%
BESS	26,473	20.9%
Substations (inclusive of Intermediate Substation, Project Substation and Sellindge Substation extension)	2,032	1.6%
Hard Surfacing	3,746	3.0%
Fencing and CCTV	410	0.3%
Embodied Carbon Total	119,375	94.2%
Construction Transport		
Materials Transport - Road	716	0.6%

Component	GHG Emissions (TCO_2e)	% of Construction Phase Emissions
Materials Transport - Shipping	3,397	2.7%
Construction Staff Travel	347	0.3%
Construction Transport Total	4,460	3.5%
Construction Site Activities		
Construction Site Activities	2,908	2.3%
Construction Phase TOTAL	**126,743**	**100%**

B: Operational Phase

Operational Transport

15.6.7 Emissions from operational transport are 570 tonnes CO_2e. Further details of the calculation of operational transport emissions are provided in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)**.

Repair, Maintenance and Replacement

15.6.8 Emissions from repair, maintenance and replacement during the operational phase of the Project are 67,058 tonnes CO_2e. Further details of the calculation of repair, maintenance and replacement emissions are provided in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)**.

C: Decommissioning Phase

Construction Site Emissions

15.6.9 Emissions from construction plant and machinery used during decommissioning are assumed to be equal to those during construction and are therefore 2,908 tonnes CO_2e. This is considered conservative since it does not account for decarbonisation of construction plant that is expected in the period until the Project is decommissioned.

Construction Staff Transport

15.6.10 Emissions from construction staff transport during decommissioning are assumed to be equal to those during construction and are therefore 347 tonnes CO_2e. This is considered conservative since it does not account for decarbonisation of vehicles that is expected in the period until the Project is decommissioned.

Transportation and disposal of waste materials

15.6.11 Emissions from transportation and disposal of waste materials during decommissioning are estimated at 1,156 tonnes CO_2e. This is considered conservative since it does not account for decarbonisation that is expected in the period until the Project is decommissioned. Further details of the calculation of transportation and disposal of waste materials emissions are provided in **ES Volume 4, Appendix 15.2: GHG Footprint Methodology (Doc Ref. 5.4)**.

D: Whole Life GHG Emission Footprint

15.6.12 A summary of the whole life GHG emissions footprint for the Project is provided in **Table 15.6**.

Table 15.6: Whole Life GHG Emissions Summary

Component	GHG Emissions (TCO_2e)	% of Whole Life Emissions
Construction		
Embodied Carbon	119,375	60.1%
Construction Transport	4,460	2.2%
Construction Site Activities	2,908	1.5%
Construction Total	**126,743**	**63.8%**
Operation		
Operational Transport	570	0.3%
Operational Repair, Maintenance and Replacement	67,058	33.7%
Operation Total	**67,628**	**34.0%**
Decommissioning		
Construction Site Activities	2,908	1.5%
Staff Transport	347	0.2%
Transportation and disposal of waste materials	1,156	0.6%
Decommissioning Total	**4,411**	**2.2%**
WHOLE LIFE TOTAL	**198,782**	**100%**

Carbon Intensity and Energy Offset

15.6.13 The Project generating capacity, assuming 655W panels and the illustrative design is circa 144 MW. This is lower than stated during the 2023 Statutory Consultation due to design changes in response to consultee feedback including the removal of panels within Fields 26 to 29 and other adjustments which has reduced the illustrative design panel numbers by approximately 8%. This analysis assumes 655W modules as a reasonable worst case assessment as these are readily available today; however, by the time of construction it is highly likely that higher wattage panels will be readily available which could increase the generating capacity from the illustrative design figure to circa 165 MW.

15.6.14 Any generated electricity that exceeds the grid connection capacity of 99.9MW in a given time period, and therefore cannot be immediately exported, can be stored using the on-Site BESS and exported when the Project is generating less electricity, for example at night. This design approach maximises the contribution of the Project to the achievement of net zero, is consistent with policy, ensures the grid capacity secured by the Project is utilised as efficiently as possible and is also the approach taken by previously consented NSIP projects.

15.6.15 Using conservative yield assumptions (assuming no improvement PV Panel output or efficiency) the Project is anticipated to export a total of 155,794 MWh of renewable electricity in the opening year. Over the 40-year lifetime of the Project, the total expected electricity export is 5,714,836 MWh. This assumes a 0.45% per annum degradation rate of the PV panels.

15.6.16 Based on total whole life GHG emissions of 198,782 tonnes CO_2e, the lifecycle carbon intensity of electricity generated by the Project is 34.8 g CO_2e/kWh.

15.6.17 The Project will provide renewable electricity that would otherwise be generated via alternative means with higher carbon intensity. Specifically, the Project is supportive of government policy to transition the grid to renewables, enabling the removal of fossil fuel generated fuel (e.g., natural gas) from the grid. Therefore, it is appropriate to compare the lifecycle carbon intensity of the Project to that of a gas fired power generation using Combined Cycle Gas Turbines ('CCGT') which is 371 g CO_2e/kWh.

15.6.18 The electricity production from the Project is over 10 times more carbon efficient than the fossil fuel generated electricity that it aims to replace. Over the lifetime of the Project, the effect is to save nearly two million tonnes of CO_2e compared to generation of that electricity from natural gas using CCGT. It should also be noted that this comparison does not account for the embodied carbon in the CCGT power source and therefore is a conservative assessment.

