



# **Lime Down**

Solar Park

## **Environmental Statement**

### **Volume 1, Chapter 7: Climate Change**

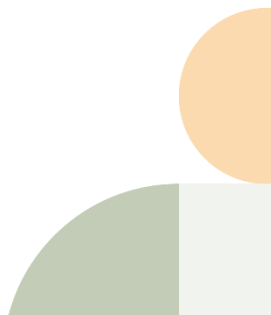
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## Schedule of Changes

| Revision | Section Reference | Description of Changes                                                                                                                                                                                                               | Reason for Revision                                                                                      |
|----------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 2        | Throughout        | Updated construction vehicle movements associated with workers and deliveries.                                                                                                                                                       | Updated for Deadline 5 to reflect design updates associated with uplift in Solar PV Panel numbers.       |
|          | Throughout        | Updated GHG emissions calculations accounting for maximum number of solar panels (842,000 fixed, 598,260 tracked configuration) and corresponding yield (442,300 MWh/y for tracker and 560,000 MWh/y for fixed panel configuration). | Updated for Deadline 5 to reflect design updates associated with uplift in Solar PV Panel numbers.       |
|          | Throughout        | Updated GHG emissions calculations of solar panels using example solar panel EPD                                                                                                                                                     | Updated for Deadline 5 in response to Wiltshire Council's Post Hearing Submission, Appendix D [REP4-132] |
|          | Throughout        | Updated GHG emissions calculations including Well-To-Tank emissions for energy usage and transport                                                                                                                                   | Updated for Deadline 5 in response to Wiltshire Council's Post Hearing Submission, Appendix D [REP4-132] |
|          | 7.10.53           | Clarification regarding SF <sub>6</sub> procurement                                                                                                                                                                                  | Updated for Deadline 5 in response to Post Hearing Submission, Appendix D [REP4-132]                     |
|          | Section 7.12      | Update of conclusions to provide clarity regarding the benefits of the Scheme.                                                                                                                                                       | Updated for Deadline 5 in response to Post Hearing Submission, Appendix D [REP4-132]                     |
|          | Throughout        | Update of references                                                                                                                                                                                                                 | Update following the agreement of the 7 <sup>th</sup> Carbon Budget; Carbon Budget Order 2026 (Ref 7-13) |

## 7 Climate Change

### 7.1 Introduction

- 7.1.1 This chapter presents the findings of the Environmental Impact Assessment (EIA) in relation to the potential Climate Change impacts as a result of the Scheme for a scenario with 100% tracker panels and one with 100% fixed panel configuration. For more details about the Scheme, refer to **ES Volume 1, Chapter 3: The Scheme [EN010168/APP/6.1]**.
- 7.1.2 The chapter identifies and proposes measures to address the potential effects on Climate Change, during the construction, operation and maintenance, and decommissioning phases of the Scheme.
- 7.1.3 This chapter should be read in conjunction with **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]**.

### 7.2 Consultation

- 7.2.1 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in July 2024. The issues raised in the Scoping Opinion are summarised and responded to within **ES Volume 3, Appendix 1-2: Scoping Opinion Responses [EN010168/APP/6.3]**, which demonstrates how the matters raised in the Scoping Opinion are addressed in this ES. Matters where the scope of the assessment has been raised by the Planning Inspectorate are summarised in **Table 7-1** below.

**Table 7-1: Planning Inspectorate Scoping Opinion Responses**

| ID    | Summary of Matter                                                                                                                                                                                                                                                                                                                                                                                  | Response                                                                                                                                                                                                                                                                                                                                            |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.1.1 | Climate Change: sea level rise<br>The Scoping Report states 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 in-combination climate change impact assessment and climate change resilience assessment can be scoped out of further assessment. | Noted. Sea level rise has been scoped out.                                                                                                                                                                                                                                                                                                          |
| 3.1.2 | Climate Change: in-combination climate change impact assessment<br>The Applicant proposes to scope out an in-combination climate change impact assessment from the climate chapter of the ES on the basis that climate change impacts relevant to the Scheme will be assessed through the other relevant topics of the ES. Given that climate change impacts                                       | Noted. The relevant climate change factors, increased flooding events, have been assessed in <b>ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]</b> , impacts on watercourses and associated sensitive habitats, and Ground Conditions have been assessed in <b>ES Volume 1, Chapter 9: Ecology and Biodiversity</b> |

| ID    | Summary of Matter                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Response                                                                                                                                                                                                                                               |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | relevant to the Schemes will be assessed Scheme other relevant topics of the ES, the Inspectorate agrees to scope out an in-combination climate change impact assessment from the climate change chapter. The climate change chapter should signpost where in the ES the relevant climate change factors have been assessed.                                                                                                                                                         | <b>[EN010168/APP/6.1]</b> and interactions with groundwater and soil stability have been assessed in <b>ES Volume 1, Chapter 19: Ground Conditions and Contamination [EN010168/APP/6.1]</b> . This Chapter summarises these findings. Topic scoped in. |
| 3.1.3 | Climate Change: mitigation.<br>Limited information has been provided with regard to mitigation measures. Any relevant mitigation measures identified from the assessment should be clearly described in the ES and secured through the DCO.                                                                                                                                                                                                                                          | Embedded mitigation is included within this ES (See Section 7.9). Topic scoped in.                                                                                                                                                                     |
| 3.1.4 | Climate Change: greenhouse gas (GHG) impact assessment assumptions<br>The GHG impact assessment within the ES should clearly describe any assumptions made in determining the quantification of any emissions reduction resulting from the Scheme such as the displacement of fossil fuel power generation.                                                                                                                                                                          | Assumptions are included within the ES (See Section 7.4, the Future Baseline in Section 7.7, the assessment itself in Section 7.10 and the Appendix). Topic scoped in.                                                                                 |
| 3.1.5 | Climate Change: GHG emissions<br>The Inspectorate notes that the Scoping Report does not provide the calculation methods for GHG emissions. For the avoidance of doubt, the ES should specify the methods used to quantify GHG emissions relating to the Scheme.                                                                                                                                                                                                                     | A detailed methodology is provided in this ES chapter (See Section 7.6).                                                                                                                                                                               |
| 3.1.6 | Climate Change: assessment methodology – climate change resilience assessment<br>The Scoping Report does not provide a description of the methodology to be used in the climate change resilience assessment. The ES should explain how the climate change resilience impacts have been identified and the methodology that will be used to determine the significance of effects. Any use of professional judgement to assess significance should be fully justified within the ES. | A detailed methodology is provided in this ES chapter which aligns with industry standard good practice methodology from the Institute of Sustainability and Environmental Professionals (ISEP) (See Section 7.6). Topic scoped in.                    |

| ID    | Summary of Matter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.1.7 | <p>Climate Change: significance criteria – GHG impact assessment</p> <p>The Scoping Report does not clearly set out how the level of significance for the Scheme GHG emissions and potential impact to the climate will be determined. The assessment presented in the ES should address this. It should be aligned with the approach presented within the Institute of Environmental Management and Assessment (IEMA)'s 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' as the basis for the assessment of effects. With reference to Scoping Opinion ID 3.1.6 above, a separate methodology and criteria should also be presented for the assessment of climate resilience.</p> | <p>A detailed methodology for determining the level of significance is provided in this ES chapter which aligns with the methodology from the Institute of Sustainability and Environmental Professionals (ISEP). (See Section 7.6). Topic scoped in.</p> <p>A detailed methodology and criteria for climate resilience is provided in this ES chapter which aligns with industry standard good practice methodology from the Institute of Sustainability and Environmental Professionals (ISEP). (See Section 7.6, paragraph 7.6.25 to 7.6.36). Topic scoped in.</p> |

7.2.2 Engagement has been undertaken with stakeholders in relation to Climate Change. The matters raised are summarised in **Table 7-2** below.

**Table 7-2: Summary of Engagement Undertaken**

| Consultee and Date                                  | Issue/Climate Change                                                                                                                                                                                                                                                                                                                                                                                                | Response                                                                                                                                                                                                                                                    |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wiltshire Council Climate Team<br>(Email, 24.03.25) | <p>GHG Assessment</p> <p>It is relevant to also compare the whole life estimated GHG emissions against a BAU scenario. The BAU might be considered a continuation of current uses at the Sites. In order to consider climate commitments made by Wiltshire Council reference is suggested to the outward-facing delivery plan for the whole county of Wiltshire "Climate Strategy Delivery Plan for Wiltshire".</p> | <p>The ES includes the comparison with the Business As Usual (BAU) scenario (see Paragraph 7.7) and references to the outward facing delivery plan for the whole county of Wiltshire "Climate Strategy Delivery Plan for Wiltshire" (Paragraph 7.3.38).</p> |
| Wiltshire Council Climate Team<br>(Email, 24.03.25) | <p>Climate change is acknowledged to be a cross-cutting issue in development and it is agreed that it should be addressed in technical detail within relevant sections e.g. precipitation within drainage. However, it is important that the Climate Change chapter provides non-technical summaries as indicated within Table 6.2.</p>                                                                             | <p>Please see Paragraph 7.10.113. Topic Scoped in.</p> <p>The ES includes a non-technical summary of Climate Change (See <b>ES Volume 4, Non-Technical Summary [EN010168/APP/6.5]</b>).</p>                                                                 |

- 7.2.3 Statutory consultation was held between 29 January 2025 and 19 March 2025. A full list of consultation responses in relation to Climate Change are presented in the **Consultation Report [EN010168/APP/5.1]** submitted as part of the Application.
- 7.2.4 A further round of targeted consultation was undertaken between 3 June 2025 and 11 July 2025 following changes to the development boundary area of the Scheme presented in the PEIR and at Stage Two Statutory Consultation. Further detail regarding the targeted consultation is provided in **ES Volume 1, Chapter 1: Introduction [EN010168/APP/6.1]**.

### **7.3 Legislation, Planning Policy and Guidance**

- 7.3.1 A summary of applicable legislation, planning policy and other guidance documents relating to the Climate Change assessment for the Scheme is provided below.
- 7.3.2 Full details of the legislation, policy, and guidance of relevance to the assessment of Climate Change is provided in full in **ES Volume 1, Chapter 5: Energy Need Legislative Context and Energy Policy [EN010168/APP/6.1]**.

#### Legislation

- 7.3.3 Applicable legislation to inform the Climate Change assessment includes:

#### **International Legislation**

##### Kyoto Protocol (Ref 7-1).

- 7.3.4 The Kyoto Protocol is a United Nations international treaty adopted in 1997 under the United Nations Framework Convention on Climate Change (UNFCCC). It set binding emission reduction targets for developed countries to reduce greenhouse gas (GHG) emissions, with the goal of mitigating the effects of climate change. The GHG definitions from the Kyoto Protocol have been used to inform this assessment of Climate Change.

##### The Paris Agreement (Ref 7-2)

- 7.3.5 The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016 and was ratified by the UK later that month. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- 7.3.6 The Glasgow Climate Pact (Ref 7-3), adopted at the 2021 United Nations Climate Change Conference (COP26) in Glasgow, Scotland and the Sharm El-Sheikh Implementation Plan (Ref 7-4), adopted at the 2022 United Nations

Climate Change Conference (COP27) in Sharm El-Sheikh, Egypt reaffirmed the goal of the Paris Agreement.

## **UK Legislation**

### *The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) (Ref 7-5)*

- 7.3.7 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that projects which might have significant effects on the environment to carry out a formal impact assessment. The Infrastructure Planning Regulations cover projects that are classified as Nationally Significant Infrastructure Projects, which are regulated under the Planning Act 2008 (Ref 7-6).

### *Climate Change Act 2008 (Ref 7-7)*

- 7.3.8 The Climate Change Act 2008 sets a framework for reducing GHG emissions and a target for net zero emissions by 2050. Additionally, it requires the establishment of carbon budgets.

### *Climate Change Act 2008 (2050 target amendment) Order 2019 (Ref 7-8)*

- 7.3.9 The 2019 amendment to the Climate Change Act 2008 changed the target for the UK to “net-zero” emissions by 2050.

### *Carbon Budgets Order (2009) (Ref 7-9) Carbon Budget Order (2011) (Ref 7-10), Carbon Budget Order (2016) (Ref 7-11), Carbon Budget Order (2021) (Ref 7-12), Carbon Budget Order (2026) (Ref 7-13).*

- 7.3.10 Established under the Climate Change Act 2008 (Ref 7-8), these Carbon budgets set legally binding limits on the total amount of GHGs the UK can emit over a five-year period, called budgetary periods, towards the goal of net zero by 2050.
- 7.3.11 **Table 7-3** shows the Carbon budget periods and the binding limits on the total amount of GHGs expressed in Million Tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e).

**Table 7-3 UK National Carbon Budgets**

| Carbon Budget     | Total Budget (MtCO <sub>2</sub> e) |
|-------------------|------------------------------------|
| 3rd (2018 – 2022) | 2,544                              |
| 4th (2023 – 2027) | 1,950                              |
| 5th (2028 – 2032) | 1,725                              |
| 6th (2033 – 2037) | 965                                |
| 7th (2038 – 2042) | 535                                |

7.3.12 All assumptions past 2042 will use the 7<sup>th</sup> Carbon Budget.

### National Planning Policy

#### National Policy Statement (NPS) for Energy EN-1 (January 2024) (Ref 7-14)

7.3.13 The NPS guidance makes it easier for decision makers, applicants and the wider public to understand:

- Government policy on the need for nationally significant infrastructure projects (NSIPS);
- How applications for energy infrastructure will be assessed; and
- The way in which impacts and mitigations will be judged.

7.3.14 With particular reference to Section 2.2 (Net zero by 2050), Section 2.3 (Meeting net zero), Section 2.4 (Decarbonising the power section), Section 4.10 (Climate Change Adaptation and Resilience) and Section 5.3 (Greenhouse Gas Emissions); Paragraph 4.10.4 recognises the role of climate change adaptation in respect of GHG emissions, coastal change and flood risk.

7.3.15 Paragraphs 4.10.5 to 4.10.12 relate to Lime Down Solar Park Limited's (hereafter referred to as the 'Applicant') assessment and Paragraphs 4.10.13 to 4.10.19 relate to the Secretary of State's decision-making regarding adaptation measures and resilience in response to climate projections. The guidance states that applications for new generating stations and related infrastructure should be contained in a single application to the Secretary of State or in separate applications submitted in tandem which have been prepared in an integrated way. The Secretary of State should be satisfied that appropriate network connection arrangements are/will be in place for a given project regardless of whether one or multiple (linked) applications are submitted.

