EAST PARK ENERGY

East Park Energy

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Preliminary Environmental Information Report

Volume 1 – Main Report

Chapter 15: Climate Change

September 2024

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Chapter 15: Climate Change

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15.0 CLIMATE CHANGE

15.1 Introduction

15.1.1 This Chapter of the PEIR presents the findings of a preliminary assessment of the resilience of the Scheme to the effects of climate change, and the likely significant effects of the Scheme on climate change, specifically the impact of greenhouse gas ('GHG') emissions.

15.1.2 Naturally occurring GHG emissions such as carbon dioxide ('CO_2') act as a blanket around the earth (a process called the 'GHG effect'). However, increases in GHG emissions are resulting in an enhancement of the GHG effect, resulting in an increase in global temperatures (global warming). These changes in global temperatures are driving changes in short-term weather events as well as extremes in longer-term climate variability (referred to as climate change).

15.1.3 The Scheme has the potential to be affected by the projected changes in climate, as well as contribute to the GHG emissions which are enhancing these changes.

15.1.4 This chapter is supported by the following Appendices in ***PEIR Volume 2***:

- Appendix 15-1: Greenhouse Gas Emissions Assessment;
- Appendix 15-2: Baseline Climate; and
- Appendix 15-3: Climate Resilience Assessment.

Statement of Competence

15.1.5 The author of this assessment is an environmental scientist with two and a half years' experience in planning and the environment in a variety of sectors including energy, transport and waste. The assessment has been reviewed by a chartered environmental consultant and chartered scientist with over 15 years' experience with extensive knowledge of planning and environmental issues and has undertaken and managed EIA and DCO projects on matters

relating to climate change for a range of renewable technologies including solar.

15.2 Legislation, Policy, and Guidance

Legislation

15.2.1 Statutory legislation with regards to the Climate Change is provided for within the following statute:

- Climate Change Act 2008[1];
- Climate Change Act 2008 (2050 Target Amendment) Order 2019[2];
- The Carbon Budgets Order 2009[3];
- The Carbon Budgets Order 2011[4];
- The Carbon Budgets Order 2016[5]; and
- The Carbon Budgets Order 2021[6].

15.2.2 The United Nations Framework Convention on Climate Change ('UNFCCC') was adopted in 1992 with the aim of preventing dangerous human interference with the climate system. Following the adoption of the UNFCCC, several agreements have followed including the Kyoto Protocol and more recently the Paris Agreement.

15.2.3 The Kyoto Protocol was adopted on 11 December 1997 and, owing to a complex ratification process, entered into force on 16 February 2005. The Kyoto Protocol is an international agreement that commits industrialised countries and economies in transition to reduce GHG emissions in accordance with agreed individual targets. The targets were based on the scientific consensus that global warming is occurring; that human-made CO_2 emissions are driving it and that industrialised countries and economies in transition are largely responsible for the current high levels of GHG emissions in the atmosphere.

15.2.4 Although the Kyoto Protocol technically remains in force, the Paris Agreement has, in effect, superseded the Kyoto Protocol. This was adopted on 4 November 2016. This is an international agreement created as a result of the UNFCCC Conference of the Parties ('COP') 21 in 2015. The goal of the Paris

Agreement is to limit global average temperature rise to well below 2°C, preferably 1.5°C, compared to pre-industrial levels. The agreement was a landmark in the climate change process. The Paris Agreement recognised that climate change is a shared problem and called on all countries to set emissions targets. Today, 194 parties have committed to the Paris Agreement and are required to produce Nationally Determined Contributions that set out their targets to meet the Paris Agreement targets through national legislation.

15.2.5 The UK's legislation on climate change was established within the Climate Change Act 2008[7]. This sets out the UK government's commitment to reduce GHG emissions in the UK by at least 80% of 1990 levels by 2050. It also requires the UK government to set legally binding 'carbon budgets' to act as stepping stones towards 2050 and to produce Climate Change Risk Assessments ('CCRAs') and National Adaptation Programmes ('NAPs') every five years. In 2019, the Net Zero - The UK's Contribution to Stopping Global Warming[8] was published by the Committee on Climate Change ('CCC') responding to the UK government's request to reassess the UK's long-term emission targets. The CCC recommended the new emissions target of net-zero greenhouse gases by 2050 (rather than 80% which was set in 2008). The new target reflected the increased ambition of the 2015 Paris Agreement[9] and wider updates to the evidence base on tackling climate change. This CCC report further led to the Climate Change Act 2008 (2050 Target Amendment) Order 2019[10].

15.2.6 Since the Climate Change Act 2008, six carbon budgets have been set to date under the following Orders, covering the period 2008 to 2037:

- The Carbon Budgets Order 2009[11] (2008-2022);
- The Carbon Budgets Order 2011[12] (2023-2027);
- The Carbon Budgets Order 2016[13] (2028-2032); and
- The Carbon Budgets Order 2021[14] (2033-2037).

15.2.7 A 'carbon budget' is a cap on the amount of GHGs which can be emitted in the UK over a five-year period. The Sixth Carbon Budget, the first to be set

under the UK's new net zero target, was legislated for in June 2021 and provides ministers with advice on the amount of GHGs the UK can emit during the period 2033-2037, in order to comply with the net zero trajectory. One of the key recommendations in the Sixth Carbon Budget is to expand low carbon energy supplies including renewable sources such as solar and wind. The Carbon Budgets have been used within this assessment to inform whether the GHG emissions associated with the Scheme would be significant or not, and the lifetime GHG emissions have been compared to the net zero trajectory in line with the guidance from the Institute of Environmental Management and Assessment ('IEMA').

15.2.8 As a requirement of the Climate Change Act 2008, the UK government has a duty to undertake regular five-yearly CCRAs and complete a NAP. The CCRA identifies the range of climate risks and opportunities facing the UK from current and predicted climate change, whilst the NAP sets the actions that UK government and others will take to adapt to the impacts of climate change in the UK.

15.2.9 The third five-year programme, the Third NAP ('NAP3'), covers the period 2023 to 2028. NAP3 sets out a clear overarching vision that reflects the importance of the need to adapt while responding to every risk and opportunity in the CCRA and provides more detail on how the UK government proposes to address each individual risk. Additionally, NAP3 was the first NAP to consider the international risks impacting the UK.

15.2.10 NAP3 identifies the following six key areas of climate change risks and the actions planned to improve resilience to them:

- Flooding and costal change risk to communities, businesses and infrastructure;
- Risks to health, wellbeing and productivity from high temperatures;
- Risks of shortages in the public water supply for agriculture, energy generation and industry;

- Risks to natural capital including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity;
- Risks to domestic and international food production and trade; and
- New and emerging pests and diseases and invasive and non-native species affecting people, plants and animals.

Policy

National Policy and Guidance

15.2.11 The following National Policy Statements set out national planning policies in relation to nationally significant solar photovoltaic generation developments:

- Overarching National Policy Statement ('NPS') for Energy (EN-1)[15];
- NPS for Renewable Energy Infrastructure (EN-3)[16]; and
- NPS for Electricity Networks Infrastructure (EN-5)[17].

15.2.12 The National Planning Policy Framework ('NPPF')[18], and the accompanying online Planning Practice Guidance[19] ('PPG') are also important and relevant but are not the key policy documents against which the application will be determined.

15.2.13 Relevant national policies and guidance from the above documents are summarised in Table 15.1.

Table 15.1 – Summary of National Planning Policy

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
NPS EN-1	Paragraph 4.9.4 – 4.9.10	Requires Applicants to consider nature-based solutions and green infrastructure to deliver multiple environmental benefits. Requires Applicants to set out how the Scheme will take account of the projected impacts of climate change, and assess a range of scenarios.
	Paragraph 5.3.5 – 5.3.10	Requires Applicants to include a GHG Assessment as part of the ES. Requires Applicants to seek opportunities to reduce GHG emissions at every stage of a project.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
		Requires Applicants to look for opportunities within the Scheme to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning. Requires Applicants to set out a GHG Reduction Strategy.
NPS EN-3	Paragraph 2.4.11	Requires Applicants to consider how plant will be resilient to increased risk of flooding and impacts of higher temperatures.
NPS EN-5	Paragraph 2.3.2	Requires Applicants to set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: • flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change; • the effects of wind and storms on overhead lines; • higher average temperatures leading to increased transmission losses; • earth movement or subsidence caused by flooding or drought (for underground cables); and • coastal erosion – for the landfall of offshore transmission cables and their associated substations in the inshore and coastal locations respectively.
NPPF	Paragraph 157	States that the planning system should support the transition to a low carbon future in a changing climate, and support renewable and low carbon infrastructure.
	Paragraph 159	States that new development should be planning in a way that avoids increased vulnerability to the range of impacts arising from climate change.
PPG	Climate Change Section	Provides guiding principles on how planning can help to mitigate climate change by reducing emissions from a new development, and how new developments can be built to be resilient and adapt to climate change.