15.6.19 Another way to look at this is to calculate the 'payback period' i.e., the time over which the whole life emissions associated with the Project (198,782 tonnes CO_2e) are expected to be overtaken by emissions from electricity generation by CCGT. This is estimated to be just over three years, and therefore any electricity generated after the 3^{rd} year of the operational phase is actively reducing the UK carbon emission verses the case where that energy was generated through natural gas.

15.6.20 Overall, it is demonstrated that the Project will lead to net GHG savings by replacing electricity currently generated by more carbon intensive methods such as natural gas CCGT, and helping to enable the removal of fossil fuel generation from the UK electricity grid.

Assessment of Significance of Effects

15.6.21 The assessment of the significance of the GHG emissions is informed through IEMA Guidance detailed in **Section 15.4** and follows a 2-step process detailed below.

Step 1: Establish Context

15.6.22 The GHG emissions from the Project are compared to national CO_2e totals to establish context.

15.6.23 The UK has legislated a 2050 net zero target following recommendations and analysis completed by the CCC[17]. To meet this target the CCC sets carbon budgets to define a pathway to net zero.

15.6.24 The construction emissions coincide with the 4th carbon budget (covering the period 2023 to 2027).

15.6.25 **Table 15.7** summarises the net change in GHG from construction emissions as a percentage of the 4th Carbon Budget.

Table 15.7: Net GHG from Construction as % of Carbon Budgets

Budget	Period	Budget value (Mt)	GHG emissions due to the Project (Mt)	% of Carbon Budget
Fourth carbon Budget	2023-2027	1,950	0.127	0.0065%

15.6.26 **Table 15.7** shows that the construction phase GHG emissions (126,744 tonnes) as a percentage of the 4th carbon budget is 0.0065% and therefore very small. Much of the embodied carbon will be emitted abroad during product manufacture and is therefore not included within the UK's carbon budgets, so this comparison is very conservative.

15.6.27 The operational emissions of the Project equal 67,628 tonnes over 40 years, or approximately 8,450 tonnes CO_2e over each of the 5th and 6th Carbon budget, and therefore represent 0.000005% of the 5th Carbon Budget and 0.000009% of the 6th Carbon Budget, again a very small contribution.

15.6.28 The GHG emissions during the decommissioning phase will occur after 2050. There are no legislated carbon budgets for this period since the UK's target is to be net zero by 2050.

15.6.29 Looking at the whole life emissions it is also constructive to compare those from the Project with the carbon budget identified for KCC by the Tyndell Centre for Climate Change. The KCC Pathway to Net Zero report[34] provides a carbon budget consistent with meeting Paris Agreement targets of limiting temperature change to *"well below 2 degrees and pursing 1.5 degrees centigrade"* and consequently with UK's net zero target. KCC's "Paris aligned" carbon budget for the period 2020-2050 is stated as 57,700KtCO_2, which compares to the whole life GHG emissions from the Project of 198,782 tonnes, or 0.34% of KCC's carbon budget. However, calculation this does not take into account the net effect of the Project (e.g. taking into account the displacement of electricity generation from fossil fuels). As detailed above, 3 years from opening the Project will be contributing a net GHG emission savings towards KCC carbon budget assuming it was displacing fossil fuel generated electricity in the county.

Step 2: Determine Significance

15.6.30 Significance of effects is established through applying the criteria detailed in **Table 15.4.** This requires judgments on:

a) The consistency of the Project with national, regional and local policies designed to limit GHG emissions and meet the UK's net zero target; and

b) The robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG.

15.6.31 Each is considered further below.

Step 2a: Consistency of the Project with National, Regional and Local Policies

National

15.6.32 The key relevant national policies are NPS EN-1 and NPS EN-3. These policies provide support for solar development, the use of energy storage and recognise the role of solar and other low carbon energy developments in the transition to a net zero economy by 2050.

15.6.33 The whole life GHG assessment provided in this chapter also satisfies the requirements of NPS EN-1 that a whole life GHG assessment be included in the ES for all nationally significant energy Projects.

15.6.34 Overall, the Project is demonstrated to result in lifecycle GHG benefits and contribute in the transition to net zero and is supported by key national policy.

Regional

15.6.35 There are no specific regional policies relevant to GHG emissions; however, KCC recognised the UK climate emergency in 2019 and committed to reducing GHG emissions for the whole county to net zero by 2050[11]. KCC have also published an Energy and Low Emissions Strategy[24] document setting out their approach and priorities. Specifically, priority 7 of KCC's strategy: Renewable Energy Generation states that: *"We will focus on supporting opportunities that allow more of our energy to be produced locally and from renewable sources"* and have set a key performance indicator that tracks renewable electricity generation in the county. The Project, in generating renewable electricity and providing lifecycle GHG benefits contributing to the transition to net zero is therefore consistent with KCC's net zero target and supportive of KCC's climate change priorities.

Local

15.6.36 There are a number of ABC local plan policies relevant to the GHG assessment, as listed in **Paragraph 15.2.3**.

15.6.37 The Project is judged to accord with all relevant local policies relating to GHG emissions in the following ways:

- The gross emissions associated with the construction and operational phase of the Project are small in the context of wider GHG emissions;
- The net effect of the Project is to provide lifecycle GHG savings compared to conventional electricity generation, and support the transition to net zero;

- The Project is designed to minimise embodied carbon and maximise the lifecycle benefits including use of PV panels for 40 years without wholesale replacement to maximise yield, and use of steel frames in favour of higher carbon aluminium frames;
- Production of a whole life GHG emissions assessment to support the DCO Application; and
- Incorporation of a BESS into the Project to ensure all generated energy is used.