7.3.16 Paragraphs 5.3.4 to 5.3.7 are relevant to the applicant assessment relevant policy, assessment requirements, mitigation and Paragraphs 5.3.8 to 5.3.12 include Secretary of State decision making criteria regarding GHG emissions and mitigation. The guidance states that, all proposals for energy infrastructure projects should include a GHG assessment as part of their ES including:

- A whole life GHG assessment showing construction, operational and decommissioning GHG impacts;
- An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages;
- Measurement of embodied GHG impact from the construction phase;
- How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures;
- How operational emissions have been reduced as much as possible through the application of best available technology for that type of technology;
- Calculation of operational energy consumption and associated carbon emissions;
- Whether and how any residual GHG emissions will be (voluntarily) offset or removed using a recognised framework; and
- Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if sectoral targets are developed.
- Paragraph 5.3.7 requires a GHG Reduction Strategy to be produced. The reduction strategy measures are included within the **Outline Construction Environmental Management Plan (CEMP) [EN010168/APP/7.12]** and **Outline Operational Environmental Management Plan (OEMP) [EN010168/APP/7.13]**, rather than as a standalone document.

7.3.17 The guidance also states that a GHG assessment should be used to drive down GHG emissions at every stage of the Scheme's development and ensure that emissions are minimised as far as possible for the type of technology, taking into account the overall objectives of ensuring our supply of energy always remains secure, reliable and affordable, while transitioning to net zero.

7.3.18 Regarding the Secretary of State decision making, the guidance states that the Secretary of State should be content that the GHG emissions have been assessed as far as possible and all reasonable steps to reduce the GHG emissions have been taken. However, in light of the vital role energy infrastructure plays in the process of economy wide decarbonisation, the Secretary of State must accept that there are likely to be some residual emissions from construction and decommissioning of energy infrastructure. Operational emissions will be addressed in a managed, economy-wide manner, to ensure consistency with carbon budgets, net zero and our international climate commitments. The Secretary of State does not, therefore need to assess individual applications for planning consent against operational carbon

emissions and their contribution to carbon budgets, net zero and international climate commitments.

*NPS for Renewable Energy Infrastructure EN-3 (January 2024) (Ref 7-15)*

- 7.3.19 Section 2.10 reaffirms the government commitment to sustained growth in solar capacity to align with the net-zero emissions by 2050 target. It recognises the important role of solar energy in delivering the government's goals for greater energy independence. The government seeks large scale ground-mount solar deployment across the UK. It recognised that solar farms are one of the most established renewable electricity technologies in the UK and the cheapest for of electricity generation.
- 7.3.20 Section 2.4 (Adaptation) and specially Paragraph 2.4.11 for solar Photovoltaic (PV), emphasise that if the Scheme is proposed in a low-lying exposed site, the increased risk of flooding and the impact of higher temperatures should be particularly considered.

*NPS for Electricity Networks Infrastructure EN-5 (January 2024) (Ref 7-16)*

- 7.3.21 Paragraph 2.3.2 highlights the importance of climate change resilience. It states that the applicant should assess the vulnerability and resilience of the proposed infrastructure to climate change impacts, including:
- Flooding;
  - 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; and
  - Coastal erosion.
- 7.3.22 The NPSs listed above came into effect on 17 January 2024. These NPSs set out the Government's energy policy for the delivery of nationally significant energy infrastructure, the need for new energy infrastructure, and guidance for the determination of an application for a Development Consent Order (DCO).
- 7.3.23 The relevant NPS requirements, together with an indication of where in the ES the information is provided to address these requirements, are provided in the **ES Volume 3, Appendix 5-1: NPS Requirements [EN010168/APP/6.3]**.
- 7.3.24 Draft versions of EN-1, EN-3 and EN-5 were published in May 2025. These continue to highlight the need for new nationally significant energy projects. With regards to Climate Change, emphasis continues to be placed on the government targets to be the first major economy to be net zero by 2050 and the importance of seeking to meet the outcomes set out in the Clean Power 20230 Action Plan. This is reliant on large scale delivery of low carbon generation technologies such as solar.

*National Planning Policy Framework (NPPF) (December 2024)<sup>1</sup> (Ref 7-18)*

- 7.3.25 The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. Section 14 highlights the importance of integrating climate change considerations into the planning system by promoting for development that reduces GHG emissions and enhances resilience against future climate risks. Paragraph 168 states that when determining applications for renewable and low carbon energy developments, local planning authorities should not require applicants to demonstrate the overall need for renewable or low carbon energy and give significant weight to the benefits associated with renewable and low carbon energy generation and the proposal's contribution to a net zero future.
- 7.3.26 The NPPF (December 2024) states in paragraphs 170 to 182 that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary in such areas, it should be made safe for its lifetime without increasing flood risk elsewhere. Subsequently, it states that Plans should apply a sequential, risk-based approach to the location of development, considering all sources of flood risk and resilience.

*Net Zero Strategy, 2021 (Ref 7-19)*

- 7.3.27 The Net Zero Strategy represents the Government's plan to transition to a net-zero economy while supporting economic growth and job creation. It outlines a set of policies and initiatives aimed at reducing carbon emissions across every sector of the UK economy to achieve Net Zero by 2050.

*Clean Growth Strategy, 2017 (Ref 7-20)*

- 7.3.28 Published in 2017, it outlines how the UK will achieve the carbon budgets set out under the Climate Change Act. It includes policies to support clean technology innovation, improve energy efficiency, and enhance the route to market for renewable technologies.

*UK Third Climate Change Risk Assessment 2022 (Ref 7-21)*

- 7.3.29 The Climate Change Act 2008 mandates that the UK Government conducts a Climate Change Risk (CCR) Assessment every five years and creates an adaptation program to address identified risks. The UK CCR Assessment for 2022 was released in January 2022. The third CCR Assessment highlights the dangers of inaction regarding climate change and stresses that the UK's pioneering net zero strategy must incorporate adaptation measures to ensure future resilience. This involves further development of the domestic renewable energy sector.

*The UK's Nationally Determined Contribution (NDC) (Ref 7-22)*

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<sup>1</sup> In February 2025, there was a 'correction' to the NPPF, but it is still dated as December 2024.

- 7.3.30 The policy outlines the country's commitment to reducing GHG emissions in accordance with the Paris Agreement on climate change. Specifically, the UK aims to achieve a reduction of GHG emissions by at least 68% by 2030, relative to 1990 levels. As part of this commitment, the NDC emphasises the development of solar energy as a key strategy for reducing dependence on fossil fuels and lowering the nation's carbon footprint.

*Climate Change: third national adaptation programme (2023 – 2029) (Ref 7-23)*

- 7.3.31 The Climate Change: Third National Adaptation Programme (2023 – 2029) (NAP3) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and launched in 2023.

*Clean Power 2030 Action Plan (Ref 7-24)*

- 7.3.32 The government's Clean Power 2030 plan provides a clear policy framework that supports the development of renewable energy projects. It sets a target of at least 95% of Great Britain's generation; reducing the carbon intensity of our generation from 171gCO<sub>2</sub>e/kWh in 2023 to well below 50gCO<sub>2</sub>e/kWh in 2030. This will be achieved through a significant expansion of renewable energy capacity, including 45 to 47GW of solar power complemented by 23 to 27GW of battery capacity and other flexible capacity systems.

### **Local Planning Policy**

- 7.3.33 Local planning policies that are relevant to the Scheme and Climate Change are:

*Wiltshire Core Strategy (WCS) (Ref 7-25)*

- 7.3.34 The Scheme is located completely within Wiltshire Councils administrative boundary. The current Local Plan is the WCS, adopted in 2015. Wiltshire Council has published a draft Wiltshire Local Plan, with adoption expected at the end of in late 2024 or early 2025. The Wiltshire Local Plan Regulation 19 consultation was undertaken in autumn 2023 (Ref 7-26). The WCS outlines six key 'strategic' challenges for Wiltshire. Addressing Climate Change is listed as one of these key 'strategic' objectives to be addressed by the Wiltshire Core Strategy.

- 7.3.35 Local planning policies that are relevant to the Scheme and Climate Change are:

- Core Policy 42: Standalone Renewable Energy Installations; and
- Core Policy 67: Flood Risk.

- 7.3.36 As part of the emerging Local Plan, Wiltshire Council has updated their policies. The emerging Local Plan policies relevant to this Chapter are listed below:

- Policy 86: Renewable Energy (Formerly Core Policy 42); and

- Policy 95: Flood Risk (Formerly Core Policy 67).

Wiltshire Council Climate Strategy (2022) (Ref 7-27)

- 7.3.37 While the Wiltshire Council Climate Strategy is a non-statutory document and is not part of the local development plan, it sets a framework for reducing emissions in Wiltshire from 2022 to 2027 and for making the county resilient to climate impacts. The strategy states that many of the solutions needed to reduce GHG emissions are already available. It includes the use of solar and wind energy as part of these solutions.

Wiltshire Council Climate Delivery Plan (2025) (Ref 7-28)

- 7.3.38 The delivery plan outlines Wiltshire Council's priorities for action on climate change as well as implementation steps towards becoming carbon neutral by 2030. One of the focus areas for 2025 is to decarbonise the Council building reducing Scope 1 and 2 emissions and mentions it can be achieved by a Community Energy generator or via a commercial scheme.

- 7.3.39 Other priorities around the energy sector are to support the development of community energy groups and empower communities to develop energy projects and create an energy system to support the net zero transition.

Wiltshire Council Climate Adaptation Delivery Plan (2025-29) (2025) (Ref 7-29)

- 7.3.40 The Adaptation Delivery Plan (2025-29) sets out Wiltshire Council's response to risks from a changing climate on service delivery, assets and business plan objectives considering risks up to 2°C rise predicted by 2050.

**Other Guidance**

- 7.3.41 Other guidance documents relevant to the assessment of the impacts of the Scheme on Climate Change include:

World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines (Ref 7-30)

- 7.3.42 The Greenhouse Gas Protocol (GHG Protocol) is a globally recognised standard for measuring and managing GHG emissions. It provides a consistent framework for GHG reporting.

Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. Institute of Sustainability and Environmental Professionals (2022) (ISEP) (Ref 7-31)

- 7.3.43 This Guidance provides a framework for evaluating the GHG emissions from a development project. It includes methods for quantifying emissions, assessing their significance, and identifying mitigation measures.

Climate Change Adaption Practitioner Guidance (2022) (ISEP) (Ref 7-32)

- 7.3.44 This Guidance provides steps for assessing climate risks, developing adaptation strategies, and implementing measures to enhance resilience.

*Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2020) (ISEP) (Ref 7-33)*

- 7.3.45 This guidance provides steps for assessing climate resilience and in-combination climate impacts.

*Planning Policy Guidance (PPG) (Ref 7-34)*

- 7.3.46 The Climate Change section advises how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change.

*Greenhouse Gas Reporting: Conversion Factors 2024 (Ref 7-35)*

- 7.3.47 The UK Government issues emission conversion factors for use to report on GHG emissions.

## **7.4 Assessment Assumptions and Limitations**

- 7.4.1 The methodology for Climate Change GHG emissions has considered the following assumptions.

*Carbon Budgets*

- 7.4.2 Considering the recommended level by the Climate Change Committee (CCC) for the 7<sup>th</sup> carbon budget, current carbon budgets are only available up to 2042. As the Scheme is expected to be operational past this; all assumptions past 2042 will use the 7<sup>th</sup> Carbon Budget. The 7<sup>th</sup> Carbon Budget covering the period from 2038 to 2042 is currently under review and was not yet adopted by the Government at the time of writing.

*Baseline Emissions*

- 7.4.3 For the lifecycle GHG impact assessment, the baseline is a 'business as usual' scenario whereby the Scheme is not implemented. The baseline comprises existing carbon stock and sources of GHG emissions within the Site from the existing activities on-site. In this case the future baseline is also based on a zero emissions scenario.

*Construction Plant*

- 7.4.4 Fuel use for construction plant is not known at the time of writing, as such it has not been possible to complete a calculation of these emissions. Good practice measures are included in the **Outline CEMP [EN010168/APP/7.12]** to limit emissions during the construction phase. Based on the relatively small scale and short duration of the construction works required as well as the implementation of emission reduction measures in the **Outline CEMP [EN010168/APP/7.12]** it is considered that the fuel use for construction plan

represent less than 1% of the total GHG emissions. This is in line with similar solar farm projects, where the construction plant GHG emissions represent less than 1% of the total GHG emissions.

#### Construction Phase

- 7.4.5 The construction of the Scheme is proposed to be phased over a two-year period and, subject to the DCO consenting process, the earliest construction could start is 2027. For the purposes of this assessment, the construction phase is assumed to have a duration of two years. This is expected to be a realistic yet conservative assumption for this assessment, as it represents the expected maximum build time and therefore the maximum total emissions and impacts occurring as a result of the construction phase.

#### Assessment of Ancillary Products on Site

- 7.4.6 According to the ISEP guidance, activities that do not significantly change the result of the assessment can be excluded where the expected emissions are less than 1% of the total emissions, and where all such exclusions total a maximum of 5% of the total emissions. In the case of the GHG assessment, the emissions associated with ancillaries such as fencing, portacabins, security system (closed-circuit television (CCTV) camera system), etc. are considered minor and are expected to contribute less than 1% of the total emissions. Anything not explicitly referenced can be assumed to not have been quantified as emissions are anticipated to be negligible.
- 7.4.7 Therefore, these minor emissions will be excluded from the quantification, as including them would not significantly impact the overall results.
- 7.4.8 In addition, wherever relevant, conservative assumptions will be made such that the predicted GHG emissions are likely to be at the upper limit of potential emissions from the Scheme.
- 7.4.9 All other inputs and outputs to the relevant processes for which data are available are included in this assessment.

#### Construction Worker Vehicle Movements

- 7.4.10 The UK Government 2024 emission conversion factors for 'medium car' and 'average local bus', including Well-To-Tank (WTT) emissions will be applied to average distance travelled and total worker numbers to calculate GHG emissions associated with worker transport.
- 7.4.11 The distance is assumed to be equal to the average trip length for business in the UK in 2023 (19.6 miles) for car and shuttle bus trips. It is assumed that there will be 1,264 daily two-way worker movements, of which 624 will be by car and 640 by shuttle bus. Each car is considered to transport 1.5 people and each shuttle 20 people. This translates to 416 two way car movements and 32 shuttle bus movements. These assumptions are consistent with **ES Volume 1, Chapter 13: Transport and Access [EN010168/APP/6.1]**.