Local Policy

15.2.14 The Scheme lies within the administrative boundaries of Bedford Borough Council ('BBC') and Huntingdonshire District Council ('HDC'), with HDC being

a two-tier authority with Cambridgeshire County Council. Planning policy of relevance to the assessment that will be considered includes:

- Bedford Borough Local Plan 2030[20];
- Bedford Allocations and Designations Local Plan[21];
- Bedford Borough, Central Bedfordshire and Luton Borough Councils Minerals and Waste Local Plan: Strategic Sites and Policies[22];
- Saved Policies of the Bedford Borough Council Local Plan 2002[23];
- Huntingdonshire Local Plan to 2036[24]; and
- Cambridgeshire and Peterborough Minerals and Waste Local Plan[25].

15.2.15 Relevant local planning policies from the above documents are summarised in Table 15.2.

Table 15.2– Summary of Local Planning Policy

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
Huntingdonshire Local Plan to 2036	Objective 2	Promotes high quality, well designed, locally distinctive, sustainable development that is adaptable to climate change and resilient to extreme weather.
	Objective 24	Encourages waste management and pollution control practices which minimise and reduce contributions to climate change and avoid adverse impacts on the local environment or human health.
	Policy LP35	Supports proposals for renewable and low carbon energy where the impacts are or can be made acceptable.
Bedford Local Plan 2030	Objective 4.1	Seeks to deliver development that is equipped to respond to the impacts of climate change.
	Objective 4.10	Protect and enhance our natural resources including air, soil minerals and water to minimise the impacts of flooding, climate change and pollution
	Policy 51S	Requires development and the use of land and buildings to address climate change, adapting to anticipated future changes and mitigating against further change by reducing greenhouse gas emissions.

Document	Policy / Paragraph Reference	Summary of Policy / Paragraph
Bedford Allocations and Designations Local Plan	Objective 15	Seeks to protect the environment by minimising the risk of flooding and the effects of climate change and facilitating improvements in air quality.

Guidance

15.2.16 IEMA is the global professional body for anyone working in environment and sustainability. IEMA have provided resources, tools, networking, knowledge sharing, and high-quality formal training and qualifications for over 25 years with the aim to raise the bar for professionalism in sustainability. The following IEMA guidance have been considered:

- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance[26] (herein referred to as the 'IEMA GHG Guidance'); and
- Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation[27] (herein referred to as the 'IEMA Climate Change Resilience Guidance').

15.2.17 The assessment of GHG emissions has been undertaken in line with IEMA GHG Guidance and the assessment of the resilience of the Scheme to the effect of climate change has been undertaken in line with the IEMA Climate Change Resilience Guidance.

15.3 Assessment Methodology

15.3.1 The methodologies described in the following section have been developed in line with the relevant planning policy and the IEMA guidance.

Climate Resilience Assessment

Study Area

15.3.2 For the climate change resilience assessment, the Scheme itself, during construction, operation and decommissioning, is considered the receptor and therefore the study area is the Scheme Boundary as described in ***PEIR Volume 1 Chapter 2: The Scheme***.

Scope of Assessment

15.3.3 The scope of the climate resilience assessment in accordance with the Scoping Opinion (***PEIR Volume 2 Appendix 4-1***) is provided in Table 15.3:

Table 15.3 – Topics scoped in and out of the Climate Resilience Assessment

Topic	Construction	Operation	Decommissioning
Increase in winter precipitation	Scoped In	Scoped In	Scoped In
Decrease in summer precipitation	Scoped Out	Scoped In	Scoped Out
Increased frequency and magnitude of storms	Scoped Out	Scoped In	Scoped Out
Increase in summer temperatures	Scoped Out	Scoped In	Scoped Out
Changes in cloud cover	Scoped Out	Scoped In	Scoped Out
Sea level rise	Scoped Out	Scoped Out	Scoped Out
Changes to snow and ice	Scoped Out	Scoped Out	Scoped Out

15.3.4 As set out in the Scoping Report, climate change is unlikely to impact upon the construction phase of the Scheme given that, if consented, construction

would occur in the near future when the climatic conditions are well understood and would be accounted for in the construction practices. Weather conditions would have the greatest effect on the construction and measures to minimise the effects are set out in the outline Construction and Environmental Management Plan (oCEMP) (***PEIR Volume 2 Appendix 2-3***). Similarly, effects during the Decommissioning Phase have been scoped out. Measures to minimise the effects have been included in the outline Decommissioning Environmental Management Plan (ODEMP) (***PEIR Volume 2 Appendix 2-5***). The final CEMP and DEMP would be prepared in advance of the respective works phases for approval by the Local Planning Authority and are likely to be secured through a DCO Requirement.

15.3.5 Despite this, an increase in winter precipitation has been included for the construction and decommissioning phases at the request of the consultees as increased winter precipitation has the potential to cause waterlogged and muddy fields which could have an impact on the ability to construct or decommission the Scheme.

Methodology

15.3.6 The assessment of the resilience of the Scheme to climate change has been undertaken in line with the IEMA Climate Change Resilience Guidance. This includes quantifying the current and future baseline climate, identifying receptors sensitive to the projected changes to climate and their level of sensitivity, determining the magnitude of impacts, and the significance of any effects.

15.3.7 In order to determine the existing baseline climate, climate averages from the period 1991-2020 have been sourced from the nearest meteorological site to the Scheme (Bedford) and Met Office UK regional climate summary (Southern England) from the same time period, as published on the Met Office website.

15.3.8 The future baseline has been defined using UK Climate Projections 2018 (‘UKCP18’). UKCP18 are a set of climate projections and tools to access

climate data. The data used within this assessment has been extracted from the UKCP18 key results. The identified changes have then been applied to the current baseline climate conditions to give a prediction of the local future climate conditions.

15.3.9 The climate resilience assessment systematically describes how each receptor could be impacted by the effects of the projected changes to climate change that have been scoped into the climate resilience assessment.

Assessment of Significance

15.3.10 For each receptor, the significance of each predicted effect of climate change has been assessed. This has considered the sensitivity of the receptor and the magnitude of impact.

15.3.11 As per the IEMA Climate Change Resilience Guidance, the sensitivity of a receptor is *"the degree of response of a receiver to a change and its capacity to accommodate and recover from a change if it were to be affected"*[27]. The sensitivity of the receptor should account for the susceptibility, vulnerability, and the value / importance of the receptor.

- susceptibility is defined as "*the ability of the receptor to be affected by a change*" [27];
- vulnerability is defined as "*the potential exposure of the receptor to a change*" [27] which is the inverse of resilience; and
- Receptors are defined as *"elements of the project relevant to the location, nature and scale of the development"* [27].

15.3.12 Resilience is the measure of the ability of a receptor to respond to changes in experiences. If a receptor or a project has good climate change resilience, it is able to respond to the changes in climate in a way that ensures it retains much of its original function and form. A receptor or project that has poor climate change resilience will lose much of its original function or form as the climate changes.

15.3.13 The scale of the susceptibility and vulnerability has been determined using the IEMA Climate Change Resilience Guidance as set out in Table 15.4.

Table 15.4 – Climate Change Receptors – Susceptibility and Vulnerability Scale

Scale	Susceptibility	Vulnerability
High	Receptor has no ability to withstand / not be substantially altered by the projected changes to the existing / prevailing climatic factors (e.g. lose much of its original function and form).	Receptor is directly dependent on existing / prevailing climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions
Moderate	Receptor has some limited ability to withstand / not be altered by the projected changes to the existing / prevailing climatic conditions (e.g. retain elements of its original function and form).	Receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain).
Low	Receptor has the ability to withstand / not be altered much by the projected changes to the existing/prevailing climatic factors (e.g. retain much of its original function and form).	Climatic factors have little influence on the receptors (consider whether it is justifiable to assess such receptors further within the context of EIA – i.e. it is likely that such issues should have been excluded through the EIA scoping process).

15.3.14 In addition to the susceptibility and vulnerability, the value/importance of the receptor has been used to reach a reasoned conclusion on sensitivity using professional judgement. The greater the susceptibility, and/or vulnerability of the receptor, the greater the likelihood that the receptor would also be of higher sensitivity. For instance, a high-value receptor that has very little resilience to change in climate is considered to be more likely to have a higher sensitivity than a high-value receptor that is very resilient to changes in climate. The sensitivity of the receptor to the effect of climate change has been deemed to be low, medium or high. These descriptors have been determined based on professional judgement and are in line with the following examples:

15.3.15 The sensitivity of a receptor to the impacts from fluvial flooding could be described as ‘low’ under the following scenario:

- The value of the receptor is low – such as an unused non-Best and Most Versatile (BMV) agricultural field;
- The vulnerability is low – as it does not lie within the flood plain so is unlikely to be impacted by fluvial flooding associated with increased rainfall as a result of climate change; and
- The susceptibility is low – as the receptor would have the ability to return to its previous use as the event would only cause temporary loss of use of the field, and damages would be limited.