15.6.38 Overall, the Project is entirely consistent with relevant national, regional and local policies relating to GHG emissions.

Step 2b: Robustness, timeliness and efficacy of mitigation

15.6.39 The principles of the IEMA Guidance are that where GHGs cannot be avoided, that mitigation should be provided to minimise GHGs. Mitigation measures adopted by the Project are described for each element of the GHG footprint.

Construction and Decommissioning

15.6.40 Mitigation measures adopted by the Project to minimise GHG emissions from the construction and decommissioning phase are inherent in the design and described in **Section 15.5** 'Embedded Design Measures' of this Chapter. No additional measures are proposed.

Summary of GHG Assessment

15.6.41 The assessment of significance has followed a 2-step process consistent with IEMA Guidance and is summarised below in **Table 15.8**.

Table 15.8: Assessment of Significance

Step	Description	Assessment	Applicable IEMA rating
Step 1	Context	The Project's construction emissions are a very small component of national carbon budgets (0.0065%). When considering whole life GHG emissions, the Project will result in a net reduction in GHG emissions through provision of renewable electricity reducing demand for fossil fuel use.	Beneficial (Significant)
Step 2	Consistency with National and Local policy	The Project is fully consistent with applicable existing and emerging policy requirements.	
	Robustness, timeliness and efficacy of mitigation	The Project has adopted good practice measures to avoid and minimise GHG emissions during the construction, operational and decommissioning	

Step	Description	Assessment	Applicable IEMA rating
		phases and will support the transition to net zero by or before 2050.	

15.6.42 Based on **Table 15.8** and with reference to IEMA Guidance significance criteria (see **Table 15.4**) the assessment therefore finds that the effects are beneficial and significant. This is a judgement based on the balance of the effects, but applying considerable weight to the ability of the Project to result in a net reduction in GHG emissions from power generation.

Residual Effects

15.6.43 No additional measures are proposed and therefore the residual effects remain as beneficial and significant.

Part B: Climate Change Resilience Assessment

15.7 Assessment Methodology

15.7.1 This part of the Chapter provides a qualitative assessment of the embedded mitigation and resilience of the Project to climate change. The assessment methodology takes into account the recommendations in the IEMA EIA guide to Climate Change Resilience and Adaptation[25] and has been adapted to ensure the assessment is proportionate to the Project.

Study Area and Scope

15.7.2 There are two key strands to assessing climate change resilience issues within EIA, which need separate treatment:

- The risks of changes in the climate to the Project (i.e., the resilience or conversely the vulnerability of a Project to future climate changes). A climate risk assessment has been carried out to establish likely significant effects resulting from climate change on the Project; and
- The extent to which climate exacerbates or ameliorates the effects of the Project on the environment (i.e., 'in-combination' climate effects). In line with the IEMA Guidance, this has been analysed within relevant ES technical chapters. The effects of the Project on various environmental receptors have been assessed, then these effects have been re-assessed taking into account climate change if relevant.

Geographical Scope

15.7.3 The study area for climate resilience, unlike other disciplines, focuses on the impact that climate will have on the Project (as opposed to the impact of the Project on the environment). The study area is therefore the Site (Order limits) of the Project, split into its constituent parts (receptors).

Temporal Scope

15.7.4 The Project has an operational lifespan of 40 years. Climate projections from UKCP18 for the period 2060-2079 have been used (Representative Concentration Pathway ('RCP') 8.5 - high emissions scenario).

Establishing Baseline Conditions

15.7.5 The assessment of resilience of the Project to the impacts of climate change was informed by regional scale information on historic and Projected change in climate variables, and other studies undertaken relevant to the Project.

15.7.6 The future baseline conditions were defined by potential climate risks identified in the UK Climate Change Risk Assessment[29], National Adaptation Programme[28], and the Key Climate Projections: Headline Findings produced by the Met Office UK (2019)[27]. These are based on the 2018 UK climate projection dataset (UKCP18)[26].

Identifying Likely Significant Effects

15.7.7 It is standard practice in EIA to distinguish between construction, operational and decommissioning effects of the Project on the environment. The Climate Change Resilience Assessment is required to establish any significant effects of climate change on the Project. The focus of the assessment is in the future when it is anticipated that changes from the existing climate will have occurred and these may pose risks in relation to the operational function of the Project and its users and potentially during its decommissioning. As such, this component of the assessment does not explicitly consider climate risks during the construction period since these works will largely be happening in a period which is not subject to additional climate change to that already experienced and those risks are well established and managed through standard practices. The exclusion of the construction phase from the climate resilience assessment has been scoped out of the assessment at scoping stage (see **Table 15.1**).

15.7.8 In terms of resilience to climate change, this is principally a function of the design which needs to anticipate future risks and build in appropriate adaptation measures as required. There is therefore an important focus on embedded measures to address future climate change.

15.7.9 The assessment starts by establishing potential receptors, potential climate risks and considers the significance of that risk through an assessment of likelihood and consequence taking into account embedded design measures.

15.7.10 As a further step the assessment identifies additional mitigation as required to address any significant effects and concludes on the residual risks.