Transport of Materials

- 7.4.12 At the time of writing, the manufacturer of Solar PV Panels has not yet been chosen. It is assumed that the Solar PV Panels will be sourced from China as China accounts for 80% of global Solar PV Panel production. The manufacture and transport of Solar PV Panels and batteries are the largest sources of GHG emissions from the Scheme.
- 7.4.13 Heavy Goods Vehicle (HGV) and sea freight distances assumed for transportation of materials and waste are outlined below. The country of origin for materials have been chosen as China, and assumptions have been made around the specific ports used, based on proximity to relevant manufacturing facilities within each country. The following assumptions apply:
- HGV transport of materials within China prior to sea freight transportation – 150km (based on the average distance of a number of major manufacturing centres in and around Shanghai to the nearest port);
  - While sea freight may come into a closer port, such as Avonmouth, as a conservative approach, it has been assumed that freight will travel from Dover to the Site;
  - Sea freight distance from China to England –21,880 km (based on the sea freight distance between Shanghai and Dover);
  - For HGV transportation of materials, the UK Government GHG 2021 Conversion Factors for ‘Rigid HGV >7.5-17t’ and ‘Articulated HGV >3.5 – 33t’ have been applied, including WTT emissions. It has been assumed that HGVs are 50% laden; this approach is more conservative than assuming HGV are 100% laden on incoming trips and 0% laden on outgoing trips.
  - For tippers around the Site, the distance has been assumed to be the National Travel Survey (NTS) (Ref 7-36) average trip distance for business on the assumption that these vehicles would not be transporting materials from China. The value for ‘average HGV’ has been used; and
  - For sea freight transportation, the UK Government GHG 2024 Conversion Factors (Ref 7-35) for ‘General Cargo –Average’ has been applied, including WTT emissions.

Embodied Carbon in Production of Scheme Materials/Components

- 7.4.14 All assumptions made within the calculations for estimating the embodied carbon of the materials used for the Scheme have been set out within the individual sections detailed in Section 7.9.10.

Product Replacement

- 7.4.15 The Scheme is expected to be operational from 2029 and to generate more than 50MW of electricity. This assessment accounts for efficiency losses of the

Solar PV Panels over time based on an initial 1% degradation in the first year and 0.35% for every additional year for a lifespan of 40 years. For the purpose of this assessment, the replacement of panels has been considered at 30 years at which point the same assumptions of a 1% loss in the first year and 0.35% loss for every additional year has been used. These degradation factors are in line with the solar panel Environmental Product Declaration (EPD) used in the assessment (paragraph 7.6.11).

- 7.4.16 Operational maintenance involving the replacement of components during the Scheme's life span is determined by replacement rates observed in similar projects and the expected design life of the components.
- 7.4.17 Whilst Solar PV Panels can have a lifespan of up to 40 years or more, it has been assumed that Solar PV Panels will be replaced once during the lifetime of the Scheme. The Solar PV Panels are anticipated to be replaced over a 12-to-24-month period.
- 7.4.18 The BESS Container batteries could be replaced up to five times during the operation and maintenance phase.
- 7.4.19 Replacement rates are summarised in the below table:

**Table 7-4: Replacement Rates for Products**

| Component                                                                                    | Comment                                                                                                                                                                                           | Replacement Frequency                                           | Recyclable |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------|
| Solar PV Panels                                                                              | The approximate operational life of Solar PV Panels is 40 years. It is assumed that replacement would be undertaken once during the operation of the Scheme.                                      | Once during the Scheme's lifespan.                              | Yes        |
| Solar PV Mounting Structures                                                                 | Replacement is not anticipated during the Scheme's operation and maintenance phase.                                                                                                               | None                                                            | Yes        |
| On-Site Cables (low voltage DC on-site cabling between Solar PV Panels and Conversion Units) | It is not anticipated that the On-Site cables will need to be replaced during the operation and maintenance phase, although an allowance has been made for up to 20% of the On-Site cabling to be | Approx 20% of On-Site cables once during the Scheme's lifespan. | Yes        |

| Component                                                     | Comment                                                                                                                                  | Replacement Frequency                                       | Recyclable |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------|
|                                                               | replaced due to damage or defects.                                                                                                       |                                                             |            |
| Batteries (within the BESS)                                   | Assumed design life of up to 10 years.                                                                                                   | Every 10 years.<br>Five times during the Scheme's lifespan. | Yes        |
| Interconnecting Cable (medium voltage AC on-site cabling)     | Replacement is not anticipated during the Schemes operation and maintenance phase.                                                       | None.                                                       | Yes        |
| Transformers (Element within the Standalone Conversion Units) | Assumed design life of 30 years, although replacement will only be carried out if required for performance or health and safety reasons. | Every 30 years.                                             | Yes        |
| Inverters                                                     | Assumed design life of 10 years.                                                                                                         | Every 10 years.<br>Five times during the Scheme's lifespan. | Yes        |
| Grid Connection Cables (HV Cabling)                           | Replacement is not anticipated during the Schemes operation and maintenance phase.                                                       | None.                                                       | Yes        |
| On-site Substations (132kV and 400kV)                         | Replacement of the building is not anticipated during the Schemes operation and maintenance phase.                                       | None.                                                       | Yes        |

**Assessment of Future Baseline for Comparison with 'With Scheme' Scenario**

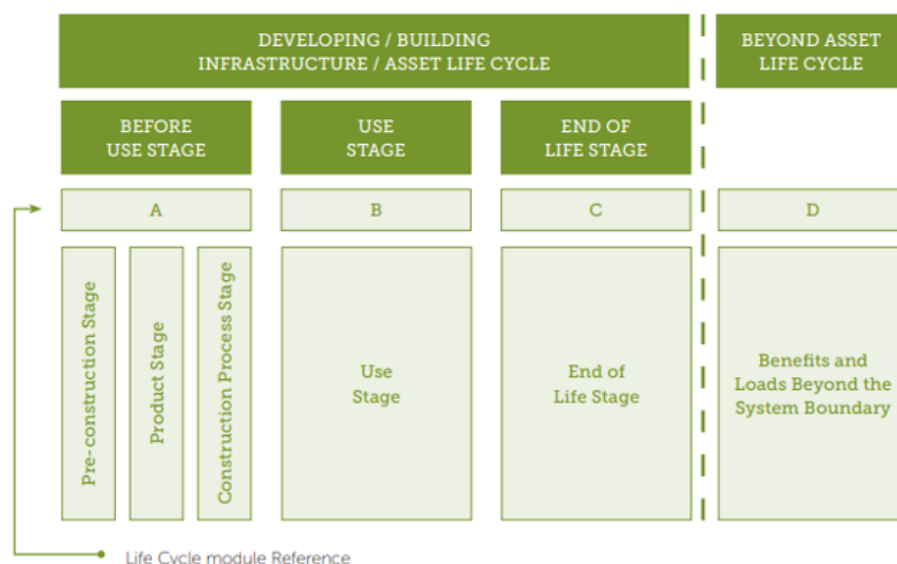
- 7.4.20 To account for the beneficial effect of the Scheme in reducing GHG emissions compared to a 'without scheme' scenario, the ES assesses the impact of the Scheme against the forecast average intensity (g/kWh) from the grid as published by Department for Energy Security and Net Zero (Ref 7-37), using 'Data Table 1-19', Table 1: Electricity emissions factors to 2100, kgCO<sub>2</sub>e/kWh for the forecast emissions data for 2029.
- 7.4.21 The future baseline used for the assessment will be the gCO<sub>2</sub>e/kWh intensity of the operation and maintenance phase of the Scheme. The grid carbon intensity for 2029, the first year of operation of the Scheme, is forecasted to be 0.049 gCO<sub>2</sub>e/kWh.
- 7.4.22 This process will be calculated for the lifetime of the Scheme.

## 7.5 Study Area

### GHG Impact Assessment:

- 7.5.1 In accordance with the latest ISEP guidance (Ref 7-31), the Study Area for the assessment of GHG emissions is considered to be the global climate.
- 7.5.2 The GHG Impact Assessment is based on the Scheme lifecycle stages shown in Plate 7-1. The considered stages include: the before use stage (A), hereafter referred to as the 'construction phase', the use stage (B), referred to as the 'operation and maintenance phase', and end of life stage (C), referred to as the 'decommissioning phase'.
- 7.5.3 Direct emissions are defined as those directly resulting as from the Scheme, e.g. tailpipe emissions from vehicles travelling to the Site. Indirect emissions are those not directly caused by the Scheme but generated as a result of the manufacturing of Scheme components. This includes embodied carbon within construction materials.
- 7.5.4 Both direct emissions and indirect emissions have been considered in the assessment.
- 7.5.5 The operation and maintenance phase of the Scheme is projected to span 60 years.

**Plate 7-1: Modular approach of life cycle stages and modules (Ref 7-31)**



Source: IEMA. EIA Guide.

### In-combination Climate Change Impact (ICCI) Assessment:

- 7.5.6 The ICCI Study Area considers receptors that are identified within other relevant chapters, for example, the Flood Risk assessment as outlined in **ES Volume 1, Chapter 9: Ecology and Biodiversity, Chapter 11: Hydrology, Flood Risk and Drainage, Chapter 13: Transport and Access and Chapter 19: Ground**

**Conditions [EN010168/APP/6.1]**, that will be impacted by the Scheme in combination with future climatic conditions.

#### Climate Change Risk (CCR) Assessment

7.5.7 For the CCR Assessment, the Study Area for this assessment is the Order Limits of the Scheme.

7.5.8 The climate resilience review will provide a description of how the Scheme will be impacted by climate change and how it will be designed to be more resilient to the impacts identified during the review of the UK Climate Projections 2018 (UKCP18) data (Ref 7-38).

## **7.6 Assessment Methodology**

7.6.1 This section sets out the scope and methodology for the assessment of the impacts of the Scheme on Climate Change (GHG Impact Assessment), the In-combination Climate Change Impact Assessment and the impacts of Climate Change on the Scheme (Climate Change Risk Assessment).

#### Sources of Information

7.6.2 In the preparation of this chapter, the following sources of published information have been used:

- World Business Council for Sustainable Development and World Resources Institute (2004) The GHG Protocol: A Corporate Accounting and Reporting Standard. Revised Edition. (Ref 7-30);
- ISEP (2022a) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition. Institute of Environmental Management and Assessment (ISEP). (Ref 7-31);
- ISEP (2022b) Climate Change Adaption Practitioner Guidance. (Ref 7-32);
- ISEP (2020) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation. (Ref 7-33);
- Department for Energy Security and Net Zero (2024) UK Government GHG Conversion Factors for Company Reporting (Ref 7-35);
- UK Met Office (2018) UK Climate Projections 2018 (UKCP18) (Ref 7-36); and
- UK Met Office (2019) Historic climate data (Ref 7-37).

#### Impact Assessment Methodology

7.6.3 The methodologies described in the following section have been developed in line with the relevant planning policy and appropriate industry standard guidance for assessing GHGs (ISEP document 'Environmental Impact

Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition', (Ref 7-31)) and considering climate change resilience (CCR) and adaptation (Ref 7-32) in EIA.

*GHG Impact Assessment*

- 7.6.4 All GHG emissions arising over the lifecycle of the Scheme will be assessed through the lifecycle GHG impact Assessment. Direct emissions from the Scheme, indirect emissions resulting from the Scheme but arising from activities outside the Site and embodied carbon within materials and components required for the Scheme are all considered as part of the GHG impact assessment.
- 7.6.5 In line with the World Business Council for Sustainable Development and World Resources Institute GHG Protocol (Ref 7-30), the potential effects of the Scheme on the climate have been assessed.
- 7.6.6 The approach to assessing emissions follows the different phases of the Scheme including construction, operation and maintenance, and decommissioning.
- 7.6.7 The seven Kyoto Protocol GHGs have been considered in this assessment, which are in-line with the 'GHG protocol' (Ref 7-30):
- Carbon dioxide (CO<sub>2</sub>);
  - Methane (CH<sub>4</sub>);
  - Nitrous oxide (N<sub>2</sub>O);
  - Sulphur hexafluoride (SF<sub>6</sub>);
  - Hydrofluorocarbons (HFCs);
  - Perfluorocarbons (PFCs); and
  - Nitrogen trifluoride (NF<sub>3</sub>).
- 7.6.8 It should be noted that within this assessment, 'GHG emissions' represent all seven Kyoto Protocol GHGs. The unit of kgCO<sub>2</sub>e, (kilograms CO<sub>2</sub> equivalent) tCO<sub>2</sub>e (tonnes CO<sub>2</sub> equivalent) or MtCO<sub>2</sub>e (Megatonnes of CO<sub>2</sub> equivalent) captures CO<sub>2</sub> as well as the other GHGs of concern and has been used as the unit to quantify GHGs within this assessment.
- 7.6.9 The Department for Energy Security and Net Zero (DESNZ) 2024 conversion factors for reporting (Ref 7-35) have been used as a calculation-based methodology for estimating the anticipated GHG emissions arising during the construction, operation and decommissioning activities of the Scheme:

Activity data x GHG emissions factor = GHG emissions value

- 7.6.10 For example, if a construction worker is expected to make a total 1,200 km of trips over the construction phase in their petrol car, the ‘activity data’ for this would be 1,200 km. The GHG emissions factor for this as sourced from the DESNZ 2024 inventory for a petrol car is 0.25987 kgCO<sub>2</sub>e/km. Therefore, the calculation would be:

$$1,200 \text{ km (Activity)} \times 0.00025987 \text{ tCO}_2\text{e/km (GHG emissions Factor)}$$

$$= 0.311 \text{ tCO}_2\text{e (GHG Emissions Value)}$$

- 7.6.11 To calculate the Greenhouse Gas Emissions for the PV Panels, an Environmental Product Declaration (EPD) value has been used to inform life cycle modules A1-A3 (raw material supply, transport, and manufacturing). Five EPDs were reviewed for solar panels that are widely available on the market, with dimensions and characteristics consistent with those used to inform the indicative layouts of the Scheme. The EPDs ranged from 0.320-0.389 kgCO<sub>2</sub>e/Wp. The selected EPD that has been used in these calculations has a value of 0.346 kgCO<sub>2</sub>e/Wp (Ref 7-17), demonstrating a reasonable representation of typical panels that may be deployed on site.

#### Sensitivity of Receptors

- 7.6.12 For the purposes of this assessment, it has been considered that any increase in GHG emissions compared to the baseline has the potential to have an impact, due to the high sensitivity of the global climate to increases in GHG emissions. This is in line with the latest ISEP guidance (Ref 7-31), which states that all GHG emissions have the potential to be significant.