15.3.16 The sensitivity of a receptor to the impacts from fluvial flooding could be described as ‘high’ under the following scenario:

- The value of the receptor is high – such as a residential property;
- The vulnerability is high – as it lies within the flood plain and is likely to be impacted by fluvial flooding associated with increased rainfall as a result of climate change; and
- The susceptibility is high – as there are no flood defences or on-site mitigation measures and therefore no ability to withstand fluvial flooding.

15.3.17 The sensitivity of a receptor to the impacts from fluvial flooding could be described as ‘medium’ under the following scenario:

- The value of the receptor is high – such as a residential property;
- The vulnerability is high – as it lies within the flood plain and is likely to be impacted by fluvial flooding associated with increased rainfall as a result of climate change; and
- The susceptibility is low – as there are effective mitigation measures in place such as flood defences which would allow the property to withstand the projected increases in rainfall and associated fluvial flooding events.

15.3.18 For each receptor and each identified change in climate, the magnitude of effect has been determined. The magnitude is “*the degree of a change from*

the relevant baseline conditions which derives from the construction and operation of a development"[27]. This is based on a combination of:

- Probability, which would take into account the chance of the effect occurring over the lifespan of the development, if the risk is not mitigated; and
- Consequence, which would reflect the scale or complexity of the effect, considering degree of harm, duration, frequency and reversibility of effect.

15.3.19 A combination of probability and consequence has been used to reach a reasoned conclusion on the magnitude of effect using professional judgement. Where a probability and / or consequence of the effect is high then the magnitude of effect would also be high. Descriptors of negligible, small, medium and large have been used to define the magnitude of impact in line with the following examples in relation to fluvial flooding:

- A negligible magnitude of change may be used to describe a scenario where there is a low probability of a fluvial flooding occurring, if the receptor is not within or close to a flood zone, and the consequence of flooding is low, for example the damage caused by fluvial flooding of a non-BMV agricultural field is minimal and reversible;
- A small magnitude of change may be used to describe a scenario where there is a low probability of a fluvial flood occurring, i.e. the receptor is not within a flood zone, but there is a higher consequence of risk, for example a residential property may undergo a small amount of damage. A small magnitude of change could also be used to describe a scenario where there is a high probability of fluvial flooding, but the consequence is low, for example the damage caused by flooding of a non-BMV agricultural field is minimal and reversible;
- A medium magnitude of change may be used to describe a scenario where there is some probability of a fluvial flood event occurring, if the receptor is within a flood zone, and there is some consequence to a flood, for

example a residential property may undergo some amount of damage; and

- A large magnitude of change may be used to describe a scenario where there is a high probability of a fluvial flood event occurring, if the receptor is within a flood zone particularly close to a river, and there is a likely consequence to a flood, for example a residential property may undergo significant damage.

15.3.20 The level of effect is then determined, taking into account the sensitivity for each receptor and the magnitude for each climate change effect using professional judgement. Table 15.5 provides an example of how the sensitivity of receptor and magnitude of effect can be used to determine the significance of the effect.

Table 15.5 – Climate change receptors – Significance of effect

Sensitivity of receptor	Magnitude of effect descriptors			
	Negligible	Small	Medium	Large
Low	Negligible	Negligible	Negligible	Slight
Medium	Slight	Slight	Moderate	Substantial
High	Moderate	Moderate	Substantial	Substantial

15.3.21 Where a level of effect is defined as “Substantial” then the effect is likely to be considered significant.

GHG Assessment

Study Area

15.3.22 All GHG emissions arising over the course of the Scheme have been assessed within the GHG Emissions Assessment. Direct GHG emissions from activities taking place within the boundary of the Scheme, indirect GHG

emissions from activities outside the boundary of the Scheme and embodied GHG emissions within construction materials are all considered as part of the study area for the GHG Emissions Assessment.

Scope of Assessment

15.3.23 The scope of the GHG Emissions Assessment is provided in Table 15.6:

Table 15.6 – Topics scoped in and out of the GHG Assessment

Topic	Construction	Operation	Decommissioning
Embodied emission associated with raw material extraction and manufacturing of products required for the Scheme and transportation of raw materials to the place of manufacturing	Scoped In		
Transportation of manufactured equipment and materials to the Scheme	Scoped In		
Plant vehicles and generators	Scoped In		Scoped In
Transportation of construction materials (where not included in the embodied emissions)	Scoped In		
Travel of workers	Scoped In	Scoped In	Scoped In
Loss of peat	Scoped Out		
Leakage of GHGs		Scoped In	
Energy generated		Scoped In	
Transportation and disposal of waste materials			Scoped In
Provision of clean water and treatment of wastewater	Scoped In	Scoped In	Scoped In
Energy consumption, material and waste generation from ongoing Site maintenance		Scoped In	
Land use change	Scoped In	Scoped In	Scoped In

Methodology

15.3.24 The IEMA GHG Guidance acknowledges that there are many different methods available for measuring and quantifying GHG emissions. However, the guidance provides a framework of six steps that have been incorporated into the assessment, as follows:

- **Set the scope and boundaries of the assessment**. These include system boundaries and temporal boundaries.
- **Develop the baseline**. This includes the current, future and alternative baselines.
- **Decide upon the assessment methodologies**. The methodology should result in a relevant, complete, consistent, transparent and accurate assessment of the reasonable worst case.
- **Data collection**. Project activity data and GHG emissions factors should be collated.
- **Calculate the GHG emissions inventory**. Although the quantification of GHG emissions for an EIA may vary in methodology and approach between projects, it is expected that in almost all cases, a calculated (not measured) approach is taken because these are completed in advance of a project commencing development. It is recommended that the following structure should be used to calculate GHG emissions: GHG emission/removal = GHG emission factor × activity data. Both annual and lifetime GHG emissions should be calculated and reported. In addition, as part of this inventory, uncertainty should be considered.
- **Mitigation opportunities**. Once the magnitude of emissions has been determined, mitigation measures should be proposed.

15.3.25 The approach to assessing emissions follows the different stages of the Scheme i.e. the Construction Phase, Operational Phase and Decommissioning Phase.

15.3.26 The Applicant has provided data and information that underpins the lifecycle GHG impact assessment, which has been evaluated using the methodology and emission factors have been used from appropriate sources.

Assessment of Significance

15.3.27 In terms of significance, the IEMA GHG Guidance states 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 life time, which may be positive, negative or negligible".*

15.3.28 The key goal of EIA is "*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.

15.3.29 The crux of a significant effect occurring is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a science-based 1.5°C transition towards net zero which the UK government has committed to achieve by 2050. The IEMA GHG Guidance sets out the significance criteria as 'major adverse', 'moderate adverse', 'minor adverse', 'negligible', and 'beneficial', with examples to distinguish significance listed as follows:

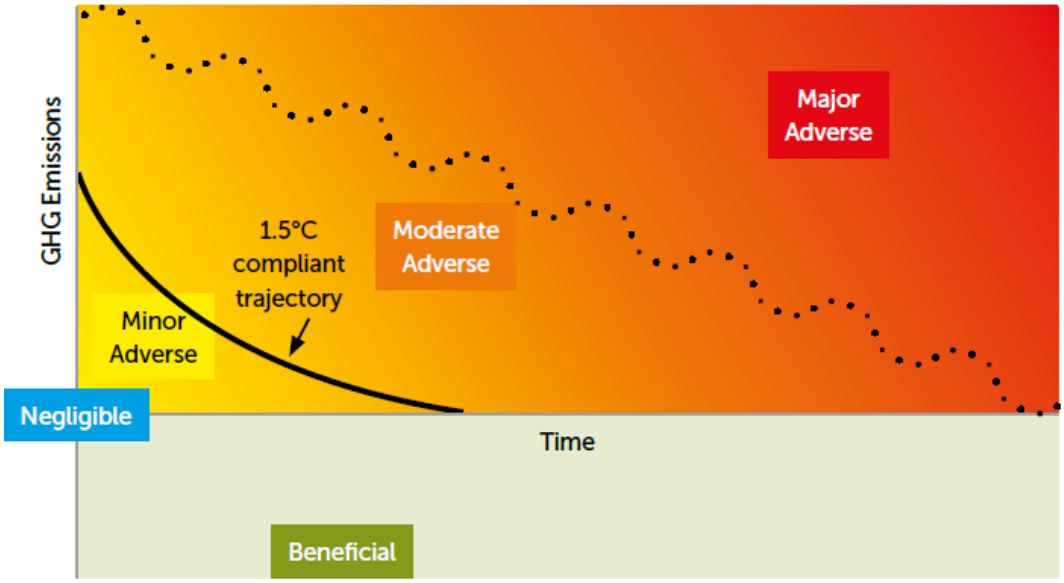
- **Major adverse**: the project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.