15.7.11 To summarise, climate change by its nature occurs over many decades and future changes as modelled by UKCP 18[26] models climate change in the longer term. The focus of the climate resilience assessment is on the operational and decommissioning phases of the Project and the risks it may face due to future climate change. This takes into account design measures that are adopted during the construction phase and any additional operational measures that may be required in the future.

15.7.12 Following IEMA Guidance[28], the assessment is carried out over five-steps, as follows:

Step 1: Establish Relevant Policy Requirements

15.7.13 This step establishes any relevant policy that informs the assessment of climate risks, and requirement for measures to manage those risks (knowns as adaptation measures).

Step 2: Identify Receptors

15.7.14 During this stage, relevant receptors in the Project which may be affected by climate change (e.g. change in average weather conditions and extreme events) are identified.

Step 3: Identify Potential Impacts of Climate Change on Receptors and Confirm Embedded Mitigation

15.7.15 This stage comprises identification of potential impacts of changes in a range of climate variables on the receptors identified in Step 2. This is undertaken using professional judgement and identifies the design measures to mitigate the impacts taking into account policy requirements identified in Step 1.

Step 4: Assess the Significance of Effects of Climate Change on Receptors

15.7.16 This step assesses the significance of each hazard based on scoring the likely consequence and likelihood of that hazard arising, using a five-point scale described in **Table 15.9** and **Table 15.10**. The assessment of significance and scoring of likelihood and consequence are based on IEMA Guidance.

Table 15.9: Qualitative Description of Consequence

Measure of Consequence	Description
Negligible	No damage to the Project, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.
Minor Adverse	Localised disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than one day. Small financial losses and/or slight adverse health or environmental effects.
Moderate Adverse	Limited damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than one day but less than one week. Moderate financial losses. Adverse effects on health or the environment.
Large Adverse	Extensive damage and severe loss of service. Disruption lasting more than one week. Early renewal of 50-90% of the Project. Major financial loss. Significant effect on the environment, requiring remediation.

Measure of Consequence	Description
Very Large Adverse	Permanent damage and complete loss of service. Disruption lasting more than one week. Early renewal of the Project >90%. Extreme financial loss. Very significant loss to the environment requiring remediation and restoration.

Table 15.10: Qualitative Description of Likelihood

Measure of Likelihood	Description (assuming 40-year lifetime)
Very High	The event occurs multiple times during the lifetime of the Project e.g., approximately annually.
High	The event occurs several times during the lifetime of the Project e.g., approximately once every five years.
Medium	The event occurs limited times during the lifetime of the Project e.g., approximately once every 10 years.
Low	The event occurs occasionally during the lifetime of the Project e.g., twice in 40 years.
Very Low	The event may occur once during the lifetime of the Project.

15.7.17 These determinants are combined to assess the significance of effects on receptors, as shown in **Table 15.11**. The assessment is qualitative and based on expert judgment based on knowledge of similar schemes, engagement with the wider Project Team and a review of relevant literature.

15.7.18 The assessment of significance takes embedded mitigation into account. Embedded mitigation is identified through consultation with the Project Team and taking into account policy requirements identified through Step 1.

Table 15.11: Significance Rating Matrix

Likelihood of hazard occurring	Consequence of Hazard Occurring				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Very High	Not significant	Significant	Significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant
Medium	Not significant	Not significant	Significant	Significant	Significant

Likelihood of hazard occurring	Consequence of Hazard Occurring				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Low	Not significant	Not significant	Not significant	Significant	Significant
Very Low	Not significant	Not significant	Not significant	Not Significant	Not Significant

Step 5: Establish Further Adaptation Measures and Determine Residual Effects

15.7.19 In the fifth step, further adaptation and mitigation measures for any significant effects are identified through expert opinion based on knowledge of similar schemes and consultation with the Applicant and any residual effects of climate change on the receptors are assessed using **Table 15.9** to **Table 15.11**.

15.8 Assumptions and Limitations

15.8.1 This assessment provides a broad indication of the potential impacts of climate change on the Project based on a qualitative assessment and professional judgement using knowledge of similar schemes. The UKCP18 Projections[26] are the most up-to-date projections of climate change for the UK.

15.8.2 UKCP18 provides probabilistic projections of future climate for a range of emissions scenarios. Future GHGs emissions, and the resulting pathway, is uncertain. A precautionary approach, consistent with IEMA Guidance[25] has therefore been adopted by selecting a high emissions scenario (RCP8.5) and long-term time slice (2060-2079) projections.

15.8.3 The embedded adaptation measures are based on information provided by the Applicant. The determination of significance has been undertaken under the assumption that industry design standards will be adhered to where detailed design information is unavailable.

15.9 Baseline Conditions

Existing Conditions

15.9.1 **Table 15.12** sets out the current understanding of climate hazards within the Site, based on the assessments carried out within **ES Volume 4, Appendix 10.2: Flood Risk Assessment (Doc Ref. 5.4)**, and meteorological data taken from closest available data source, located at Folkstone Ski Centre, approximately 15km to the south east of the Site[35], as well as Met Office published data on extreme weather[36].