#### Magnitude of Impacts

- 7.6.13 ISEP guidance (Ref 7-31) states that there are currently no agreed methods to evaluate thresholds of GHG significance. Therefore, the application of the standard EIA significance criteria is not considered to be appropriate for climate change assessments, and that professional judgement is required to contextualise a project’s GHG emission impacts.
- 7.6.14 The guidance explains that “*the crux of significance therefore 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 trajectory towards net zero by 2050.*”
- 7.6.15 **Table 7-5** presents the different significance levels as per the latest version of ISEP guidance. The guidance emphasises that “*a project that follows a ‘business-as-usual’ or ‘do minimum’ approach and is not compatible with the UK’s net zero trajectory or accepted aligned practice or area-based transition targets, results in a significant adverse effect. It is down to the practitioner to differentiate between the ‘level’ of significant adverse effects e.g. ‘moderate’ or ‘major’ adverse effects.*”

**Table 7-5 Significance levels as per ISEP guidance for GHG Assessment (Box 3, Ref 7-31)**

| Significance Level      | Definition                                                                                                                                                                                                                                                                                                                                                                                                    | Significant |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Major Adverse</b>    | 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.                         | Yes         |
| <b>Moderate Adverse</b> | 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.                                | Yes         |
| <b>Minor Adverse</b>    | 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.                                                                                                    | No          |
| <b>Negligible</b>       | 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. | No          |
| <b>Beneficial</b>       | 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.                                                                                                              | Yes         |

- 7.6.16 As noted, it is down to the practitioner's professional judgement on how best to contextualise a project's GHG impact. In GHG accounting, it is considered good practice to contextualise emissions against pre-determined carbon budgets.
- 7.6.17 The UK has national carbon budgets which have been determined as being compatible with net zero and international climate commitments. For this Scheme, the most appropriate sector carbon budget is for the electricity supply sector. The electricity supply sectoral carbon budgets (Table 7-6) are in place to track the sector's pathway to being carbon neutral by 2050. Progress against these budgets is reviewed annually and future budgets are set 12 years in advance.

**Table 7-6: Relevant UK Carbon Budgets**

| Carbon Budget     | Total budget (MtCO <sub>2</sub> e) | Sectoral Carbon Budget year | Annual Electricity Supply Sectoral Carbon budget (MtCO <sub>2</sub> e) |
|-------------------|------------------------------------|-----------------------------|------------------------------------------------------------------------|
| 3rd (2018 – 2022) | 2,544                              | -                           | -                                                                      |
|                   |                                    | -                           | -                                                                      |
|                   |                                    | 2020                        | 51.26                                                                  |
|                   |                                    | 2021                        | 49.71                                                                  |
|                   |                                    | 2022                        | 48.48                                                                  |
| 4th (2023 – 2027) | 1,950                              | 2023                        | 44.01                                                                  |
|                   |                                    | 2024                        | 44.44                                                                  |
|                   |                                    | 2025                        | 41.65                                                                  |
|                   |                                    | 2026                        | 32.36                                                                  |
|                   |                                    | 2027                        | 26.70                                                                  |
| 5th (2028 – 2032) | 1,725                              | 2028                        | 23.75                                                                  |
|                   |                                    | 2029                        | 22.40                                                                  |
|                   |                                    | 2030                        | 18.55                                                                  |
|                   |                                    | 2031                        | 15.77                                                                  |
|                   |                                    | 2032                        | 12.09                                                                  |
| 6th (2033 – 2037) | 965                                | 2033                        | 9.86                                                                   |
|                   |                                    | 2034                        | 8.00                                                                   |
|                   |                                    | 2035                        | 6.20                                                                   |
|                   |                                    | 2036                        | 6.01                                                                   |
|                   |                                    | 2037                        | 5.67                                                                   |
| 7th (2038 – 2042) | 535                                | 2038                        | 4.97                                                                   |
|                   |                                    | 2039                        | 4.78                                                                   |
|                   |                                    | 2040                        | 4.59                                                                   |
|                   |                                    | 2041                        | 4.03                                                                   |
|                   |                                    | 2042                        | 3.47                                                                   |

- 7.6.18 The receptor for the GHG Assessment is the global atmosphere. All projects worldwide have the potential to contribute to cumulative impacts on the global climate through their GHG emissions. As per ISEP and precedent, and supported in case law, it is not appropriate to undertake a cumulative assessment for GHG assessments, as the climate is global and so a cumulative assessment would require an assessment of all potential worldwide future developments which is not feasible, and it is not appropriate to seek to only assess only some specific schemes. Instead, the appropriate approach is to

consider the Scheme's emissions in the context of Carbon budgets as they are considered to be inherently cumulative. Hence, to assess the impact of GHG emissions from the Scheme, the carbon budgets for the electricity supply sector have been used to help establish significance (**Table 7-6**). To provide further perspective, emissions from the Scheme have also been considered in the context of the full UK carbon budgets. The UK carbon budgets are in place to restrict the total amount of GHG emissions the UK can legally emit in a five-year period.

- 7.6.19 A qualitative approach has been taken for assessing the significance of GHG emissions arising as a result of the Scheme for the years beyond 2042. A quantitative approach is not possible beyond 2042 as, although the carbon budgets are set to decrease over time, there will still be permitted GHG emissions beyond 2050, but with offsetting measures in place to ensure net emissions are zero. The rate at which they will decrease is not known, so beyond 2042, emissions will be compared against the last available Carbon Budget.

Cumulative effects

- 7.6.20 As per ISEP and precedent, and supported in case law, it is not appropriate to do a cumulative assessment for GHG assessments, as the climate is global so would be inappropriate to choose just one project. Carbon budgets can be used as a proxy instead as they are inherently cumulative.

In-combination Climate Change Impact (ICCI) Assessment:

- 7.6.21 The ICCI assessment methodology has been developed in line with the ISEP–'Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation' (Ref 7-32).
- 7.6.22 According to the guidance, an ICCI effect is "*When a projected future climate impact (e.g. increase in temperatures) interacts with an effect identified by another topic and exacerbates its impact. For example, if the biodiversity topic identifies an effect on a habitat or species receptor due to a project/scheme, such as loss of habitat, and in addition projected future higher temperatures will increase the vulnerability of this habitat to fragmentation, this is an ICCI.*"
- 7.6.23 An ICCI assessment identifies how identified receptors in the surrounding environment are affected by the Scheme in combination with future climate change conditions. Climate change impacts relevant to the Scheme will be assessed through the other relevant topics of the ES. These in-combination effects are summarised within this chapter.
- 7.6.24 The related disciplines and the anticipated effects of climate change in **Table 7-7** are considered in the ICCI Assessment.

**Table 7-7: Climate Change Factors for ICCI Assessment**

| Related ES Volume 1 Topic [EN010168/APP/6.1].         | Anticipated Effect                                                   |
|-------------------------------------------------------|----------------------------------------------------------------------|
| <b>Chapter 11: Hydrology, Flood Risk and Drainage</b> | Precipitation changes. Increased risk of flooding. Reduced drainage. |
| <b>Chapter 9: Ecology and Biodiversity</b>            | Climate change impacting species and habitats.                       |
| <b>Chapter 13: Transport and Access</b>               | Greenhouse gas emissions from vehicle movements.                     |
| <b>Chapter 19: Ground Conditions</b>                  | Changing dryness and soil quality as a result of climate change      |

*Climate Change Risk Assessment*

- 7.6.25 For the CCR Assessment, the Scheme during construction, operation and maintenance, and decommissioning phases is considered the receptor. The CCR Assessment provides a description of how the Scheme will be affected by climate change impacts, taking into consideration the embedded mitigation measures that have been designed into the Scheme so that it will be more resilient to the impacts identified during the review of the UK Climate Projections 2018 (UKCP18) data (Ref 7-39).
- 7.6.26 UKCP18 data and historic climate data from the Met Office were acquired to establish the future and historic baseline climate conditions (Ref 7-40).
- 7.6.27 The EIA regulations require information regarding the vulnerability of the Scheme to climate change. An assessment has been developed based on the ISEP 'Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption' document (Ref 7-32), which assesses the Scheme's resilience to potential impacts caused by climate change.
- 7.6.28 The risks to the Scheme associated with an increased frequency of extreme weather events, as highlighted by UKCP18 projects will be assessed. The Scheme's resilience against gradual climatic changes over the lifespan of the Scheme, expected to be 60 years, will also be considered.
- 7.6.29 Vulnerable and sensitive receptors were identified, and the sensitivity of the receptors determined using quantifiable data, where available. The susceptibility and vulnerability of the receptor are considered alongside its value and importance.
- 7.6.30 The susceptibility of the receptor is determined using the following scale:
- **High susceptibility:** receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevaling climatic factors (e.g. lose much of its original function and form).

- **Moderate susceptibility**: receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevaling climatic conditions (e.g. retain elements of its original function and form).
- **Low susceptibility**: receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevaling climatic factors (e.g. retain much of its original function and form).

7.6.31 The vulnerability of the receptor is determined using the following scale:

- **High vulnerability**: receptor is directly dependent on existing/prevaling 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 vulnerability**: 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 vulnerability**: climatic factors have little influence on the receptors.

7.6.32 The likely effects of climate change on the Scheme will be evaluated to identify the magnitude i.e. the degree of change from the relevant baseline conditions. Magnitude is based on a combination of likelihood and consequence.

7.6.33 The criteria to assess the likelihood of occurrence and the consequence of the hazard produced by the climate change impact are defined in **Table 7-8** and

7.6.34 **Table 7-9**. The consequence of the climate risk will be determined using professional judgement and supporting evidence.

**Table 7-8: Criteria to Assess Likelihood of Climate Change Risk Impact**

| Level of Likelihood | Definition of Likelihood                                                                                                                                                                                                    |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very low            | It is highly improbable that the impact will occur during the operation and maintenance phase or the construction phase of the assets or systems. The event might occur once during the lifetime of the project (60 years). |
| Low                 | The event occurs once during the lifetime of the Scheme (60 years).                                                                                                                                                         |
| Medium              | The event occurs limited times during the lifetime of the project (60 years), e.g. approximately once every 15 years, typically four events.                                                                                |
| High                | The event occurs several times during the lifetime of the project (60 years), e.g. approximately once every five years, typically 12 events.                                                                                |
| Very High           | The event occurs multiple times during the lifetime of the project (60 years), e.g. approximately annually, typically 60 events.                                                                                            |

**Table 7-9: Measure of CCR Consequence**

| Consequence of impact | Description                                                                                                                                                                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very large adverse    | <ul style="list-style-type: none"> <li>▪ Single or multiple deaths involving any persons;</li> <li>▪ Disastrous work interruption;</li> <li>▪ Huge financial loss; and</li> <li>▪ Devastating environmental implications.</li> </ul>                 |
| Large adverse         | <ul style="list-style-type: none"> <li>▪ Major injuries, including permanent disabling injuries of over 14 days;</li> <li>▪ Major work interruption;</li> <li>▪ Serious financial loss; and</li> <li>▪ Severe environmental implications.</li> </ul> |
| Minor adverse         | <ul style="list-style-type: none"> <li>▪ Injury requiring first aid treatment;</li> <li>▪ Causing interruption of work for three days or less;</li> <li>▪ Slight financial loss or cost; and</li> <li>▪ Slight environmental consequence.</li> </ul> |
| Negligible adverse    | <ul style="list-style-type: none"> <li>▪ Minor cuts/abrasions requiring minimal treatment;</li> <li>▪ Causing minimal work interruption;</li> <li>▪ No financial loss or costs; and</li> <li>▪ No environmental consequence.</li> </ul>              |

7.6.35 The receptor significance is evaluated using the sensitivity and magnitude of effect that are combined in the significance matrix shown in **Table 7-10**.

**Table 7-10: Significance matrix**

|                        |            | Measure of Likelihood* |     |        |      |           |
|------------------------|------------|------------------------|-----|--------|------|-----------|
|                        |            | Very Low               | Low | Medium | High | Very High |
| Measure of Consequence | Negligible | NS                     | NS  | NS     | NS   | NS        |
|                        | Minor      | NS                     | NS  | NS     | S    | S         |
|                        | Moderate   | NS                     | NS  | S      | S    | S         |
|                        | Large      | NS                     | S   | S      | S    | S         |
|                        | Very large | NS                     | S   | S      | S    | S         |

\*NS: Not Significant, S: Significant

7.6.36 Embedded mitigation measures of the Scheme have been considered as part of the review of potential impacts. These measures are detailed in Section 7.9.

#### Cumulative Effect

- 7.6.37 As per ISEP and precedent, and supported in case law, it is not appropriate to do a cumulative assessment for GHG assessments, as the climate is global so would be inappropriate to choose just one project. Carbon budgets can be used as a proxy instead as they are inherently cumulative.

## 7.7 Baseline Conditions

- 7.7.1 This section describes the existing and anticipated future baseline conditions for the Climate Change assessment.

### **GHG Impact Assessment**

#### Existing Baseline

- 7.7.2 The current use of the Site (2025) predominantly consists of arable land, managed trees and hedgerows. The baseline agricultural GHG emissions are dependent on the soil and vegetation types present, and the fuel used for the operation of any plant and machinery on the Site.
- 7.7.3 For the lifecycle GHG impact assessment, the baseline is a 'business as usual' scenario whereby the Scheme is not implemented. The baseline comprises existing carbon stock and sources of GHG emissions within the Site from the existing activities on-site. As a conservative approach, the baseline activities on site will be assumed to be generating zero emissions of CO<sub>2</sub>e.

#### Future Baseline

- 7.7.4 The Scheme is expected to provide a substantial source of renewable electricity for the country. Compared to the emissions generated from the current grid as a UK average, the Scheme is anticipated to contribute to a net reduction in GHG emissions. This was assessed by the comparison of emissions of Carbon Dioxide and equivalent gases (CO<sub>2</sub>e) from existing UK average grid emissions forecasts for 2029 (49 gCO<sub>2</sub>e/kWh), the first year of operation of the Scheme, and the carbon intensity of the Scheme.
- 7.7.5 It is recognised that UK grid carbon intensity is projected to decrease over time as additional low-carbon generation is deployed. However, the purpose of the assessment is not to demonstrate that the Scheme will maintain a lower carbon intensity than the evolving national grid throughout its operational lifetime. Rather, the assessment considers the lifecycle greenhouse gas emissions associated with the Scheme and the contribution it makes to meeting national decarbonisation.
- 7.7.6 By using the first operational year data, the assessment avoids inherent uncertainties and potential fluctuations that may arise in future years. This includes uncertainties related to technological advancements, policy changes, market dynamics, and other factors that could impact the grid's carbon intensity and the Scheme's emissions. This means that the effect of the scheme on future national grid intensity is not double counted.

7.7.7 Consideration was given to the wider impacts of the Scheme including in the context of the carbon budget targets developed for the UK, and the Scheme's overall contribution to climate change.

7.7.8 In the absence of the Scheme, it is considered there will be no change to the future baseline for climate change.

### **Climate Change Risk**

#### **Existing Baseline**

7.7.9 The most recent available and completed historic climate data acquired by the Met Office from the closest Met Office Station to the Scheme (Yeovilton) for the 30-year climate period of 1991 – 2020 will provide the current baseline for the CCR Review (Ref 7-40). Yeovilton Met Office Station is approximately 55km to the southwest of the Scheme. This is summarised in **Table 7-11** below.