- **Moderate adverse**: the project's 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 and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
- **Minor adverse**: the project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
- **Negligible**: the project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. 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.
- **Beneficial:** the project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

15.3.30 Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

15.3.31 Accordingly, an assessment of the contribution of the Scheme towards the net zero trajectory (in accordance with the budgeted, science based 1.5 °C trajectory) and the significance of the contribution has been undertaken and presented within this assessment. Plate 15.1 is displayed in the IEMA GHG Guidance as a visualisation of how to determine the significance of the GHG emissions from the Scheme in the context of the net zero trajectory.

Plate 15.1 – Net zero trajectory context from IEMA GHG Guidance.



15.3.32 The IEMA GHG Guidance states that: *"a modification to this approach is required for the very largest-scale developments, those that in themselves have magnitudes of GHG emissions that materially affect the UK's or a devolved administration's total carbon budget. An indicative threshold of 5% of the UK or devolved administration carbon budget in the applicable time period is proposed, at which the magnitude of GHG emissions irrespective of any reductions is likely to be significant".* This approach has also been considered within this assessment, in addition to the previously described approach to determining likely significant effects.

15.3.33 The IEMA GHG Guidance sets out 'good practice' approaches to contextualising a projects carbon emissions by comparing to sector-based, local, and / or national carbon budgets, policy goals and / or performance standards. Based on this the emissions associated with the Scheme have been compared to the UK carbon budgets for the periods 2023-2027, 2028-2032 and 2033-2037. It is noted that the Sixth Carbon Budget only reaches 2037. Future continuation in the reduction of these budgets is expected in order to reach net zero by 2050. The emissions associated with the Scheme have also been compared to the local carbon budget using the Tyndall Carbon Budget Tool[28].

15.4 Assumptions and Limitations

Climate Resilience Assessment

15.4.1 The current climate baseline at the Site has been determined based on Met Office historical climate averages data from the period 1991-2020, from the closest meteorological station with this historical data, Bedford (approximately 6 km to the south west of the Site in a straight line) and Met Office UK regional climate summaries from the same time period for Eastern England[29] and the Midlands[30] (The Site is located within the Eastern England region but as the Site is close to the western boundary of the region, the Midlands region has also been summarised). The future baseline has been calculated by taking the UKCP18 regional profiles. The UKCP18 regional profiles are based on the UK administrative regions and therefore, vary slightly from the Met office regional profiles. Within the Met office regional profiles, the Site falls just within Eastern England; however, within the UK administrative regions, the Site falls within the East of England. Therefore, some of the results may be slight over or under estimations. Nevertheless, they offer an estimate sufficient for this assessment.

15.4.2 There may be some uncertainty over the climate change projections. Being projections, they are in their nature not definite. However, they have been taken from UKCP18[31], which provides the most up to date assessment of how the UK climate may change in the future and are supported by the Department for Energy Security and Net Zero ('DESNZ') and the Department for Environment Food and Rural Affairs ('Defra'). This assessment has used projections for 2060-2079 for a 'high emissions scenario' (RCP8.5). This is considered to be conservative as it is based on a significant increase in coal use across the world but is recommended for use by IEMA unless a case can be made for using a different, lower emission scenario. In UKCP18, the probabilistic projections provide local low, central and high changes across the UK, corresponding to 10%, 50% and 90% probability levels. This assessment has used the central estimate, which is considered to be the level

at which as much evidence points to a lower outcome as a higher one. However, any under or over estimations will not impact the outcome of the assessment, as significance assumptions have been based on the impacts which climate changes cause (i.e. an increase in temperature, not an increase in temperature of X°C), for which small differences in the magnitude of change will not influence.

GHG Assessment

15.4.3 The largest single source of GHG emissions from the Scheme is likely to result from the manufacture and transport of the equipment. The equipment manufacturer has not been confirmed and therefore, for the purposes of estimating the GHG impact of the Scheme, a conservative estimate has been assumed that the solar PV modules, batteries, transformers and inverters will be sourced from China, and the cabling and mounting structure are sourced from Europe. This assumption is consistent with other large scale UK solar schemes. If these are sourced closer to the Scheme the emissions associated with the transportation of equipment will be lower.

15.4.4 The construction and operational data used in the GHG assessment has been supplied by the Applicant. The embodied carbon factors used in the GHG assessment have come from reputable sources such as the Institute of Circular Ecology's Embodied Carbon Database[32], DESNZ's Greenhouse gas reporting conversion factors 2024[33] and recent academic papers where possible.

15.4.5 The UK government's policy is to decarbonise grid electricity. The previous government set a target to bring all GHG emissions to net zero by 2050, with all electricity to come from low carbon sources by 2035, and the incoming government's plan is that this is achieved by 2030. The purpose of the Scheme is to support these policies and to displace fossil-fuelled power stations. Therefore, for the purposes of this assessment, the benefits of the Scheme have been assessed using the current marginal technology ('CCGT') as the comparator. It is considered that until such time that all unabated CCGT

has been eradicated from the grid, this is an appropriate comparator. However, in recognition of recent SoS decisions (such as Gate Burton Solar) which suggest that using unabated CCGT as a comparator was not viable, the assessment has also used other alterative comparators to provide a range of scenarios against which to the carbon intensity of the Scheme has been compared.

15.4.6 Emissions from the decommissioning process at the end of the design life are very difficult to estimate due to the substantial uncertainty surrounding decommissioning methodologies and approaches so far into the future. It has been assumed that the resources and effort required for decommissioning will be equivalent to those required for construction. This is considered to be a worst-case scenario, as future developments in methodologies and technological advances are likely to reduce the GHG impact of decommissioning. It is assumed that the land will be returned to its original land use (arable land) following decommissioning of the Scheme.

15.5 Stakeholder Engagement

15.5.1 Scoping of the Climate Change Assessment was undertaken as part of a wider EIA scoping exercise, the findings of which were recorded in the Scoping Report. A Scoping Opinion was issued by the Planning Inspectorate (PINS) in December 2023 (***PEIR Volume 2 Appendix 4-1***).

15.5.2 The feedback received from PINS and stakeholders relating to climate change are summarised in Table 15.7.

Table 15.7: Scoping responses

Consultee	Comment	Response
Planning Inspectorate	The Inspectorate agrees that changes in precipitation, frequency and magnitude of wind and storms, summer temperatures and changes in cloud cover as a result of climate change are unlikely to give rise to significant effects on the construction and decommissioning phases of the Scheme. Therefore, the Inspectorate is content to scope these matters out of further assessment. However, the ES should explain how the Scheme has been designed to be resilient to such effects.	This has been considered within the Climate Resilience Assessment.
Planning Inspectorate	The Scoping Report identifies the potential for changes in water availability to alter soil acidity, which can increase the deterioration of building materials. Given that paragraph 15.5.5 states that materials used will be chosen to be appropriate for existing ground conditions and would be able to withstand changes in soil acidity as a result of changes in water availability, the Inspectorate is content to scope this matter out. The ES should explain how the use such materials would be secured in the application.	This has been considered within the effects of reduced precipitation. Equipment which is suitable for the site will be chosen.
Planning Inspectorate	The Applicant explains that the Scheme is not located in an area that is susceptible to sea level rise. The Inspectorate agrees that significant effects are not likely to occur and an assessment of sea level rise in the climate change chapter can be scoped out of further assessment.	Comment required no changes to the scope of the Climate Resilience Assessment within the PEIR.
Planning Inspectorate	The Inspectorate agrees to scope this matter out on the basis that UKCP18 predictions anticipate less snow and ice than the current baseline and that the risk from snow and ice is not anticipated to increase with climate change.	Comment required no changes to the scope of the Climate Resilience Assessment within the PEIR.