Table 15.12: Current Climate Change Hazards

Climate Hazard	Current Baseline
Extreme rainfall and flood risk	EA Flood Mapping[37] indicates the majority of the Site lies within Flood Zone 1 (identified as having less than 1 in 1,000 annual probability of river (fluvial) flooding) (i.e., low risk of flooding). The Northern Area and Fields 19, 23 to 25 of the Central Area of the Site are classified by the EA as in Flood Zone 2 (identified as land having a 1 in 100 and 1 in 1,000 annual probability of river flooding, which is defined as 'medium' probability) and Flood Zone 3 (identified as land having a 1 in 100 or greater annual probability of river flooding, which is defined as 'high' probability. Parts of the Cable Route Corridor and Sellindge Substation are also located within Flood Zones 2 and 3. The majority of the Site is also at low (between 0.1% and 1% chance of flooding each year) to very low risk (less than 0.1% chance of flooding each year) of surface water flooding. Northern parts of the Central Area and the majority of the Northern Area are in high (greater than 3.3% chance of flooding each year) to medium risk (between 1% and 3.3% chance of flooding each year) of surface water flooding. Northern parts of the Central Area and the majority of the Northern Area are also at risk of flooding from reservoirs (i.e., the Aldington Flood Storage Area ('AFSA')). The East Stour River flows in an east to west direction within, and adjacent to, the northern part of the Site. For the Site, in a year, the average rainfall is 796.60mm. The driest month is March (an average of 46.69mm). Most of the precipitation falls in October, averaging 95.23mm. The Met office climate data for 12km square located at the Site states there have been 8 rainy days on average per month (in the summer) and 11 days in the Winter over the period 1991-2019, with a wettest summer day in the past 30 years resulting in 46mm of rain, and 42mm in the Winter.
Storms and drought	The Met office climate data confirms that although severe storms will occur more frequently with climate change, drought conditions are also expected to increase as summers become drier and hotter. The South East of England are already classed as 'seriously water stressed', meaning more water is taken from the natural environment than is sustainable in the long-term.
Extreme temperatures	The average annual maximum temperature at the Site is 14.40°C. With an average of 21.48°C. August is the warmest month. January is the coldest month, with temperatures averaging 7.85°C. The Met Office climate data[2] for temperature indicates that the hottest summer day at the Site in the past 30 years (between 1991 and 2019) was 35.9°C (and winter day of 17.9 °C), with 4 days during the summer where the temperatures was above 25°C per month on average.

[2] This data excludes data relating to the record heatwave that was experienced in July 2022

15.10 Future Baseline

15.10.1 In this baseline section, the UKCP 2018 Climate Projections[26] central estimate (50th percentile) projections for high emissions scenario (RCP8.5) in the period 2060-2079 are presented. The high emissions scenario was used to adopt a 'worst-case' estimate of climate projections. These are summarised in **Table 15.13**.

Table 15.13: Climate projections for South East England in 2060-2079 using UKCP18 - RCP8.5 (50th percentile)[38]

Climate Variable [a]	2070/80s
Mean annual temperature	+3.0 °C
Mean winter temperature	+2.4°C
Mean summer temperature	+3.9 °C
Mean winter precipitation (%)	+19 %
Mean summer precipitation (%)	-25 %

[a] Change relative to 1981-2000 baseline

15.10.2 Extreme weather events are considered for the Project. Climate change predictions indicate increasingly erratic weather patterns that are likely to lead to greater number of extreme weather events.

15.10.3 This includes heatwaves (precursor to droughts) and an increase in localised intense precipitation events, (precursor to flooding) with some climate models predicting an increase in frequency and intensity of winter storms[27]. Increase in the frequency and intensity of these extremes can put further pressure on resources and increase risk posed to infrastructure and public health and safety.

15.10.4 The Projected changes to the climate in the UK are translated in to eight priority risk areas in the UK Climate Change Risk Assessment 2022[29]:

- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards;
- Risks to soil health from increased flooding and drought;
- Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions;
- Risks to crops, livestock and commercial trees from multiple hazards;
- Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks;
- Risks to people and the economy from climate-related failure of the power system;
- Risks to human health, wellbeing and productivity from increased exposure

to heat in homes and other buildings; and

- Multiple risks to the UK from climate change impacts overseas.

Snow

15.10.5 According to UKCP18 climate projections, for the period 2060-2079, under a high emissions scenario (RCP8.5), the regional (12km) and local (2.2km) projections show a decrease in both falling and lying snow across the UK relative to the 1981-2000 baseline.

Wind

15.10.6 Winds associated with major storm events can be some of the most damaging and disruptive events for the UK with implications for property, power networks, road and rail transport and aviation. Calm periods with little wind, particularly over prolonged periods, can affect air quality whilst winds from a particular direction can be a critical factor in the spread of particulates. Both cases are also examples where the combination of factors such as wind, temperature and precipitation can exacerbate their impacts (e.g., air quality issues tend to be worse under conditions of light winds and higher temperatures; pathogen spread can require wind, temperature and precipitation conditions to be favourable)[39].

15.10.7 Changes in wind speeds are not currently available at the regional level and there remains considerable uncertainty in UKCP18[26] climate projections with respect to wind speed; however, there are small changes in projected wind speed. Across the UK, near surface wind speeds are expected to increase in the second half of the 21st century with winter months experiencing more significant impacts of winds[39]. This is accompanied by an increase in frequency of winter storms over the UK. However, the increase in wind speeds is projected to be modest. There are no compelling trends in storminess as determined by maximum gust speeds from the UK wind network over the last four decades[40].

Summary

15.10.8 The South East region of England, in which the Site is located, is set to experience hotter, drier summers and milder, wetter winters. With winter precipitation and the number of heavy rain days projected to increase, flooding events may be more likely and occur on a more frequent basis. Conversely, summer precipitation is expected to decrease. Coupled with a central estimate of summer temperatures increasing by 3.2ºC, the area may experience an overall reduction in water resources. Whilst there are large uncertainties in the frequency and intensity of storms increasing under climate change, wind speeds are expected to increase slightly as well.