**Table 7-11: Historic Climate Data**

| Climatic Factor                               | Month    | Value  |
|-----------------------------------------------|----------|--------|
| Average annual maximum daily temperature (°C) | -        | 14.89  |
| Warmest month on average (°C)                 | July     | 21.93  |
| Coldest Month on average (°C)                 | February | 1.81   |
| Mean annual rainfall levels (mm)              | -        | 729.53 |
| Wettest month on average (mm)                 | November | 81.87  |
| Driest month on average (mm)                  | May      | 47.15  |

#### **Future Baseline**

7.7.10 It is anticipated that the future baseline will be different from the current present-day baseline, due to changes in climate. For this assessment, UKCP18 probabilistic projections have been provided for 30-year periods from 2020 – 2099 (Ref 7-39) and obtained for the following climate variables which includes annual and seasonal changes in climatic conditions over the land area of the Scheme.

- Mean annual air temperature;
- Maximum air temperature;
- Mean annual precipitation; and
- Mean annual cloud cover.

- 7.7.11 A representative 25 km<sup>2</sup> grid square that encompasses the Scheme's location has been used to analyse the UKCP18 probabilistic projections for changes in average climate. Temperature, precipitation, and cloud anomalies are considered relative to the 1981 to 2010 baseline. These variables are illustrated in **Table 7-12**.
- 7.7.12 There are a range of different climate scenarios also known as Representative Concentration Pathways (RCPs) used in UKCP18 that help inform future trends in emissions (Ref 7-41). For this assessment RCP 8.5 has been used, which assumes a 'business as usual' pathway for climate change as recommended by the ISEP guidance.
- 7.7.13 The impact of climate change will be determined over the course of the Scheme's lifetime, which is estimated to be 60 years for the purpose of the EIA.

**Table 7-12: Anomalies for probabilistic projections (25km<sup>2</sup>) over UK for RCP8.5**

| Variable                                      | 2020-2049 | 2050-2079 | 2070-2099 |
|-----------------------------------------------|-----------|-----------|-----------|
| Mean air temperature anomaly at 1.5 m (°C)    | 1.0       | 2.4       | 3.7       |
| Precipitation rate anomaly[%]                 | 1.0       | -0.4      | 0.7       |
| Maximum air temperature anomaly at 1.5 m [°C] | 1.1       | 2.6       | 4.0       |
| Total cloud anomaly [%]                       | -2.2      | -5.1      | -7.7      |

## 7.8 Potential Impacts

- 7.8.1 Embedded mitigation measures being incorporated into the design and construction of the Scheme are set out in Section 7.9 below. Prior to the implementation of any mitigation (embedded or additional), the Scheme has the potential to affect Climate Change (positively or negatively), during construction, operation and decommissioning. The potential beneficial impacts include the generation of renewable energy and the associated reduction in GHG emissions compared to the existing grid mix. The potential adverse impacts include emissions from construction activities, transportation, and the embodied carbon in materials used.

## 7.9 Embedded Mitigation

- 7.9.1 The Scheme has been designed, as far as practicable, to avoid and reduce impacts and effects on Climate Change and to increase Climate Change resilience through the process embedding measures into the design. In addition, how the Scheme is constructed, operated and maintained, and decommissioned would be controlled through measures secured in the DCO in order to manage and minimise potential environmental effects (required as a

result of legislative requirements and/or standard sectoral practices). The relevant measures which form the GHG Reduction Strategy for the Scheme, as is required by NPS EN-1, are included within the **Outline CEMP [EN010168/APP/7.12]** and **Outline OEMP [EN010168/APP/7.13]**, as relevant, rather than forming a separate document.

- 7.9.2 The following embedded mitigation measures have been incorporated into the Scheme design.

### **Construction (2027-2029)**

#### **GHG Impact**

- 7.9.3 Embedded mitigation measures will be implemented to reduce the GHG impact of the Scheme. Specific embedded mitigation measures include the following and are also included in the **Outline CEMP [EN010168/APP/7.12]** and **Outline Site Waste Management Plan [EN010168/APP/7.16]**.

7.9.4 **Reducing waste:**

- Reuse of materials on-site wherever feasible, e.g. reuse of excavated soil for landscaping;
- Off-site prefabrication, where practical, including the use of prefabricated elements;
- Segregation of waste at source, where practical, to facilitate a high proportion and high-quality recycling; and
- Off-site reuse, recycling and recovery of materials and waste where reuse on-site is not practical, e.g. through use of an off-site waste segregation or treatment facility or for direct reuse or reprocessing off-site.

7.9.5 **General practices:**

- Adopting the Considerate Constructors Scheme (CCS) to assist in reducing pollution, including GHGs, from the Scheme by employing good industry standard practice measures, e.g. recycling and separating waste and choosing low carbon and recyclable materials where feasible; and
- Conducting regular planned maintenance of the construction plant and machinery to optimise efficiency.

7.9.6 **Reducing vehicle emissions:**

- Encouraging the use of lower carbon modes of transport by identifying and communicating local bus connections and pedestrian and cycle access routes to/from the Scheme to all construction staff, and providing appropriate facilities for the safe storage of cycles;

- Switching vehicles and plant off when not in use and ensuring construction vehicles conform to current applicable EU emissions standards adopted by the UK (Ref 7-45); and
- Implementing a shuttlebus to reduce the number of trips made by construction staff.

### **Climate Change resilience**

7.9.7 Climate change resilience measures are embedded within the Scheme, particularly in relation to flood risk. These measures are outlined below. The specific flood risk impacts and associated mitigation measures are discussed in more detail in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]** and include:

- Associated electrical infrastructure, including substations and Conversion Units (refer to **ES Volume 1, Chapter 3: The Scheme [EN010168/APP/6.1]**) are sequentially located to areas with a 'Low' probability of flooding (less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)), where practicable;
- Less-flood sensitive infrastructure forming the wider Scheme (Solar PV Panels and cabling) will be sequentially located outside the 1 in 100 plus climate change annual probability extent (1% +CC) or where this is not practicable restricted to areas which would experience less than 1m depth of flooding during the same event;
- For both fixed and tracker panels, all sensitive and electrical equipment on the Solar PV Panel will be elevated by the legs (including the solar panel face itself) so that it is no less than 0.6 metres above the above the 0.1% Annual Exceedance Probability (AEP) flood level;
- Tracker panel units will be mounted on raised frames (raised a minimum of 0.4 metres when on maximum rotation angle) and will therefore be raised above surrounding ground levels and fitted with a tracking system. During times of flooding, solar panels may be stowed by the tracking system algorithm onto a horizontal plane, to the minimum post height of 2.5 metres above ground level. This ensures that all sensitive and electrical equipment on the solar panel is raised to a minimum of 2.5 metres above ground level in the horizontal position;
- Protecting workers and resources from extreme weather conditions through appropriate PPE and working practices as secured through the detailed CEMP; and
- Monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways. This will be included within the detailed CEMP.

### Operation (2029-2089)

- 7.9.8 Embedded mitigation measures to be applied during the operation and maintenance phase are set out in the **Outline OEMP [EN010168/APP/7.13]**. Specifically, those measures which are applicable for both construction and operation are set out below:
- Using equipment's cooling systems where necessary, i.e. for the BESS Area and for the standalone conversion units, and adapting working practices and equipment used based on current weather conditions;
  - Protecting workers and resources from extreme weather conditions through appropriate PPE and working practices as secured through the OEMP;
  - Monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways. This will be included within the OEMP; and
  - BESS Area to include Heating, Ventilation and Cooling (HVAC) systems which would be contained within the individual equipment containers.
- 7.9.9 The Scheme itself mitigates against the effects of climate change. There is a need to generate electricity and generating this through solar power results in less GHG emissions than other conventional methods.

### Decommissioning (2089-2091)

- 7.9.10 Similar measures will be developed prior to the decommissioning phase for the use of lower-carbon and more climate change resilient methods and will be outlined in the **Outline Decommissioning Statement (DS) [EN010168/APP/7.14]**. Detail about the measures is limited as the decommissioning environment beyond 2089 is likely to be considerably different to today.

## **7.10 Assessment of Likely Impacts and Effects**

- 7.10.1 This section considers the potential impacts outlined in Section 7.8 and, taking into account the committed mitigation measures as detailed in Section 7.9, assesses the potential for the Scheme to generate effects using the methodology as detailed in Section 7.6.

### **GHG Impact Assessment**

- 7.10.2 For each lifecycle stage of the Scheme (construction, operation and maintenance, and decommissioning), the associated GHG emissions are identified and assessed.

7.10.3 A summary of the anticipated GHG emissions arising from the Scheme are shown below. Note that Well-To-Tank (WTT) emissions are included for energy usage and transport sources.

**Table 7-13: Possible sources of GHG emissions**

| Lifecycle Stage                 | Activity                                                                                                                                                                                          | Primary emission sources                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Construction phase              | The mining and generation of raw materials and manufacturing of products necessary to make equipment.                                                                                             | GHG emissions that are embodied within the product.                                                                            |
|                                 | This stage is anticipated to create a significant input to GHG emissions, due to the materials that contain high levels of embodied carbon, complex manufacturing processes and equipment design. | GHGs that are produced during manufacturing                                                                                    |
|                                 | Construction activity on-site.                                                                                                                                                                    | Energy consumption on-site. Commuting construction workers.                                                                    |
|                                 | Construction materials that are transported and not integrated in embodied GHG emission. Equipment required is likely to require shipment, due to overseas origin.                                | Transportation of materials to the Sites and the amount of fuel consumed.                                                      |
|                                 | Construction workers that would need transportation to the Site.                                                                                                                                  | Transportation of workers to the Sites and resulting GHG emissions.                                                            |
|                                 | Waste produced during the construction process that need to be disposed.                                                                                                                          | GHG emissions produced from the transportation and removal of waste materials                                                  |
|                                 | Water use                                                                                                                                                                                         | Treatment of wastewater and supply of potable water                                                                            |
| Operation and maintenance phase | Scheme maintenance                                                                                                                                                                                | GHG emissions from maintenance. The operational aspects are expected to be negligible in the context of overall GHG emissions. |
|                                 | Replacement of materials (i.e. batteries and replacement panels)<br>Water use on site for fire suppression and cleaning panels.                                                                   | GHG emissions that are embodied within the products and the transportation of the materials.                                   |
| Decommissioning phase           | Decommissioning activity occurring on-site.                                                                                                                                                       | Energy consumption of on-site vehicles and generators.                                                                         |
|                                 | Removal and transportation of any waste materials.                                                                                                                                                | GHG emissions generated from the transportation and disposal of waste materials.                                               |

| Lifecycle Stage | Activity                                              | Primary emission sources                                      |
|-----------------|-------------------------------------------------------|---------------------------------------------------------------|
|                 | Workers that would need to be transported to the Site | Transportation of workers to site and resulting GHG emissions |

- 7.10.4 The impacts and effects (both beneficial and adverse) associated with the construction, operation and maintenance, and decommissioning of the Scheme are outlined in the sections below.
- 7.10.5 Whilst it is important to understand the GHG impacts at each individual lifecycle stage, it is also important to understand the net lifecycle GHG impact of the Scheme due to the long-term cumulative nature of GHG emissions over the assessed lifespan of the Scheme.
- 7.10.6 The net impact of the Scheme is also identified and assessed, taking into account the renewable energy generation and the benefit of this in the context of the wider energy generation sector and the National Grid average GHG intensity inclusive of future estimated emissions. This overall assessment, which accounts for all GHG emissions over the assessed lifespan of the Scheme, compares the Scheme's lifetime GHG intensity to the projected National Grid average GHG intensity for 2029, the year where the Scheme will be operational, to quantify the net GHG impact of the Scheme compared with other predicted energy generation sources.
- 7.10.7 By using the first operational year data, the assessment avoids the inherent uncertainties and potential fluctuations that may arise in future years. This includes uncertainties related to technological advancements, policy changes, market dynamics, and other factors that could impact the grid's carbon intensity and the Scheme's emissions. This does not double count for the effectiveness that the scheme will have in reducing overall grid emission intensity.
- 7.10.8 The lifecycle greenhouse gas intensity of the Scheme was compared with the projected UK grid carbon intensity in the first year of operation (2029) to provide context regarding the carbon performance of the Scheme at the point electricity generation commences.

### **Construction (2027-2029)**

- 7.10.9 The construction phase is anticipated to take approximately two years (24 months). Construction activities will be carried out Monday to Friday 07:00-18:00 and between 08:00 and 13:30 on Saturdays.
- 7.10.10 The construction phase for the Scheme includes the preparation of the Site, installing the access tracks, erection of security fencing, assembly and erection of the Solar PV Panels, installation of the inverters/transformers and grid connection.

- 7.10.11 The construction of the BESS Area element of the Scheme will include the preparation of the Site, installation of the access roads, erection of security fencing, assembly of the battery system, and installation of the Conversion unit and grid connection.
- 7.10.12 Calculations for the embodied carbon within the various products to be used on site and the sources for each are set out below.

*Solar PV Panels*

- 7.10.13 A Solar PV Panel is composed of multiple modules. It is estimated the total number of modules for Lime Down will be 842,000.
- 7.10.14 The EIA allows for either tracking (maximum 598,260) or fixed (maximum 842,000) panels. Carbon equivalent totals are provided for both scenarios, providing a maximum and minimum of the final total CO<sub>2</sub>e of the Scheme. Whilst applying a fixed design would generate a lower yield per panel, a greater number of panels can be installed, thereby yielding a greater amount of energy over the lifetime of the Scheme.
- 7.10.15 The same solar panel EPD is applied for both the tracked and fixed designs. The EPD accounts for all Greenhouse Gas emissions for the life cycle modules A1-A3; raw material supply (including silicon, glass etc), transport, and manufacturing.
- 7.10.16 The power output of the solar panel used in the scheme is assessed as 660 Wp, based on currently available technologies and current design, with an EPD value of 0.346 kgCO<sub>2</sub>e/Wp. This gives a total of 136,619 tCO<sub>2</sub>e for the tracked, or 192,279 tCO<sub>2</sub>e for the fixed PV panels in the Scheme. The lower emissions for the tracker scenario is a reflection of the lower number of panels.
- 7.10.17 It is considered that each Solar PV mounting structure will weigh 17.6 kg. It has been assumed that all Solar PV Mounting Structures will be primarily made of steel.
- 7.10.18 Using a value of 2.71 kgCO<sub>2</sub>e/kg (Ref 7-35) a value of 40,065 tCO<sub>2</sub>e has been estimated for the Solar PV Mounting Structures. This has not been reduced for the lower number of panels for the tracked panels scenario.
- 7.10.19 The total embodied carbon for all Solar PV Panels and Solar PV Mounting Structures, accounting for the materials used in the Scheme is: 176,683 tCO<sub>2</sub>e for tracked panels or 232,344 tCO<sub>2</sub>e for fixed panels.