Consultee	Comment	Response
Planning Inspectorate	The ES should provide an assessment of GHG emissions for the whole lifetime of the Scheme. This includes consideration of GHG emissions from the listed activities during construction, operation and decommissioning. Therefore, these matters should be assessed for the lifetime of the Scheme and the Inspectorate does not agree to scope these matters out of further assessment.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include all the activities required by the planning inspectorate.
Planning Inspectorate	GHG emissions related to the leakage of GHGs - construction and decommissioning. Notwithstanding the advice set out in ID 3.9.5 above, that the ES should include an assessment of GHG emissions for the whole lifetime of the Scheme, the Inspectorate agrees to scope this matter out of further assessment on the basis that impacts would be limited to the operational phase only, for which an operational phase assessment has been proposed.	Comment required no changes to the scope of the GHG Assessment within the PEIR.
Planning Inspectorate	Travel of construction workers. The Applicant proposes to scope this matter out on the basis that emissions from the travel of construction workers are expected to be negligible in context of the other sources of emissions during construction and the overall GHG emissions savings associated with the Scheme. In the absence of further detail, the Inspectorate cannot agree to scope this matter out at this time. The ES should provide an assessment of the GHG emissions associated with the travel of construction workers or provide evidence to demonstrate the absence of LSE including agreement with relevant consultation bodies.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include travel of construction workers.
Planning Inspectorate	Energy consumption, material and waste generation from ongoing site maintenance. The Scoping Report states that operational emissions related to maintenance are expected to be negligible in context to the overall GHG emissions and proposes to scope this matter out. As advised above, the ES should provide an assessment of GHG emissions for the entire lifetime of the Scheme, including as a result of energy consumption, material and waste generation from ongoing site maintenance. Therefore, the Inspectorate cannot agree to scope out this matter from further assessment.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include energy consumption, material and waste generation from ongoing site maintenance
Planning Inspectorate	The Applicant proposes to scope this matter out on the basis that emissions from the travel of workers are expected to be negligible in context of the other sources of emissions and the overall GHG emission	Scope of assessment for the GHG Assessment within the PEIR has been

Consultee	Comment	Response
	savings associated with the Scheme. In the absence of further detail, the Inspectorate cannot agree to scope this matter out at this time. The ES should provide an assessment of the GHG emissions associated with the travel of workers or provide evidence to demonstrate the absence of LSE including agreement with relevant consultation bodies.	expanded to include travel of workers.
Planning Inspectorate	The Applicant explains that peat is not present at the site. The Inspectorate agrees that on this basis significant effects are not likely to occur and an assessment of the loss of peat in the climate change chapter can be scoped out of further assessment. However, should peat be discovered on-site, the ES should provide an assessment of the potential effects on GHG emissions from the loss of peat during construction of the Scheme.	Comment required no changes to the scope of the GHG Assessment within the PEIR but reference should be made to the protocol if peat is found on-site.
Planning Inspectorate	Energy consumption from the provision of clean water and treatment of wastewater. The Applicant proposes to scope this matter out on the basis that energy consumption from the provision of clean water and treatment of wastewater is expected to be negligible in context to the overall GHG emission savings. In the absence of further detail, the Inspectorate cannot agree to scope this matter out at this time. The ES should provide an assessment of potential GHG emissions associated with energy consumption from the provision of clean water and treatment of wastewater related to the Scheme or provide evidence to demonstrate the absence of LSE.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include energy consumption from the provision of clean water and treatment of wastewater.
Planning Inspectorate	The ES should consider how other developments cumulatively may affect the vulnerability of the Scheme to climate change e.g. any changes in flood flows, and cumulative GHG emissions/ savings. The Applicant should seek to agree the approach to the climate change cumulative effects assessment with relevant consultation bodies.	An assessment of cumulative effects will be made in the ES.
Anglian Water	Anglian Water now advise that new non household water supply requests (construction and operational phases) may be declined as these could compromise our regulatory priority of supplying existing and planned domestic growth. The flows needed to fill water storage tanks for example (in the event that the promoter decides not to use rainwater harvesting on site to meet this non potable demand) will need to be assessed by Anglian Water to advise whether a supply is	Reference of this to be included within the Climate Resilience Assessment of the PEIR.

Consultee	Comment	Response
	feasible when assessed in terms of the potential to jeopardise domestic supply or at a significant financial or environmental cost. Our new position on non- household supply is due to our joint aim with the Environment Agency of reducing abstraction to protect sensitive environments. The promoter will need to submit a water resources assessment setting out a daily demand for each stage of the project and whether this is for domestic or non-domestic uses. Water use during construction means that the promoter will need to establish whether concrete production, for example, would be offsite or would need an on-site supply in order to assess the water supply options with Anglian Water. Further advice on water and wastewater capacity and options can be obtained by contacting Anglian Water's Pre-Development Team at: planningliasion@anglianwater.co.uk	
Bedford Borough Council	BBC note that the Applicant's Scoping Report does not address where the infrastructure elements/ 'kit-of-parts' are to be manufactured (§13.5.2 'global suppliers') and decommissioned. We would suggest that the full life-cycle carbon footprint has to be assessed, including the manufacturing of components made internationally/ sub-regionally and shipped/ railed as freight into/ across the UK.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include manufacturing of the components.
Bedford Borough Council	Our reading of Table 15.4 suggests that once all infrastructure elements have been installed/ constructed there will be no further need to replace these elements and hence Topics 9 (Raw materials) to 13 and 19 (on-site maintenance) have been scoped out. Over the intended operational period of 40-years these assumptions need to be questioned in light of continually changing technologies, etc. While the Applicant states that effects may be negligible, this is currently not known. Consequently, all topics hereby noted relating to operation (management and maintenance) should be scoped in.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include energy consumption, material and waste. generation from ongoing site maintenance.
Bedford Borough Council	(§14.5.9) Travel of workers: there will be '10-16 staff on-site at any one time', 'visitor trips per week', and (§14.5.10) trips associated with staff on-site movement and maintenance. BBC would wish to see this accounted for, however negligible, as currently the full extent of this activity could be more extensive in regard to the matters above.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include travel of workers.
Cambridgeshire County Council	In paragraph 15.4.3, the applicant states that their intention is to the average carbon intensity for	The purpose of solar projects like the

Consultee	Comment	Response
	current energy generation in the UK in order to calculate the carbon emissions displaced by the electricity generated at the Scheme. However, this method is not acceptable, because it does not take into account the predicted future decarbonisation of the UK electricity grid over the years that the Scheme would be operational. Therefore, that method would not provide a good estimate of the carbon emissions that would be displaced. It is not sufficient to carry out sensitivity analysis of future scenarios with a range of alternative electricity generation carbon intensities (although this would also be helpful as an additional point). Rather, the core case must be one that takes into account projected future decarbonisation over the years, as this must be regarded as the most likely scenario. Using the current year's carbon intensity to calculate future years displaced emissions is not suitable. Predictions of the carbon intensity of the UK electricity grid by year are readily available, published by the Department for Energy Security and Net Zero (DESNZ). Sensitivity analysis may consider the potential change to displaced emissions in the event that the UK electricity grid decarbonises faster or slower than predicted, but it will never be right to use a single carbon intensity for the many years of the full lifetime of the Scheme.	Scheme is to replace electricity generated from fossil fuels to facilitate government policy to achieve net zero. Therefore, the correct displacement factor is that associated with CCGT, which has been taken from the Fuel Mix Disclosure Table for 2024. The DESNZ predicted carbon intensity of the grid includes the take up of solar – i.e. that associated with the Scheme. Using this as a comparator would assume that the grid would be decarbonised without the Scheme, even though the purpose of the Scheme is to assist with decarbonising the grid. Notwithstanding this position, a number of alternative baselines have been considered in this assessment.
Cambridgeshire County Council	The ES should consider land use and land use change in addition to the other sources of GHG emissions listed in paragraph 15.5.7.	Scope of assessment for the GHG Assessment within the PEIR has been expanded to include land use change.
Huntingdonshire District Council	The Scoping Report notes (§15.2.2) that indirect emissions from activities outside of the site will be considered, including embodied GHG emissions within the construction materials and the manufacturing of the equipment to be used for the proposal and proposes to Scope In 'Raw material extraction and manufacturing of products required for the Scheme and transportation of raw materials to the place of manufacturing' for the construction stage, 'Energy generated' for the operational stage and 'Transportation and disposal of waste materials' for the decommissioning stage. Whilst	Replacement of equipment has been considered within the construction and decommissioning section of the GHG Assessment.

Consultee	Comment	Response
	these points are supported in principle it is suggested that the scheme be assessed which reviews the full life-cycle carbon footprint for the scheme. The operational stage does not appear to consider any necessary replacements elements for the scheme; whilst it is acknowledged that the Scoping Report refers throughout to the detailed design being unknown at this stage, it is suggested that management and maintenance factors should be scoped in.	
Huntingdonshire District Council	Waste - The Scoping Report proposes to Scope Out a detailed waste assessment from the ES; this is supported in principle, however waste arising from the development and the wider decommissioning stage is considered relevant although this is to be covered within the scope of Chapter 15 and Climate Change.	This has been considered within the decommissioning section of the GHG Assessment.

15.6 Baseline Conditions

Climate Resilience Assessment

Current baseline

15.6.1 The current climate baseline at the Scheme has been determined based on Met Office historical climate averages data from the period 1991-2020, from the closest meteorological station with this historical data, Bedford (approximately 6 km to the south west of the Site in a straight line) and Met Office UK regional climate summaries from the same time period for Eastern England and the Midlands. The Site is located within the Eastern England region, however, as it is close to the western boundary of the region, the Midlands region has also been reviewed.

Full details of the baseline climate are provided in ***PEIR Volume 2 Appendix 15-2*** and summarised in Table 15.8.

Future Baseline

15.6.2 The future baseline has been calculated by taking the UKCP18 predictions based on the predictions for the administrative area of the East of England. The predicted changes to baseline climate are detailed within ***PEIR Volume 2 Appendix 15-2***.