15.11 Assessment of Climate Resilience

15.11.1 The assessment has followed the 5-step process identified earlier (see **Paragraphs 15-30 to 15-32**). The assessment under each step is detailed further below.

Step 1: Establish Relevant Policy Requirements

15.11.2 The ABC Local Plan Policy ENV 6, ENV 9 and SP1 are relevant to the assessment of resilience to climate change.

15.11.3 Specifically, in terms of climate resilience ENV 6 (Flood Risk) requires:

- Project will only be permitted where it would not be at an unacceptable risk of flooding on the Site itself, and there would be no increase to flood risk elsewhere.

15.11.4 Policy ENV 9 – Sustainable Drainage requires:

- Ensure that all new developments are designed to mitigate and adapt to the effects of climate change.

15.11.5 Policy SP1 – Strategic Objectives is also relevant and this states that:

- To ensure new development is resilient to, and mitigates against the effects of climate change by reducing vulnerability to flooding, promoting development that minimises natural resource and energy use, reduces pollution and incorporates sustainable construction practices, including water efficiency measures.

15.11.6 Nationally the NPS EN-1 sets out policy on climate resilience. EN-1 states that:

"4.10.8 New energy infrastructure will typically need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the direct (e.g. site flooding, limited water availability, storms, heatwave and wildfire threats to infrastructure and operations) and indirect (e.g. access roads or other critical dependencies impacted by flooding, storms, heatwaves or wildfires) impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure."

and

"4.10.11 Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections"

Step 2: Identify Receptors

15.11.7 The key receptors on Site identified are:

- Renewable energy infrastructure – PV Arrays, BESS units, inverters and substations;
- Site access; and
- Landscaping and Biodiversity.

Step 3: Identify Potential Impacts of Climate Change on Receptors and Embedded Mitigation

15.11.8 A number of potential impacts were identified. The Applicant was consulted regarding the potential risks inherent to the Project's design. The results are detailed in **Table 15.14**.

Table 15.14: Climate Risks and Mitigation

Climate Variable	Receptor	Potential Impact	Embedded Design Measures to Mitigate Impacts
Summers Extreme Temperatures (Heatwaves)	Renewable energy infrastructure (PV arrays, BESS units, inverters and substations)	Potential for increased energy generation	Capacity of grid connection and BESS system specified to service the peak generating capacity of the Project.
		Overheating of BESS units / inverters / other electrical infrastructure	Equipment rated to withstand higher temperatures; cooling capacity rated to accommodate higher cooling demand.
		Increased noise from cooling plant	Noise attenuation through use of acoustic barriers (secured through **Design Principles (Doc Ref. 7.5)**.
	Site access	Staff suffering from overheating	Limited maintenance requirements, scheduling to avoid extreme heat (secured through **Outline OMP (Doc Ref. 7.11))**. **Outline DEMP (Doc Ref. 7.12)** considers measures to address site access risks related to future climate change.
	Landscaping and Biodiversity	Potential to affect growth rates of habitats	The **Outline LEMP (Doc Ref. 7.10)** specifies planting that is suited to adapt to future climatic changes.
Wetter Winters Extreme Rainfall	Renewable energy infrastructure (PV arrays, BESS units, inverters, and substations)	Surface / groundwater and watercourse flooding	The majority of the Site is located within Flood Zone 1, with some northern parts of the Site located in Flood Zones 2 or 3, which are considered to be at a higher probability of flooding. Specific flood risk impacts and associated mitigation measures are discussed in more detail in **ES Volume 2, Chapter 10: Water Environment,**
	Site access		

Climate Variable	Receptor	Potential Impact	Embedded Design Measures to Mitigate Impacts
			Section 10.6 (Doc Ref. 5.2 'Embedded Design Mitigation**)** and **Outline OSWDS (Doc Ref. 7.14)**. These measures include: a. The design of drainage systems will ensure that there will be no significant increases in flood risk downstream during storms up to and including the 1 in 100 (1%) annual probability design flood, with an allowance of 45% for climate change; b. Sustainable Drainage Systems ('SuDS') features will be utilised to ensure the surface water drainage strategy adequately attenuates and treats runoff from the Project, whilst minimising flood risk to the Site and surrounding areas; and c. Scheme infrastructure and landscape proposals have been designed to ensure no floodplain storage is lost. Emergency Flood Response Plans ('EFRP's) are secured for all stages of the Project through the **Outline CEMP (Doc Ref. 7.8), Outline OMP (Doc Ref. 7.11)** and the **Outline DEMP (Doc Ref. 7.12).** The EFPRs will ensure that safe access and egress is available for site workers at all times.
	Landscaping and Biodiversity	Loss of site planting and biodiversity due to high rainfall	The **Outline LEMP (Doc Ref.7.10)** specifies planting that is suited to adapt to future climatic changes, which includes higher rainfall.
Drier Summers Drought	Landscaping and Biodiversity	Loss of site planting and biodiversity due to drought	The **Outline LEMP (Doc Ref. 7.10)** specifies planting that is suited to adapt to future climatic changes which includes drought conditions.