*Transformers, Inverters and Switchgear (contained within Conversion Units)*

- 7.10.20 To calculate the embodied carbon associated with the production of the transformers to be used by the Scheme, the material breakdown of a typical transformer as reported in a lifecycle assessment produced by Hegedic et al (2016) (Ref 7-43) was used as a benchmark to estimate material quantities associated with the transformers required for the Scheme.

- 7.10.21 For the purpose of this assessment, it is assumed a total of two (2) x 400/33 kV, six (6) x 132/33 kV and 166 439kVA 33kV transformers with inverters and switchgear would be installed on Site.
- 7.10.22 The total weight of each transformer type is based on specifications of equipment on previous Island Green Power solar schemes.
- 7.10.23 The materials used in transformers are oil, steel, copper and plasterboard as set out in (Ref 7-43). The proportions of typical material are also shown in (Ref 7-43). As the total weight is known, the remaining materials have been apportioned appropriately.

**Table 7-14: Materials of kgCO<sub>2</sub>e in Transformers and Switchgear**

| Material     | Total Weight (tonnes) | kgCO <sub>2</sub> e/kg | tCO <sub>2</sub> e |
|--------------|-----------------------|------------------------|--------------------|
| Steel        | 1266                  | 2.364                  | 2994               |
| Copper       | 332                   | 2.710                  | 900                |
| Plasterboard | 83                    | 0.390                  | 32                 |
| Oil          | 370                   | 1,401                  | 518                |
| <b>Total</b> |                       |                        | <b>4,445</b>       |

#### Electrical Cables

- 7.10.24 Indicative cable lengths (2,755 km to 3,861 km, of which 77% corresponds to high voltage cables) and weights (292.96 to 397.34 tonnes, of which 50.9 to 71.7 tonnes correspond to high voltage cables) were estimated for Grid Connection Cables, On-Site Cables and Interconnecting Cables for the whole of the Scheme.
- 7.10.25 Total weight per metre was estimated for the two main materials based on cables used for similar schemes used within the cables. These are copper (21 kg/m) and aluminium (10.7 kg/m). The remaining weight is assumed to be polyethylene.
- 7.10.26 Embodied carbon values for each material have been taken from (Ref 7-35) and are shown below:
- Copper: 2.71 kgCO<sub>2</sub>e/kg;
  - Aluminium: 6.67 kgCO<sub>2</sub>e/kg; and
  - Polyethylene: 2.54 kgCO<sub>2</sub>e/kg
- 7.10.27 The total embodied carbon from all electrical cables used by the Scheme is estimated to be 876 (tracked arrangement) to 1,194 (fixed) tCO<sub>2</sub>e.

#### BESS Containers

- 7.10.28 For the purpose of this assessment, a value of 100 kgCO<sub>2</sub>e per kWh is considered as a conservative assumption. The assessed MWh battery storage has been assumed as 1,000 MWh for both tracked and fixed panel scenarios.

- 7.10.29 Based on the above assumptions the total CO<sub>2</sub>e from batteries is 100,000 tCO<sub>2</sub>e.

**Shipping of Materials**

- 7.10.30 Based on the provided shipping weights and making the precautionary assumption that all products would come from China, the below calculations are made. Shipping distance from Shanghai to Dover is 21,880km, this includes WTT emissions.

**Table 7-15: Shipping GHG Emissions**

| Shipping Weight (tonnes) | Distance (km) | kgCO <sub>2</sub> e/tonne/km* | kgCO <sub>2</sub> e     | tCO <sub>2</sub> e |
|--------------------------|---------------|-------------------------------|-------------------------|--------------------|
| 60,655 - 75,788          | 21,880        | 0.01621                       | 21,512,658 - 26,880,122 | 21,513 - 26,880    |

\* General Average Cargo Ship from Ref 7-35

**Vehicle Movements**

- 7.10.31 A 1-way distance of 31.36 km per journey has been assumed for the worker transportation calculations. The UK Government 2024 emissions factors for 'Average car' and 'Average Local Bus', including WTT emissions, have been applied to this distance and total worker numbers to calculate GHG emissions associated with worker transport.
- 7.10.32 There are 1,264 forecast daily construction worker movements (arrivals plus departures) and an estimated construction phase of 529 days (estimated based on a conservative scenario of the Construction phase being 2 years). For the purpose of this assessment it is assumed 32 trips (arrivals plus departures) by shuttlebus (20 people per shuttlebus equals to 622 worker movements) and 416 trips (arrivals plus departures) by car considering 1.5 people per car (622 worker movements). Considering the conversion factor for a vehicle medium car for car movements and average local bus for the Shuttlebus, the total GHG emissions for construction workers is detailed in the table below. These estimates remain consistent between the tracked and fixed scenarios.

**Table 7-16: Construction Worker GHG Emissions**

| Vehicles     | Number of Trips | Average Distance (km) | kgCO <sub>2</sub> e/km (Ref 7-35) | kgCO <sub>2</sub> e | tCO <sub>2</sub> e |
|--------------|-----------------|-----------------------|-----------------------------------|---------------------|--------------------|
| Vehicles     | 222,180         | 31.36                 | 0.20910                           | 1,456,918           | 1,457              |
| Shuttle Bus  | 20,102          | 31.36                 | 2.69900                           | 1,701,446           | 1,701              |
| <b>Total</b> |                 |                       |                                   |                     | <b>3,158</b>       |

- 7.10.33 The total HGV trips for the Site have been estimated as 39,130 two-way trips and are set out below. This assessment has assumed that all the trips will be from China. The distance is estimated from industrial areas around Shanghai as detailed in Paragraph 7.4.13, and then from Dover to the Sites. The total road distance is considered to be 588.4 km. It is assumed that half of delivery vehicles will be articulated HGVs and half will be Rigid HGVs. To account for delivery to and from the Sites, it is assumed that vehicles will be 50% laden. These estimates remain consistent between the tracked and fixed scenarios.

**Table 7-17: Construction HGV GHG Emissions**

| Vehicles            | Number of Trips | Average Distance (km) | kgCO <sub>2</sub> e/km (Ref 7-35) | kgCO <sub>2</sub> e | tCO <sub>2</sub> e |
|---------------------|-----------------|-----------------------|-----------------------------------|---------------------|--------------------|
| HGV 50% Articulated | 19,565          | 588.4                 | 0.76642                           | 8,822,837           | 11,298             |
| HGV 50% Rigid       | 19,565          | 588.4                 | 0.62106                           | 7,149,489           | 9,222              |
| <b>Total</b>        |                 |                       |                                   |                     | 23,679             |

- 7.10.34 The total emissions from vehicle movements associated with the Scheme during construction has been estimated as 3,158 tCO<sub>2</sub>e for construction workers and 20,520 tCO<sub>2</sub>e for HGV. These estimates remain consistent between the tracked and fixed scenarios.

#### Waste

- 7.10.35 Waste streams during the construction phase which have been assessed for their GHG Emissions include:
- Sewage Waste;
  - Excavated Ground material which cannot be reused;
  - Aggregate and Concrete waste; and
  - Waste from Packaging of materials.
- 7.10.36 Sewage waste generated during construction has been estimated at 16,376 m<sup>3</sup>. Using a conversion factor of 0.18574 kgCO<sub>2</sub>e/m<sup>3</sup> for water treatment (Ref 7-35), the total estimated emissions from sewage waste have been calculated at 3 tCO<sub>2</sub>e. This estimate remains consistent between the tracked and fixed scenarios.
- 7.10.37 Excavated ground material from site has been estimated as 139,666 m<sup>3</sup>. When applying a conversion factor for soils of 0.98485 kgCO<sub>2</sub>e/m<sup>3</sup> (Ref 7-35), the total

emissions from excavated soil will be 172 tCO<sub>2</sub>e. This estimate remains consistent between the tracked and fixed scenarios.

- 7.10.38 It is estimated there will be a cut and fill balance and that no ground material will be trucked off site.
- 7.10.39 It is assumed that 5% of the concrete feet could be damaged unintentionally during the construction process and disposed of. This is estimated to be 78.50 tonnes. Total aggregate waste is estimated to be 7,688.62 tonnes. Using the same conversion factor of 1.23393 kgCO<sub>2</sub>e/m<sup>3</sup> for concrete disposed at landfill (Ref 7-31), total estimated emissions have been calculated at 9 tCO<sub>2</sub>e. These estimates remain consistent between the tracked and fixed scenarios.
- 7.10.40 Information relating to the waste of packaging for the Solar PV Panels and Solar PV Mounting Structures has been provided as set out below for the higher number of panels (fixed). As the volume has been provided but not the weight, typical conversion factors have been used to calculate the total weight and the total emissions from the packaging materials to be used. Data for the fixed panel configuration are presented in Table 7-18. A total of 75.91 tCO<sub>2</sub>e are estimated for the tracked panel configuration, and 106.81 tCO<sub>2</sub>e for the fixed panel configuration.

**Table 7-18: Packaging Materials Embedded GHG Emissions**

| Packaging Item                                       | Total Volume (m <sup>3</sup> ) (maximum) | Assumed Density Material (tonnes/m <sup>3</sup> ) | Total Weight (tonnes) | kgCO <sub>2</sub> e/tonne for material (Ref 7-35) | Total tCO <sub>2</sub> e |
|------------------------------------------------------|------------------------------------------|---------------------------------------------------|-----------------------|---------------------------------------------------|--------------------------|
| Pallet Wood                                          | 11,611.97                                | 0.70                                              | 8,128.38              | 6.41                                              | 52.11                    |
| Polyurethane Foam pad for cushioning between modules | 7,720.21                                 | 0.024                                             | 185.29                | 6.41                                              | 1.19                     |
| Paper and Board                                      | 12,011.56                                | 0.60                                              | 7,206.94              | 6.41                                              | 46.20                    |
| Corner pieces and edge spacers made of HDPE          | 140.70                                   | 0.02                                              | 3.38                  | 6.41                                              | 0.02                     |
| Cable Drums                                          | 1,622.27                                 | 0.70                                              | 1,135.59              | 6.41                                              | 7.28                     |
| Pallet Nails                                         | 1,427,849 <sup>a</sup>                   | 0.79 <sup>b</sup>                                 | 1.13                  | 6.41                                              | 0.01                     |
| Total                                                |                                          |                                                   |                       |                                                   | 106.81                   |

a: Total number of pallet nails

b: Nail weight (g)

- 7.10.41 The total waste generated during construction results in an estimated 184 tCO<sub>2</sub>e.

Water Use

- 7.10.42 Water use has been estimated for:

- Water consumed for construction and cleaning of HGV and other equipment in litres; and
- Potable and non-potable water for drinking and sanitary purpose in litres.

**Table 7-19: Total Construction Phase Water Use Emissions**

| Water use during construction (million litres) | Water Supply emissions (kgCO <sub>2</sub> e/ million litres) (Ref 7-35) | kgCO <sub>2</sub> e | tCO <sub>2</sub> e |
|------------------------------------------------|-------------------------------------------------------------------------|---------------------|--------------------|
| 17.8 - 25.0                                    | 153.10865                                                               | 2,720 - 3,828       | 3 - 4              |

Energy Use

- 7.10.43 Electricity for temporary site security during the construction phase and electricity for office cabin and welfare centres has been estimated for the construction phase, this includes WTT emissions. This estimate remains consistent between the tracked and fixed scenarios.

**Table 7-20: Energy usage during Construction Phase GHG Emissions**

| Total Energy usage (kWh) | Total kg CO <sub>2</sub> e per kwh (Ref 7-35) | tCO <sub>2</sub> e over construction phase |
|--------------------------|-----------------------------------------------|--------------------------------------------|
| 1,062,030                | 0.25295                                       | 269                                        |

Summary of Construction GHG Emissions

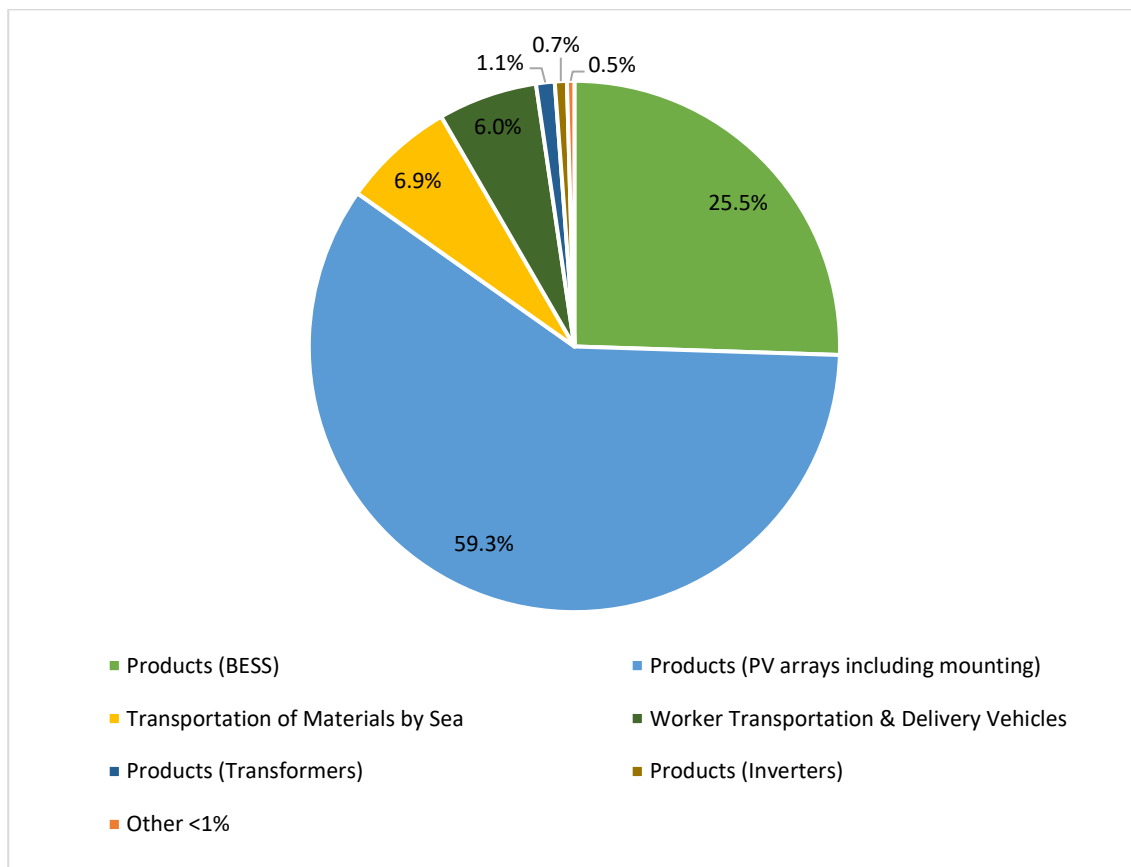
- 7.10.44 During the construction phase, the greatest impact of GHGs is the result of embodied carbon in the materials used for construction. As mentioned previously; the Solar PV Panels are expected to be sourced from China or a country of similar distance. The manufacture and supply of Solar PV Panels and batteries will be the largest source of GHG emissions. The summary of GHG emissions during the construction phase is shown in Table 7-21 for the fixed panel scenario.