15.6.3 There are uncertainty and variability in projections but generally climate change is projected to lead to hotter summers and warmer winters, and generally wetter winters and drier summers. Projections indicate there will be an increase in near surface wind speeds over the UK and more significant impacts of wind will be experienced in the winter months, including an increase in frequency of winter storms.

15.6.4 A summary of the current and future baseline climate is provided in Table 15.8 applying the central estimate which is considered to be the level at which as much evidence points to a lower outcome as a higher one. The 10th and 90th percentiles reflect the lowest and highest 10 % of the model runs – the value

at which 10 % of the model runs fall at or below (10th percentile) or at and above (90th percentile) fall at or above. These have been considered where the direction of change is predicted to vary at each level.

Table 15.8: Future baseline climate conditions

Item	Units	Baseline (Bedford 1981-2010)	Predicted change (UKCP18)	Future baseline (At Bedford 2060-2079)
Central (50th percentile) estimate				
Mean annual temperatures	°C	10.4	2.9	13.3
Mean winter temperatures	°C	4.6	2.4	7.0
Mean summer temperatures	°C	16.5	3.6	20.1
Mean in winter precipitation	mm	49.0	15.0%	56.0
Mean summer precipitation	mm	53.0	-22.0%	41.0
Central (90th percentile) estimate				
Mean summer precipitation	mm	53.0	9.0%	58.0
Central (90th percentile) estimate				
Mean summer precipitation	mm	49.0	-3.0%	48.0

GHG Assessment

15.6.5 The goal of establishing a baseline is being able to assess and report the net GHG emission associated with the Scheme.

15.6.6 The IEMA GHG Emissions Guidance27 defines the baseline as a reference point against which the impact of a project can be compared against (sometimes referred to as 'business as usual' or 'BaU', where assumptions are made on current and future GHG emissions). The baseline can be in the form of:

a) *"GHG emissions within the boundary of the GHG quantification but without the proposed project; or*

b) *GHG emissions arising from an alternative project design and/or BaU for a project of this type".*

15.6.7 Option a) has been chosen to establish the baseline for the purpose of this assessment.

Current baseline

15.6.8 The current baseline is a 'no-development' scenario whereby the Scheme is not implemented.

15.6.9 The current land use within the Site consists of arable land which undergoes farming practices necessitating machinery and fertilisers which releases GHGs into the atmosphere. However, carbon will be sequestered in the crops. The amount of GHGs released into the atmosphere is dependent on the soil, vegetation type present and the fuel use of vehicles and other agricultural machinery. For the purpose of the GHG assessment it is assumed that the baseline GHG emissions for the Site are zero. This is a conservative approach as any savings as a result of not using fertilisers on the land etc is not allowed for. A report from Natural England[34] (hereafter referred to as the 'Natural England Report 2021') shows that the net carbon flux for arable land use is +0.29 t CO_2e per hectare per year – i.e. there is a net burden in terms of GHG emissions.

15.6.10 The Scheme will export electricity which would otherwise need to be generated by other sources. Renewable energy generation sources (such as solar) currently displace baseload gas fired CCGT, and the purpose of the Scheme is to replace fossil-fuel power stations in order to decarbonise the grid.

Future Baseline

15.6.11 For the assessment, the future baseline is that the Scheme is not implemented and the Site will be continued to be used as arable land for the 40-year operational lifetime of the Scheme. It has been assumed the future baseline GHG emissions from the land use is zero. This is a conservative approach as any savings as a result of not using fertilisers on the land etc is not allowed for.

15.6.12 The Scheme will generate electricity which will offset the burden of producing electricity using other methods. Currently the electricity generated by solar displaces gas-fired power stations for which the displacement factor is 375 gCO_2e/kWh. It is acknowledged that the UK grid mix will change and decarbonise over time, but this will occur due to the Scheme and other low carbon energy projects. Therefore, it is considered reasonable to assess the benefits using the marginal technology at the current time (CCGT) as the comparator. However, as a sensitivity analysis the consideration of alternative displacement factors has been considered including the current grid mix (which includes solar Schemes) and the long-run marginal generation-based projections.

Carbon Budgets

15.6.13 The 'UK carbon budget' is a cap on the amount of GHGs which can be emitted in the UK over a five-year period. This reflects the UK government's commitments to net zero and as such are considered to be the future baseline GHG emissions for the UK. The carbon budgets for the UK are set out in Table 15.9.

Table 15.9 UK Carbon budgets

Item	Value ($MtCO_2e$)
UK carbon budget 2023 – 2027	1,950
UK carbon budget 2028 – 2032	1,725

Item	Value ($MtCO_2e$)
UK carbon budget 2033 – 2037	965

Source: Carbon Budget Order 2011, 2016 and 2021.

15.6.14 The UK Carbon budgets have not yet been set beyond 2037. The next budget, the seventh carbon budget, is due to be set in 2026 and will cover the period 2038 to 2042. The budgets will gradually reduce with the aim of achieving net zero by 2050.

15.6.15 The Tyndall Carbon Budget Tool presents recommended climate change commitments for UK local authority areas that are aligned with the commitments in the United Nations Paris Agreement. The budgets are informed by the latest science on climate change and defined by science-based carbon budget setting. Like the UK carbon budgets, the carbon budgets are a cap on the amount of GHGs which can be emitted in the local authority area over a five-year period. The carbon budgets for Bedford and Huntingdonshire are set out in Table 15.10.

Table 15.10 – Bedford and Huntingdonshire carbon budgets

Item	Value ($MtCO_2e$)
Bedford and Huntingdonshire carbon budget 2023 – 2027	4.2
Bedford and Huntingdonshire carbon budget 2028 – 2032	2.0
Bedford and Huntingdonshire carbon budget 2033 – 2037	0.9
Bedford and Huntingdonshire carbon budget 2038-2042	0.4
Bedford and Huntingdonshire carbon budget 2043-2047	0.2
Bedford and Huntingdonshire carbon budget 2048-2100	0.2

Source: The Tyndall Carbon Budget Tool for Bedford and Huntingdonshire.

15.7 Design, Embedded Mitigation and Enhancement Measures

Embedded Mitigation

15.7.1 The following mitigation measures have been incorporated into the design of the Scheme to mitigate the effects of climate change. Note the following mitigation measures are not an exhaustive list.

- The following measures have been incorporated into the oCEMP presented at ***PEIR Volume 2 Appendix 2-3***:
    1. weather conditions will be monitored;
    2. Risk Assessment Method Statements (RAMS) will be used;
    3. Staff will all have the correct personal protective equipment (PPE), be trained in site health and safety and be informed about protecting themselves from the dehydration and the sun.
- The materials will be resilient to expected climatic extremes with British Standards applicable for most materials to ensure that extreme climatic conditions are accounted for.
- The ventilation systems for the electrical systems are designed to withstand a range of temperatures greater than the currently experienced temperatures to account for climate change.

15.7.2 The Flood Risk Assessment (FRA) at ***PEIR Volume 2 Appendix 8-1*** has outlined the following mitigation measures in respect to climate change.

- Though very small areas of the Site within the Scheme Boundary are located within fluvial Flood Zones 2 and 3, all infrastructure is located in areas at the lowest possible risk of fluvial flooding, i.e., in Flood Zone 1.
- Small areas of solar panels are within pluvial flood zones according to national scale pluvial flood mapping. However, it is proposed that all panels are elevated above predicted flood levels on piled supports. Some flood modelling may be required prior to the final Environmental Statement to ensure that all panels are above predicted flood levels.

- The Solar PV panels will be fixed at an angle with a maximum height of 3m and a minimum height of 0.8m above existing ground levels along the top (northern) edge and along the bottom (southern) edge of the array, respectively. This will allow surface water to flow under the panels similar to pre-development/baseline conditions.
- Vegetation cover will be retained for as long as possible and track construction phased to minimise the potential for soil stripping.
- Temporary drainage pathways will be established to direct surface water away from at risk areas and towards the SuDS and surface water drainage network via sediment controls.
- The battery storage units in the BESS compound will be protected against the existing pluvial flood risk by means of the bunding at the perimeter of the compound.
- The existing design specifications at Eaton Socon Substation means the probability of failure is minimal.

15.8 Assessment of Likely Significant Effects

Climate Resilience Assessment

15.8.1 The resilience to climate change has been assessed for the following vulnerable receptors during the Operational Phase of the Scheme:

- Operational equipment (solar PV modules, BESS, transformers, inverters, substation, and cabling)
- Vehicular access to Site; and
- On-site workers.

15.8.2 This has considered the following projected changes to climate as identified in ***PEIR Volume 2 Appendix 15-2***:

- Increased winter precipitation;
- Decreased summer precipitation;
- Increase in temperatures;
- Increased frequency and magnitude of storms; and
- Changes in cloud cover.