Climate Variable	Receptor	Potential Impact	Embedded Design Measures to Mitigate Impacts
Wind and Storms	Renewable energy infrastructure (PV arrays, BESS units, inverters and Sub stations)	Storm/wind damage to arrays	Low lying structures, with robust fixings with limited risk of damage.
	Landscaping and biodiversity	Soil erosion, damage to planting and loss of biodiversity	The **Outline LEMP (Doc Ref. 7.10)** specifies planting that is suited to adapt to future climatic changes which includes increased storms and wind.

Step 4: Assess the Significance of Effects of Climate Change on Receptors

15.11.9 **Table 15.15** details the assessment of climate risks identified in Step 2 above, taking into account design measures to mitigate risks.

Table 15.15: Climate Resilience Assessment

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
Hotter Summers Extreme Temperatures (Heatwaves)	Renewable energy infrastructure (e.g. PV arrays, BESS units, inverters and Sub stations)	Potential for increased energy generation	High	Negligible	Not Significant
		Overheating of BESS units / inverters/sub stations	Low	Minor Adverse	Not Significant
		Increased noise from cooling plant	High	Negligible	Not Significant
	Site access	Staff suffering from overheating	Low	Minor Adverse	Not Significant

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
	Landscaping and Biodiversity	Potential to affect growth rates of habitats	Medium	Minor Adverse	Not Significant
Wetter Winters Extreme Rainfall	Renewable energy infrastructure (PV arrays, BESS units, inverters and sub stations)	Surface/groundwater and watercourse flooding	Low	Moderate Adverse	Not Significant
	Site access				
	Landscaping and Biodiversity	Loss of on-site planting and biodiversity due to high rainfall	Medium	Minor Adverse	Not Significant
Drier Summers Drought	Landscaping and Biodiversity	Loss of on-site planting and biodiversity due to drought	Medium	Minor Adverse	Not Significant
Wind and Storms	Renewable energy infrastructure (PV arrays, BESS units, inverters and sub stations)	Storm/wind damage to arrays	Low	Moderate Adverse	Not Significant
	Landscaping and biodiversity	Soil erosion, damage to planting and loss of biodiversity	Low	Minor Adverse	Not Significant

Step 5 Establish Further Adaptation Measures and Determine Residual Effects

15.11.10 **Table 15.15** shows that there are no significant effects on the Project due to future climate change.

15.12 Residual Effects

15.12.1 The residual effects are in line with those described in **Table 15.15** and are not significant.

15.13 Cumulative Resilience Effects

15.13.1 All cumulative developments from the cumulative development schedule (see **ES Volume 4, Appendix 6.1: List of Cumulative Schemes (Doc Ref. 5.4)**) have been considered in the identification of cumulative effects from climate change.

15.13.2 The climate resilience assessment considers the impacts of climate change on the Project and as such, the receptors for the assessment are the Project and its users. The changes in climate variables described in the baseline section will be experienced by all developments in the vicinity of the Project. However, the potential impacts from climate change may alter as a result of cumulative developments.

15.13.3 Effects associated with flooding and surface water runoff as a result of higher winter rainfall and extreme rainfall events may be exacerbated by cumulative developments which increase the impermeable area in the vicinity of the Development. However, the Flood Risk Assessment (see **ES Volume 4, Appendix 10.2: Flood Risk Assessment (Doc Ref. 5.4)**) takes account of climate change and cumulative effects so this is not further assessed here.

15.13.4 Effects associated with higher summer temperatures and more extreme temperature events could be exacerbated by cumulative developments if they result in a large increase in hard surface in the vicinity of the Project (urban heat island effect). However, the Project is not in an urbanised region, and landscaping and planting has been designed to minimise the urban heat effect created by the Project.

15.13.5 Cumulative effects with respect to climate resilience are therefore not significant.

15.14 Conclusions

15.14.1 The climate resilience measures identified and adopted by the design seek to minimise climate risks due to future climate change.

15.14.2 The assessment has found that the Project is resilient to likely climatic changes within its lifetime and the effects are not significant.

15.14.3 **Table 15.16** provides a summary of the GHG and climate resilience assessment.

Table 15.16: Summary of Residual Effects

Receptor	Description of Impact	Significance of Effect without additional mitigation	Additional Mitigation/ Enhancement measure	Residual effect after mitigation
Global Climate	Effects of the Project on Climate Change	Beneficial and significant	None	Beneficial and significant
Global Climate	Resilience of the Project to future changes in climate.	No significant effects	None	No significant effects

References

1 HMSO (2017). Schedule 4 Paragraph 5(f) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Available at: https://www.legislation.gov.uk/uksi/2017/572/schedule/4. Accessed: January 2024.

2 HMSO (2008). Climate Change Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents. Accessed: January 2024.

3 HMSO (2019). The Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: https://www.legislation.gov.uk/uksi/2019/1056/contents/made. Accessed: January 2024.

4 HMSO (2011). The Carbon Budget Order 2011. Available at: https://www.legislation.gov.uk/uksi/2011/1603/made. Accessed: January 2024.

5 HMSO (2016). The Carbon Budget Order 2016. Available at: https://www.legislation.gov.uk/uksi/2016/785/contents/made. Accessed: January 2024.

6 HMSO (2021). The Carbon Budget Order 2021. Available at: https://www.legislation.gov.uk/uksi/2021/750/contents/made. Accessed: January 2024.

7 Department of Energy Security & Net Zero (2023). Overarching National Policy Statement for Energy (EN-1). Accessed January 2024. https://assets.publishing.service.gov.uk/media/65a7864e96a5ec0013731a93/overarching-nps-for-energy-en1.pdf.