**Table 7-21: Construction GHG Emissions**

| Emissions Source                                                  | Emissions (tCO <sub>2</sub> e) | % Construction Emissions |
|-------------------------------------------------------------------|--------------------------------|--------------------------|
| Products (BESS containers)                                        | 100,000                        | 25.5                     |
| Products (Solar PV Panels including Solar PV Mounting Structures) | 232,344                        | 59.3                     |
| Transportation of Materials by Sea                                | 26,880*                        | 6.9                      |
| Worker Transportation and Delivery Vehicles                       | 23,679*                        | 6.0                      |
| Products (Transformers)                                           | 4,445                          | 1.1                      |
| Products (Inverters)                                              | 2,872                          | 0.7                      |
| Products (Cables)                                                 | 1,194                          | 0.3                      |
| Energy Usage for Construction Phase                               | 269*                           | 0.1                      |
| Packaging                                                         | 107                            | <0.1                     |
| Concrete Feet                                                     | 7                              | <0.1                     |
| Water Usage                                                       | 4                              | <0.1                     |
| Waste                                                             | 184                            | <0.1                     |
| <b>Total</b>                                                      | <b>391,984</b>                 | <b>100.0</b>             |

Note: \* Include emissions from Well-To-Tank

**Plate 7-2: Construction GHG Emissions**



- 7.10.45 It has been identified that products and transportation of materials and workers will likely produce the greatest amount of GHG emissions and mitigation efforts will concentrate on these priority areas.

#### **Significance of Effect (Construction)**

- 7.10.46 Total GHG emissions from the construction phase are estimated to equate to around 330,604 (tracked) to 391,984 (fixed) tCO<sub>2</sub>e.
- 7.10.47 GHG emissions from construction activities will be limited to the duration of the construction phase (anticipated to be 2 years). The emissions from the construction will not be evenly weighted between the 2 years but for the purpose of this assessment it is considered emissions will be evenly weighted between both years and will be made in 2027 and 2028. When annualised, the total annual construction emissions equate to around 165,302 (tracked) to 195,992 (fixed) tCO<sub>2</sub>e.
- 7.10.48 **Table 7-22** presents the estimated construction emissions against the carbon budget periods during which they arise. Construction emissions will fall under the 4<sup>th</sup> and 5<sup>th</sup> UK carbon budgets.
- 7.10.49 As the construction phase will fall within the 4<sup>th</sup> and 5<sup>th</sup> carbon budgets, the annual emissions of each phase have been compared to the relevant annualised carbon budgets to enable assessment of the phases individually.

**Table 7-22: Construction GHG Emissions and UK Carbon Budgets**

| Relevant UK Carbon Budget        | Annualised UK Carbon Budget (tCO <sub>2</sub> e) | Annual Construction Emissions for the Scheme During Carbon Budget Period (tCO <sub>2</sub> e) | Construction Emissions for the Scheme as a Proportion of Carbon Budget |
|----------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 4th Carbon Budget (2023 to 2027) | 390,000,000                                      | 165,302 - 195,992                                                                             | 0.042% - 0.050%                                                        |
| 5th Carbon Budget (2028 to 2032) | 345,000,000                                      | 165,302 - 195,992                                                                             | 0.048% - 0.057%                                                        |

- 7.10.50 Annual emissions from the construction of the Scheme do not contribute to equal to or more than 0.050% and 0.057% of the 4<sup>th</sup> and 5<sup>th</sup> carbon budgets respectively. The magnitude of effect is therefore considered low. GHG emissions from the construction of the Scheme are considered to have a Minor Adverse effect on the climate.

#### **Operation (2029-2089)**

- 7.10.51 GHG emissions will be generated as a result of operational activities such as the transportation of operational workers to and from the Site, water consumption, and replacement and maintenance activities.

*Sulphur hexafluoride*

- 7.10.52 Sulphur hexafluoride (SF<sub>6</sub>) is a potent GHG which has a very high Global Warming Potential (GWP) of 23,900 compared to CO<sub>2</sub>, meaning its potential to contribute to global warming is significantly greater than CO<sub>2</sub> over a 100-year period.
- 7.10.53 The procurement of SF<sub>6</sub>-free equipment will be prioritised where practicable and the selection of Automatic Identification System (AIS) equipment in the electrical design reduces the need to use SF<sub>6</sub> compared to alternative configurations. Procurement of the Scheme's components will begin two to three years before the connection date.

*Maintenance Travel*

- 7.10.54 For the purpose of this assessment, the operation and maintenance phase daily maintenance trips are considered equal to the construction phase daily trips as a conservative scenario. The figures are consistent with the transport chapter. Therefore, the operation and maintenance phase of the Scheme would generate approximately 93,139 tCO<sub>2</sub>e as a result of operational workers travelling to and from the Sites for maintenance throughout the 60 year Scheme operation and maintenance phase. This estimate remains consistent between the tracked and fixed scenarios.
- 7.10.55 The operation and maintenance GHG emissions calculated reflect a conservative approach as the trips for maintenance are expected to be less than those required during construction. Additionally, calculations for worker transportation have been carried out using current conversion emissions factors to estimate emissions over the operational lifetime of the Scheme. However, carbon and emissions associated with energy and fuel use throughout the supply chain are anticipated to be lower in the future as a result of grid decarbonisation and machinery and vehicle electrification in line with the UK's net zero carbon emissions target for 2050.

*Replacement of Scheme Components*

- 7.10.56 The lifespan for the proposed BESS Containers is 10 to 15 years. For the purpose of this assessment, it is assumed that the design lifespan is 10 years as a worst case assumption. The BESS Containers are expected to require five (5) replacements throughout the operation and maintenance phase. While technology may improve (and some of the assumptions used which underpin the embodied carbon values), it has been assumed that the embodied carbon at replacement will be the same as during the construction phase as a conservative approach (see Paragraph 7.10.28). For each BESS Container replacement, considering the embodied carbon within the BESS Container and transportation emissions (sea and land) as described for the operation and maintenance phase for each replacement, it is estimated that 107,728 tCO<sub>2</sub>e will be emitted. This results in a total of 538,639 tCO<sub>2</sub>e over the Scheme's

lifespan considering five replacements. This estimate remains consistent between the tracked and fixed scenarios.

- 7.10.57 It has been assumed that all panels will be fully replaced once during the lifecycle of the Scheme. Additionally, a 10% ad hoc replacement (0.16% replacement per year) was considered as a conservative assumption. This results in a total estimated 160,176 tCO<sub>2</sub>e (tracked) 224,588 tCO<sub>2</sub>e (fixed) over the Scheme's lifespan, inclusive of transportation emissions (sea and land). The Solar PV Mounting Structures are not assumed to require replacement.
- 7.10.58 Inverters are anticipated to have a lifespan of 10 years and as such are assumed to be replaced five times during the operation and maintenance phase. Transformers are anticipated to have a lifespan of 30 years and are assumed to be replaced once during the Scheme's lifespan as a conservative assumption. These replacements will generate 15,206 tCO<sub>2</sub>e for inverters and 5,038 tCO<sub>2</sub>e for transformers inclusive of shipment. These estimates remain consistent between the tracked and fixed scenarios.

#### Water Consumption

- 7.10.59 During operation, to maintain the effectiveness and energy generation efficiency of the solar modules, the panels will be cleaned. For the purpose of this assessment it is considered that the panels will be cleaned once per year. Water will be used for cleaning of the Solar PV Panels and for supply of drinking water on site. It is estimated that 0.42 (tracked) to 0.60 (fixed) million litres per annum will be used. Over the lifespan of the Scheme, 25.4 (tracked) to 35.7 (fixed) million litres are estimated to be used.
- 7.10.60 Using the 'water supply' GHG Conversion Factor of 153.1 kgCO<sub>2</sub>e/million litres, a total of 3.9 tCO<sub>2</sub>e (tracked) to 5.5 tCO<sub>2</sub>e (fixed) are estimated to be emitted due to water use during the operation and maintenance phase of the Scheme.

#### Operational Waste and Packaging

- 7.10.61 There is anticipated to be 4,000 m<sup>3</sup> of sewage waste from the Scheme per annum. Using the wastewater value methodology as per the construction phase, this gives a total of 44.6 tCO<sub>2</sub>e over the Scheme's 60-year lifespan (743.13 kgCO<sub>2</sub>e/year). These estimates remain consistent between the tracked and fixed scenarios.
- 7.10.62 Packaging used during the replacement of products has been estimated for the fixed panel configuration in Table 7-23. A total of 51.77 tCO<sub>2</sub>e are estimated for the tracked panel configuration, and 72.83 tCO<sub>2</sub>e for the fixed panel configuration.

**Table 7-23: Packaging Materials Embedded GHG Emissions**

| Packaging Item                                       | Total Volume (m <sup>3</sup> ) (maximum) | Assumed Density Material (tonnes/m <sup>3</sup> ) | Total Weight (tonnes) | kgCO <sub>2</sub> e/tonne for material (Ref 7-35) | Total tCO <sub>2</sub> e |
|------------------------------------------------------|------------------------------------------|---------------------------------------------------|-----------------------|---------------------------------------------------|--------------------------|
| Pallet Wood                                          | 8,294.27                                 | 0.70                                              | 5,805.99              | 6.41                                              | 37.22                    |
| Polyurethane Foam pad for cushioning between modules | 7,721.62                                 | 0.02                                              | 185.32                | 6.41                                              | 1.19                     |
| Paper and Board                                      | 8,579.89                                 | 0.60                                              | 5,147.93              | 6.41                                              | 33.00                    |
| Corner pieces and edge spacers made of HDPE          | 140.70                                   | 0.02                                              | 3.38                  | 6.41                                              | 0.02                     |
| Cable Drums                                          | 310.95                                   | 0.70                                              | 217.66                | 6.41                                              | 1.40                     |
| Pallet Nails                                         | 142,458                                  | 0.79                                              | 1.13                  | 6.41                                              | 0.01                     |
| Total                                                |                                          |                                                   |                       |                                                   | 72.83                    |

a: Total number of pallet nails

b: Nail weight (g)

### Energy Usage

- 7.10.63 There will be some required energy use for operation of the Sites for the CCTV and monitoring systems and for the office. It is anticipated that GHG emissions from energy usage will reduce over the lifespan of the Scheme as a result of the decarbonization of the grid. However, that assumption is reliant on Schemes such as this one being developed. As a conservative assumption, the baseline value for 2029 from DESNZ (Ref 7-37) has been applied and the same emissions per kWh have been applied over the estimated 60-year Scheme lifespan. This estimate remains consistent between the tracked and fixed scenarios.

**Table 7-24: Operational GHG Emissions from Energy Usage**

| Total Energy usage (kwh) | Total kg CO <sub>2</sub> e per kWh | tCO <sub>2</sub> e over Scheme lifespan |
|--------------------------|------------------------------------|-----------------------------------------|
| 79,650,900               | 0.0489                             | 3,896                                   |

### Ancillary BESS-Driven Carbon Reductions

- 7.10.64 The BESS Area is assumed to have a capacity of 1,000 MWh and has the capacity to supply 17,520 GWh to the grid over the Scheme's lifespan.

- 7.10.65 It is assumed the BESS Area is primarily charged from the solar farm's generation and discharged back into the grid once per day at a typical round-trip efficiency of 85% and has a degradation of 80%.
- 7.10.66 The additional benefits of the BESS Area can be calculated by comparing the energy provided by the BESS Area after being charged by the Scheme's energy generation with the projected carbon intensity of the grid in 2029 (Ref 7-37). According to these calculations, the use of the BESS Area for grid balancing could deliver an additional carbon saving of approximately 245,696 tCO<sub>2</sub>e over the Scheme's lifespan.
- 7.10.67 However, to avoid potential double-counting of emissions savings, these additional carbon savings from the BESS Areas grid balancing function have not been included in the overall GHG assessment for the Scheme. The assessment focuses on the primary emissions reductions achieved through energy generation alone.
- 7.10.68 While these additional BESS-related savings are not factored into the overall assessment, it is important to acknowledge the significant climate change mitigation potential of integrating the BESS Area as part of the overall solar farm development. The BESS Area provides a distinct and valuable grid services function that can lead to substantial further emissions reductions beyond just the renewable energy generation.

#### Summary of Operational Effects

- 7.10.69 The below summary provides estimated GHG emissions over the whole 60-year operation and maintenance phase for the fixed panel configuration scenario. A total of 816,191 tCO<sub>2</sub>e are estimated for the tracked panel configuration, and 880,624 tCO<sub>2</sub>e for the fixed panel configuration. As shown, the production of replacement batteries which are estimated to occur five times during the Scheme's lifespan is the greatest contribution to GHG emissions during operation and maintenance.
- 7.10.70 It should be noted that all estimated emissions are based on the current best available baseline data. It is anticipated that GHG emissions will reduce from the below sources in future years as technology improves and further policy and legislation, which are assumed to bring further GHG reductions, takes effect.