15.8.3 Full details of the assessment for each receptor can be found in ***PEIR Volume 2 Appendix 15-3***. For each receptor and climate change effect the following has been provided:

- a description of how the projected change in climate could affect the receptor;
- the sensitivity of the receptor to the effect taking into account the value, susceptibility and vulnerability;
- the magnitude of the impact taking into account the probability of the projected change in climate, and the consequence taking account of any mitigation measures in place; and
- the resultant significance of the effect.

15.8.4 A summary of this analysis is provided in Table 15.11.

Table 15.11 – Summary of climate resilience assessment

Predicted change in climate	Effect	Value	Vulnerability	Susceptibility	Sensitivity	Probability	Magnitude of effect	Overall Significance
Increased winter precipitation resulting in increased flooding								
Operational equipment	Flood damage to operational equipment	High	High	Low	Medium	Low	Small	Slight
Vehicular access to Scheme	Flood damage resulting in disruption to access	High	Moderate	Low	Medium	Medium	Small	Slight
On-site workers	Not likely to affect receptor	-	-	-	-	-	-	-
Decreased summer precipitation resulting in water shortages								
Operational equipment	Loss of water supply impacting upon operations and safety	High	Low	Low	Low	Low	Small	Negligible
Vehicular access to Scheme	Not likely to affect receptor	-	-	-	-	-	-	-
On-site workers	Not likely to affect receptor, water supplier include mitigation to ensure a supply for welfare facilities	-	-	-	-	-	-	-
Increase in temperatures								
Operational equipment	Damage to equipment	High	Moderate	Low	Low	Low	Small	Negligible
Vehicular access to Scheme	Not likely to affect receptor	-	-	-	-	-	-	-
On-site workers	Dangerous working conditions	High	Moderate	Low	Medium	Medium	Small	Slight

Predicted change in climate	Effect	Value	Vulnerability	Susceptibility	Sensitivity	Probability	Magnitude of effect	Overall Significance
Increased frequency and magnitude of storms								
Operational equipment	Damage to equipment	High	Moderate	Low	Medium	Low	Small	Slight
Vehicular access to Scheme	Fallen trees resulting in disruption to access	High	Moderate	Low	Medium	Medium	Small	Slight
On-site workers	Increased risk of hazards and dangerous working conditions	High	Moderate	Low	Medium	Low	Small	Slight
Changes in cloud cover resulting in increased solar radiation and increased temperatures								
Operational equipment	Damage to equipment	High	Moderate	Low	Medium	Medium	Small	Slight
Vehicular access to Scheme	Not likely to affect receptor	-	-	-	-	-	-	-
On-site workers	Dangerous working conditions	High	Moderate	Low	Medium	Medium	Small	Slight

15.8.5 Weather conditions would have the greatest effect on construction and measures to minimise the effects are set out in the oCEMP at ***PEIR Volume 2 Appendix 2-3***. As with the Construction Phase, the Decommissioning Phase has been scoped out for most topics as climate change is unlikely to impact upon the Decommissioning Phase as it would occur over a relatively short period where conditions will be known, and the working practices can be adapted to ensure that the effect of any changes in climate can be accounted for.

15.8.6 It has been requested that increased precipitation during the Construction and Decommissioning Phase is considered. Increased precipitation can lead to flooded and waterlogged ground conditions which can make construction difficult and potentially impact upon worker safety. However, the oCEMP (***PEIR Volume 2 Appendix 2-3***) and outline Decommissioning Environmental Management Plan (oDEMP) (***PEIR Volume 2 Appendix 2-5***) outline measures which would be in place to minimise any risk to workers. With the implementation of these measures, the effect is deemed to be negligible.

15.8.7 This analysis shows that the overall effect of climate change is negligible to slight, which is not significant. Therefore, it is considered that the Scheme is resilient to the effects of climate change.

GHG Assessment

15.8.8 Full details of the inputs into the GHG emissions calculation can be found in ***PEIR Volume 2 Appendix 15-1***. The calculated GHG emissions over the lifetime of the Scheme are shown in Table 15.12.

Table 15.12 – GHG emissions over the lifetime of the Scheme

Source of GHG emissions	Value (tCO_2e)
Construction	
1. Embodied within equipment and material - Raw material extraction and manufacturing of products required for the Scheme and	309,876

Source of GHG emissions	Value (tCO_2e)
transportation of raw materials to the place of manufacturing (including raw material extraction and manufacturing of products required for maintenance)	
2. Transportation of equipment and construction materials to the Scheme (including transportation of products and construction materials required for maintenance)	17,848
3. Plant vehicles and generators	2,839
4. Provision of clean water and treatment of wastewater	14.6
5. Travel of construction workers	314
Total Construction Phase	**330,882**
Operation	
1. Provision of clean water and treatment of wastewater	3.8
2. Leakage of GHGs	-
3. Travel for workers	0.21
4. Embodied within the replacement of equipment	268,058
5. Transportation of replacement equipment to Scheme	13,815
6. Transportation of waste materials from replaced equipment	271
7. Disposal of waste material from waste equipment	230
Total Operational Phase	**282,378**
Decommissioning	
1. Plant vehicles and generators	2,839
2. Provision of clean water and treatment of wastewater	14.6
3. Transportation of waste materials	2,488
4. Disposal of waste materials	1,081
5. Travel for workers	314
Total Decommissioning Phase	**6,736**
Total lifetime emissions	**619,996**

15.8.9 As shown, the total emissions over the lifetime of the Scheme are predicted to be 619,996 tCO_2e.

Carbon Budgets

15.8.10 The GHG emissions from the Scheme have been compared to the carbon budgets for the UK and for the combined budget of Bedford and Huntingdonshire. Table 15.14 provides a summary of the calculated direct GHG emissions for the Scheme in relation to combined budget of Bedford and Huntingdonshire and Table 15.15 provides a summary of the calculated GHG emissions for the Scheme in relation to the UK's carbon budgets. In both tables, the GHG emissions have been calculated for each budget period and compared to the budget. This does not include any offset due to the displacement of alternative forms of electricity generation.

Table 15.14 – Comparison of GHG emissions with the cumulative carbon budget of Bedford and Huntingdonshire

Budget period	Budget ($MtCO_2e$)	Calculated emissions associated with the Scheme in budget period	
		Emissions from Scheme (tCO_2e)	As % of budget
2023-2027	4.2	66,176	1.58%
2028-2032	2	264,706	13.2%
2033-2037	0.9	1	0.00006%
2038-2042	0.4	1	0.00013%
2043-2047	0.2	1	0.00026%
2048-2100	0.2	288,611	144%
Note: 1 Mt = 1,000,000 tonnes			

Table 15-15 – Comparison of net GHG emissions with the UK's Carbon Budgets

Budget period	Budget ($MtCO_2e$)	Calculated net emissions associated with the Scheme in budget period	
		Emissions from Scheme (tCO_2e)	As % of budget
2023-2027	1,950	66,176	0.0034%
2028-2032	1,725	264,706	0.0153%
2033-2037	965	0.5	0.00000005%
Note: 1 Mt = 1,000,000 tonnes			

15.8.11 As shown the Scheme makes up a very small contribution (0.0034%) of the UK carbon budget for 2023 to 2027 and 1.58% of the cumulative carbon budget of Bedford and Huntingdonshire, predominantly due to the embodied emissions during construction. It is projected that the GHG emissions from the Scheme will contribute 144% of the cumulative carbon budget of Bedford and Huntingdonshire for 2048-2100. However, this is because the period covers both the replacement of equipment in year 20 and the decommissioning of the Scheme. Given that the Scheme is to provide low carbon electricity to the UK and not just the local area it is considered more appropriate to compare the GHG emissions to the UK carbon budgets. It is also noted that the GHG emissions associated with the Decommissioning Phase are uncertain. The GHG emissions associated with recycling and landfill of the equipment have been taken as the current levels, but it is likely that these will reduce as energy decarbonises because energy emissions make up a great proportion of these GHG emissions.

15.8.12 When operating (from 2030), i.e. following the first carbon budget (2023-2027), the Scheme will produce low carbon electricity which will offset alternative forms of electricity generation. Therefore, the Scheme will have beneficial impacts which have not been captured in the above analysis.

Offset GHG emissions

15.8.13 The offset GHG emissions from the Scheme will range depending on what method of electricity generation the Scheme is displacing.

15.8.14 Displacement of gas-fired power stations has been considered as electricity generated by solar currently displaces gas-fired power stations (GHG intensity of 375 gCO_2e/kWh) (i.e. the current long-run marginal electricity generation in the UK) and the purpose of the Scheme is to support government policy by replacing fossil fuel power stations.

15.8.15 As gas-fired power stations only make up a proportion of the grid mix, the reported GHG intensity of the grid from the government's Fuel Mix Disclosure Table for the period April 2023 to March 2024 (GHG intensity of 171 gCO_2e/kWh) has also been considered as a comparator to calculate the offset emissions over the lifetime.