8 Department of Energy Security & Net Zero (2023). National Policy Statement for Renewable Energy Infrastructure (EN-3). Accessed January 2024. https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pd.

9 Department of Energy Security & Net Zero (2023). National Policy Statement for Electricity Networks Infrastructure (EN-5). Accessed January 2024. https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf.

10 Department for Levelling Up, Housing & Communities (2023), National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf. Accessed: January 2024.

11 Kent County Council (2019), Climate Emergency Statement. Available at: https://www.kent.gov.uk/environment-waste-and-planning/climate-change/climate-emergency-statement. Accessed December 2023.

12 Ashford Borough Council (2019), Ashford Local Plan 2030. Available at: https://www.ashford.gov.uk/media/jw3nbvq1/adopted-ashford-local-plan-2030.pdf. Accessed: January 2024.

[13] Ashford Borough Council (2023), Climate Change section. Available at: https://www.ashford.gov.uk/environmental-concerns/climate-change/. Accessed December 2023.

[14] IEMA (2022), Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition. Available at: [redacted]

[15] World Resources Institute, World Business Council for Sustainable Development, (42004). The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard. Available at: [redacted]

[16] British Standards Institute (2023), Publicly Available Standard (PAS) 2080: 2023 Carbon Management in Buildings and Infrastructure. Available at: [redacted].

[17] Committee on Climate Change (2019), Net Zero, Technical report. Available at: [redacted]

[18] Committee on Climate Change (2021), Sixth Carbon Budget. Available at: [redacted].

[19] HM Government (2021), Net Zero Strategy: Build Back Greener. Available at: https://assets.publishing.service.gov.uk/media/6194dfa4d3bf7f0555071b1b/net-zero-strategy-beis.pdf. Accessed: January 2024.

[20] HM Government (2023), Carbon Budget Delivery Plan. Available at: https://assets.publishing.service.gov.uk/media/6424b2d760a35e000c0cb135/carbon-budget-delivery-plan.pdf. Accessed: January 2024.

[21] RICS (2017), Whole life carbon assessment for the built environment. 1st edition. Available at: [redacted]

[22] EN15978, (2011), Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method.

[23] Ashford Borough Council (2022), Climate change strategy and climate action plan, Appendix 2. Available at: https://www.ashford.gov.uk/media/kbujmb2k/climate-change-strategy-and-climate-action-plan-june-2022-appendix-2-final.pdf. Accessed: January 2024.

[24] Kent and Medway (2020), Energy and Low Emission Strategy, Meeting the climate change challenge. Available at: https://www.kent.gov.uk/about-the-council/strategies-and-policies/service-specific-policies/environment-and-waste-policies/environmental-policies/kent-and-medway-energy-and-low-emissions-strategy#strategy. Accessed: January 2024.

[25] IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation. Available at: [redacted]

[26] Met Office UK (2018), UK Climate Projections (UKCP18). Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/headline-findings.. Accessed: January 2024.

[27] Met Office UK (222022), UK Climate Projections: Headline Findings. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v4_aug22.pdf.. Accessed: January 2024. and spreadsheet at https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-key-results.xlsx. Accessed January 2024

[28] Department for Environment, Food & Rural Affairs (Defra) (2018), The National Adaptation Programme (NAP) and the Third Strategy for Climate Adaptation Reporting. Available at: https://assets.publishing.service.gov.uk/media/64b6789361adff001301b22e/national-adaptation-programme-2018.pdf. Accessed: January 2024.

[29] Her Majesty's Government, (2022), UK Climate Change Risk Assessment 2022. Available at: https://assets.publishing.service.gov.uk/media/61e54d8f8fa8f505985ef3c7/climate-change-risk-assessment-2022.pdf. Accessed: January 2024.

[30] University of Bath (2019), Inventory of Carbon and Energy v3.0.

[31] RICS (2012), Methodology for calculating the embodied carbon of materials. Available at: [redacted] 2024.

[32] Department for Business, Energy & Industrial Strategy (BEIS) (2021), Greenhouse gas reporting: conversion factors 2021. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021. Accessed: January 2024.

[33] BEIS (2021), Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (used for electricity consumption). Available at: https://assets.publishing.service.gov.uk/media/65aadd020ff90c000f955f17/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal.pdf. Accessed: January 2024.

[34] Kent County Council (2020), Kent & Medway Emissions Analysis and Pathways to Net Zero. Available at: https://www.kent.gov.uk/__data/assets/pdf_file/0003/122898/Kent-Emissions-Pathway-Report.pdf. Accessed: January 2024.

[35] Met Office (2023), Climate Station. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcpv7fnqu . Accessed June 2023. Accessed December 2023.

[36] BBC (2023), climate change resources. Available at: [redacted] Accessed December 2023.

[37] Environment Agency (2022), Flood Map for Planning. Available at: https://flood-map-for-planning.service.gov.uk/. Accessed December 2023.

[38] Met Office (2023), Data based on UKCP18 key results: Probabilistic and sea level Projections (.xlsx spreadsheet - 434kB). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-key-results.xlsx . Accessed December 2023.

[39] Met Office (2019), UKCP18 Factsheet: Wind. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind_march21.pdf. Accessed: January 2024.

[40] Royal Meteorological Society (2018), International Journal of Climatology; State of the UK Climate 2017. [redacted] ary 2024.