15.8.16 As the grid will decarbonise to meet the UK government's net zero commitments, the long-run marginal generation-based electricity emission factors from DESNZ's report titled *"Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal"*[35] have also been used as a comparator to calculate the offset emissions over the lifetime. These emission factors start at 0.357 $kgCO_2e/kWh$ for the long-run marginal generation based in 2010 and drop to 0.00228 $kgCO_2e/kWh$ by 2070.

15.8.17 However, as shown in Table 15.17 the current long-run marginal generation based GHG emission factor is 0.357 $kgCO_2e/kWh$ in 2023. Therefore, an adjusted GHG emissions trajectory has also been calculated starting at this value in 2023 and gradually reducing to achieve the target for 2035 and then following the same trajectory as the Green Book after this date. The adjusted emission factors have also been used as a comparator to calculate the offset emissions over the lifetime.

15.8.18 As the Scheme is expected to produce 15,980,748 MWh electricity for export to the national grid over its lifetime, the GHG emissions offset over the lifetime of the Scheme has been calculated using each comparator as outlined in Table 15.17.

Table 15.17 – Offset emissions

Comparator	Emission factors (gCO_2e/kWh)	offset over lifetime (tCO_2e)
Gas-fired power station (current long-run marginal generator)	375	5,992,781
Grid average - 2023	171	2,732,708
DESNZ Green Book long-run marginal generation-based electricity emission factors	Varies over the lifetime of the Scheme	172,820
Adjusted DESNZ Green Book long-run marginal generation-based electricity emission factors	Varies over the lifetime of the Scheme	355,230

15.8.19 As shown, the Scheme will offset between ~173,000 and ~5,993,000 tCO_2e over its lifetime, depending upon the displacement factor applied.

15.8.20 Whilst current planning policy (EN-1)[15] requires new commercial scale combustion power stations to be constructed Carbon Capture Ready, this does not apply to existing combustion power stations. Furthermore, the need to construct a powers station Carbon Capture Ready does not guarantee that the infrastructure would be in place for carbon capture to be undertaken at all new facilities by 2035. The reality is that in the opening year and by 2035 it is likely that unabated CCGT plants will still be operating, so new renewable generating schemes which come become operational from 2035 (or earlier) would displace the power these unbated CCGTs generate. As such comparison to unabated CCGT is of relevance, when looking at the opening year of the project and the near future.

15.8.21 Table 15.17 provides comparisons against the predicted future grid mix to set the GHG emissions from the Scheme in the context of the likely grid mix over the Scheme's lifetime. However, in reality this is not reporting offset CO_2 as

the Scheme is part of the delivery of the policy outcome of reaching the future reduced carbon intensity of the grid.

GHG Intensity

15.8.22 The GHG intensity has been calculated for the lifetime of the Scheme and the Operational Phase of the Scheme for comparison with published values.

15.8.23 As the Scheme is expected to produce 15,980,748 MWh electricity for export to the national grid, the GHG intensity of the electricity generated over the lifetime of the Scheme has been calculated as 38.8 gCO_2e/kWh. Table 15.18 sets out the GHG intensity of other forms of electricity generation from the CCCs report titled: *"Reducing the UK's carbon footprint"*[36].

Table 15.18 – Comparison of energy intensities of varies forms of energy generation

Form of energy generation	Unit	GHG Intensity
Combined Cycle Gas Turbine (CCGT) – current long-run marginal generator	gCO_2e/kWh	380 to 500
CCGT with carbon capture and storage (CCS)	gCO_2e/kWh	90 to 245
Nuclear	gCO_2e/kWh	5 to 55
Offshore wind	gCO_2e/kWh	5 to 24
Onshore wind	gCO_2e/kWh	7 to 20
Solar PV	gCO_2e/kWh	20 to 85

15.8.24 As shown the GHG intensity of the Scheme is in line with the estimates from the literature and has a much lower GHG intensity than the current long-run marginal generator which the electricity generated by the Scheme will displace. Additionally, the Scheme has a much lower GHG intensity than CCGT with CCS, despite CCS capturing carbon dioxide from the combustion process.

15.8.25 The average operational GHG intensity of the Scheme has been calculated by dividing the total operational GHG emissions by the total energy generation of the Scheme. The operational GHG intensity of the Scheme is

0.000265 gCO_2e/kWh which is well below the 2024 GHG intensity of the current grid (171 gCO_2e/kWh) as per the Fuel Mix Disclosure Table for the period April 2023 to March 2024 and well below the projected GHG intensity of the grid over the whole operational life of the Scheme as per the long-run marginal generation-based electricity emission factors from DESNZ. It must be noted that construction, replacement of parts, and decommissioning has not been included within this calculation to allow for a like-for-like comparison with the projected grid intensity which relates to only generator emissions in the operational phase and does not include emissions related to the fuel supply chain or maintenance activities.

15.8.26 Both the GHG intensity of the Scheme and the GHG intensity of the Operational Phase of the Scheme show that low-carbon energy generation projects such as the Scheme, are essential to reduce the GHG intensity of the grid in line with the projections.

Change in land use

15.8.27 During the lifetime of the Scheme, the land use will no longer be used for agricultural purposes and would be under long term management. The Natural England Report 2021 shows that the carbon flux of undisturbed semi-natural grassland under long-term management is negligible, compared to a net carbon loss from the land of 0.29 $tCO_2e/ha/yr$ for arable land. Therefore, the land use change associated with the Scheme will be an additional net carbon benefit.

Summary of GHG Assessment

15.8.28 The Scheme has a predicted carbon burden during the Construction Phase of ~610,000 tCO_2e, with greatest emissions associated with the embodied emissions (i.e. those resulting from the raw material extraction and manufacturing of products required for the Scheme and transportation of raw materials to the place of manufacturing), contributing 0.0034% to the UK's carbon budget for 2023 to 2027 and 1.58% of the cumulative carbon budget of Bedford and Huntingdonshire.

15.8.29 The lifetime GHG intensity of the electricity generated is in line with the values stated in literature for other solar projects. The average operational GHG intensity of the Scheme is much lower than the GHG intensity of electricity generation using fossil fuels, the current grid mix and the projected grid mix.

15.8.30 Once operational the Scheme provides low carbon electricity to the national grid and supports the UK government's goal for all electricity to come from low carbon sources by 2035, and indeed the incoming government's plan that this is achieved by 2030. Without low-carbon energy generation projects such as the Scheme, the GHG intensity of the grid will not be able to decrease in line with the projections. Therefore, the Scheme is fully consistent with existing and emerging policy requirement and fully in line with measures necessary to achieve the UK's trajectory towards net zero. As such the Scheme is considered to have a beneficial effect. This is a significant effect.

15.9 Additional Mitigation and Monitoring

Climate Resilience

15.9.1 This assessment has identified the Scheme is resilient to the effects of climate change therefore no additional mitigation is required.

GHG Emissions

15.9.2 This assessment has identified that the Scheme is considered to have a beneficial effect and is fully in line with measures necessary to achieve the UK's trajectory towards net zero and therefore no additional mitigation is required.

15.10 Residual Effects

Climate Resilience

15.10.1 The resilience of the Scheme to the effects of climate change has been considered with reference to the effects on operational equipment; vehicular access to Site; and on-site workers. The level of effect has been assessed to be negligible to slight, which is not significant. Therefore, it is considered that the Scheme is resilient to the effects of climate change.

GHG Emissions

15.10.2 The GHG emissions from the Scheme have been calculated within the GHG Assessment. The lifecycle GHG emissions are in line with other similar types of projects, and the operational GHG emissions intensity of the Scheme is much lower than the GHG intensity of electricity generation using the current long-run marginal generator (which the Scheme will displace), and the current and projected grid mix. The Scheme has a net carbon benefit over its lifetime and is fully consistent with existing and emerging policy requirements and fully in line with measures necessary to achieve the UK's trajectory towards net zero. Therefore, it is considered the Scheme has a beneficial effect on climate change. This is a significant effect.

15.11 Conclusions

15.11.1 This preliminary climate change assessment has been produced as part of the PEIR for the Scheme. The assessment has considered the resilience of the Scheme to the projected changes in climate, and measures taken to mitigate the impacts, the impact of the Scheme on climate change.

15.11.2 The resilience of the Scheme to the effects of climate change has been assessed to be negligible to slight, which is not significant. Therefore, it is considered that the Scheme is resilient to the effects of climate change and no additional mitigation measures are recommended.

15.11.3 In terms of the impact on climate change the Scheme has been assessed to have a beneficial effect on GHG emissions. This is a significant effect.

Further Work

15.11.4 This chapter presents preliminary environmental information on the assessment of the Scheme's impacts with regards Climate Change. Further assessment will be completed prior to submission of the application for development consent, and will include:

- Update to the GHG emissions calculation based on any revised design.
- Cumulative assessment of other proposed or permitted development.

15.12 References

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