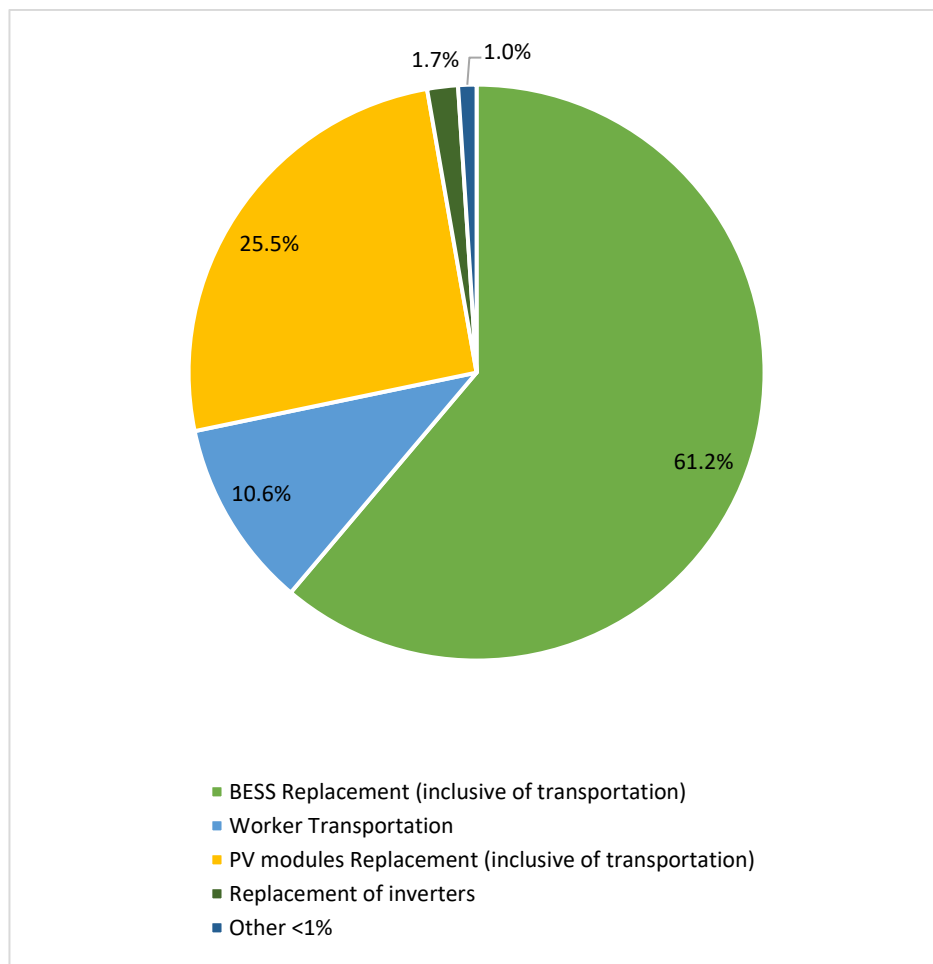
**Table 7-25: Operational GHG Emissions**

| Emissions Source                                        | Emissions (tCO <sub>2</sub> e) | % Operational Emissions |
|---------------------------------------------------------|--------------------------------|-------------------------|
| BESS Replacement<br>(inclusive of transportation)       | 538,639*                       | 61.17                   |
| Worker Transportation                                   | 93,139*                        | 10.58                   |
| PV modules Replacement<br>(inclusive of transportation) | 224,588*                       | 25.50                   |
| Replacement of inverters                                | 15,206                         | 1.73                    |

| Emissions Source                                 | Emissions (tCO <sub>2</sub> e) | % Operational Emissions |
|--------------------------------------------------|--------------------------------|-------------------------|
| Replacement of transformers                      | 5,038                          | 0.57                    |
| Energy Usage for Operation and Maintenance Phase | 3,896                          | 0.44                    |
| Packaging                                        | 73                             | 0.01                    |
| Operational Waste                                | 45                             | 0.01                    |
| Water Usage                                      | 5                              | 0.001                   |
| <b>Total</b>                                     | <b>880,624</b>                 | <b>100</b>              |

Note: \* Include emissions from Well-To-Tank

**Plate 7-3: Operational GHG Emissions**



**Significance of Effect (Operation)**

- 7.10.71 As previously stated, the operation and maintenance phase of the Scheme will encompass the 5<sup>th</sup> (2028 – 2032), 6<sup>th</sup> (2033 – 2037) and 7<sup>th</sup> (2038 – 2042) national carbon budgets, however, budgets beyond this have not been published or recommended yet. Due to the nature of the Scheme, it is unlikely that any emissions derived from the operation and maintenance phase will

produce GHG emissions >1% of the 5<sup>th</sup>, 6<sup>th</sup> or 7<sup>th</sup> carbon budgets. It is anticipated that the magnitude of effect is likely to be low.

- 7.10.72 Renewable energy generation from the Scheme during the first year of operation is estimated to be around 442,300 MWh/year if tracker panels are used and around 560,000 MWh/year if fixed panels are implemented across the Site. To account for product degradation, a 1% degradation factor for the first year has been applied, followed by a 0.35% degradation factor for each subsequent year. These figures are consistent with the EPD for the example solar panels used in the calculations. This results in an estimated energy generation of 395,543 MWh in the final year of operation for tracker panels and 500,801 MWh for fixed panels.. The total energy generated by the Scheme would be around 25.07 TWh and 31.75 TWh over the 60-year Scheme lifespan for tracker and fixed panels respectively. It is possible this is a slightly conservative estimate as future climate projections indicate a reduction in annual cloud cover over time (**Table 7-12**) which may have a beneficial impact on the energy generation potential of the Scheme, but this has not been taken into account in the calculations.
- 7.10.73 Accounting for the estimated construction phase and operation phase emissions, the Scheme's total carbon intensity value is 46.29 gCO<sub>2</sub>e/kWh for tracker panels and 40.52 gCO<sub>2</sub>e/kWh for fixed panels.
- 7.10.74 The available UK grid carbon intensity figure only considers operational emissions from the generation of electricity (Ref 7-35).
- 7.10.75 As such, to compare the performance of the Scheme with the grid emissions, the analysis is solely on the emissions associated with the ongoing operational activities. The emissions generated during the initial construction phase and eventual decommissioning are not included within this specific comparative assessment, as recommended by ISEP guidance (Ref 7-31).
- 7.10.76 By aligning the lifetime energy generation figures with the other operational GHG emissions, the Scheme achieves a carbon intensity of 32.55 gCO<sub>2</sub>e/kWh for tracker panels and 27.74 gCO<sub>2</sub>e/kWh for fixed panels. This operational carbon intensity represents a significant improvement compared to the current carbon intensity of the UK grid.
- 7.10.77 For context only (noting that in the future all new such power stations will need to be carbon capture ready and that it is ultimately intended that CCS will be applied to existing power stations, it is noted that the most carbon-efficient fossil-fuelled technology available is a gas-fired Combined Cycle Gas Turbine (CCGT) generating facility, which has a representative figure carbon intensity of 350 gCO<sub>2</sub>e/kWh. It should be noted that NPS EN-1 (January 2024) requires all combustion power stations with a capacity at or over 300 MW to be constructed Carbon Capture Ready.

- 7.10.78 For the purpose of this assessment, the Scheme is compared to a 'without scheme' baseline based on the Department for Energy Security and Net Zero UK grid average projection for the first scheme operation year of 2029 (Ref 7-37).
- 7.10.79 The significance of effect will be concluded on for the whole lifespan of the Scheme (see 'Overall GHG Significance Effect section from Paragraph 7.10.85 onwards').

### **Decommissioning (2089-2091)**

- 7.10.80 As the decommissioning activities associated with the Scheme will occur far into the future, more than 60 years from the date of writing this report; there is uncertainty over the total estimate of GHG emissions that will be produced and the available technology. However, the decommissioning phase GHG emissions are expected to be significantly lower than the construction phase. This is because the decommissioning activities do not require the extensive manufacturing, transportation, and installation of new equipment. The main decommissioning activities, such as dismantling, removal, and site restoration, are generally less emission intensive. Additionally, as the economy decarbonises over the coming years in line with national policy, emissions from sources such as worker transport and waste disposal are anticipated to be much lower.
- 7.10.81 For the purpose of this assessment, it is considered that the worker transportation emissions, the energy used by decommissioning equipment, the waste generated, and the water used produce the same emissions as for the construction phase. The HGV movements for removal are considered to emit half the emissions than the construction phase.
- 7.10.82 The decommissioning phase emissions account for approximately 1% of the total GHG emissions of the Scheme.

**Table 7-26 Decommissioning GHG Emissions**

| Emissions Source                         | Emissions (tCO <sub>2</sub> e) | % Operational Emissions |
|------------------------------------------|--------------------------------|-------------------------|
| Removal of onsite products and materials | 10,260*                        | 73.94                   |
| Worker Transportation                    | 3,158*                         | 22.76                   |
| Waste                                    | 184                            | 1.33                    |
| Energy Usage for Decommissioning Phase   | 269                            | 1.94                    |
| Water Usage                              | 4                              | 0.03                    |
| <b>Total</b>                             | <b>13,875</b>                  | <b>100.00</b>           |

Note: \* Include emissions from Well-To-Tank

### **Significance of Effect (Decommissioning)**

- 7.10.83 The projected lifespan of the Scheme is estimated to be 60 years so it is unknown at this stage what the effects will be in the future. Also, the decommissioning phase GHG emissions will be lower than construction, for example because the products do not need to be produced and there will be technological advancements unknown to date.
- 7.10.84 Therefore, based on the expected lower emissions profile of the decommissioning phase compared to construction, the magnitude of effect is therefore considered low. GHG emissions from the decommissioning of the Scheme are considered to have a Minor Adverse effect on the climate. While it is anticipated the GHG emissions will be less for decommissioning compared to construction, there will still likely be emissions arising at this stage, as such, it is anticipated that the effect of decommissioning on Climate Change will be minor adverse. This is based on the Scheme's GHG impacts being fully consistent with applicable existing and emerging policy requirements and good practice design standards at the time of decommissioning. This is not considered significant in EIA terms.

#### **Overall GHG Significance Effect**

- 7.10.85 UK's 4th, 5th and 6th carbon budgets have been used to contextualise emissions from the Scheme in line with ISEP guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (Ref 7.28).
- 7.10.86 The UK's 5th carbon budget has been used to contextualise the magnitude of GHG emissions from the Scheme in **Table 7-27**, depending on the years in which the emissions are expected to occur. Construction emissions will fall under the 4th (2027) and 5th (2028) UK carbon budgets. For this comparison, it was considered that construction emissions will occur 50% in 2027 and 50% in 2028. In line with ISEP guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance, the electricity carbon budgets have been used to contextualise emissions from the Scheme. The operation and maintenance phase of the Scheme accounts for less than 1% of the 2027 and 2028 Electricity Carbon budgets. The Scheme will be operational no earlier than 2029, and therefore operational emissions up to 2037 (the end of the 6th carbon budget) will fall under the 5th, 6th and 7th UK carbon budgets, beyond which point no carbon budgets have yet been published either in full or for initial review.

**Table 7-27 Contextualization of the Construction phase GHG emissions with the UK Carbon Budgets**

| Relevant Electricity Supply Sectoral UK Carbon Budgets | Annual Electricity Supply Sectoral Carbon budget (MtCO <sub>2</sub> e) | Annual Emissions for the Scheme During Carbon Budget Period (MtCO <sub>2</sub> e) | Emissions from the Scheme as a Proportion of Carbon Budget per annum |
|--------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 2027                                                   | 26.7                                                                   | 0.165 - 0.196                                                                     | 0.62% - 0.73%                                                        |
| 2028                                                   | 23.8                                                                   | 0.165 - 0.196                                                                     | 0.69% - 0.82%                                                        |

- 7.10.87 The UK carbon budgets are based on production emissions, rather than consumption. It should be noted that the bulk of manufactured components in this Scheme are manufactured overseas and imported to the UK. Furthermore, the manufacture of these components is the major contributor to the Scheme's GHG emissions.
- 7.10.88 The future baseline, a scenario without the Scheme, is based on forecast UK grid average energy emissions available from the Department for Energy Security and Net Zero (Ref 7-37) for the year 2029 (48.9 gCO<sub>2</sub>e/kWh). The operational energy intensity allows isolated comparison of the emissions associated with operation of the Scheme compared to the alternative in the year that electricity generation from the Scheme commences. Once in the operation and maintenance phase, the Scheme will achieve emissions reductions compared to the without-Scheme baseline.
- 7.10.89 For the first operational year of the Scheme in 2029, the average emissions intensity from the grid are estimated to be 48.9 gCO<sub>2</sub>e/kWh (Ref 7-37). This is compared with the operational carbon intensity of the Scheme, which is projected to be 32.55 gCO<sub>2</sub>e/kWh and 27.74 gCO<sub>2</sub>e/kWh for the tracker and fixed panel configurations, respectively. The Scheme will contribute to reducing the average emissions from the grid, and the GHG emissions during construction, operation, and decommissioning of the Scheme can be considered to be 'offset' by the net positive impact of the Scheme on the UK's ability to meet its carbon targets.
- 7.10.90 A comparison with other energy sources is set out below in **Table 7-28**, which shows the lifecycle emissions from different technologies, as sourced from a United Nations Commissioned study (Ref 7-38).

**Table 7-28 Comparison of Scheme Energy Intensity with other methods**

| Electricity Source | Technology                                                  | Lifecycle GHG Emissions (gCO <sub>2</sub> e/kWh) |
|--------------------|-------------------------------------------------------------|--------------------------------------------------|
| Coal               | Coal Power equipped with a carbon capture and storage (CCS) | 147 - 469                                        |

| Electricity Source            | Technology                                | Lifecycle GHG Emissions (gCO <sub>2</sub> e/kWh) |
|-------------------------------|-------------------------------------------|--------------------------------------------------|
| Natural Gas                   | Natural Gas combined cycle plant with CCS | 90 - 220                                         |
| Nuclear                       | Nuclear power                             | 5.1 - 6.4                                        |
| Typical Solar                 | Concentrated Solar Power (CSP)            | 27 - 122                                         |
|                               | Photovoltaics                             | 8 - 83                                           |
| Wind                          | Onshore Wind Power                        | 7.8 - 16                                         |
|                               | Offshore Turbines                         | 12 - 23                                          |
| Hydropower                    | Hydropower                                | 6 – 147                                          |
| <b>Lime Down Solar Scheme</b> | <b>Fixed Panels</b>                       | <b>27.74</b>                                     |
|                               | <b>Tracker Panels</b>                     | <b>32.55</b>                                     |

- 7.10.91 As shown, in comparison to other energy generating methods, the scheme is less emitting than non-renewable sources and is towards the lower end of typical GHG emissions from Solar energy generation.
- 7.10.92 Over the Scheme's lifespan, which is estimated to be 60 years for the purpose of this assessment, it is estimated the Scheme will result in a net saving of 65,916 tCO<sub>2</sub>e if tracker panels are used or 266,507 tCO<sub>2</sub>e for fixed panels in comparison with a scenario whereby the Scheme does not come into effect and emissions from the grid in the baseline year of operation are used. The exclusion of WTT emissions would lead to a reduction of total scheme emissions to 1,126,750 tCO<sub>2</sub>e, and a net saving of 99,835 tCO<sub>2</sub>e for tracker panels or to 1,251,287 tCO<sub>2</sub>e, and a net saving of 301,955 tCO<sub>2</sub>e for fixed panels.
- 7.10.93 This provides context regarding the carbon performance of the Scheme at the point electricity generation commences. It is therefore considered that the overall GHG impact of the Scheme is **beneficial and significant**, whether tracker or fixed panels are installed.
- 7.10.94 It is noted that the relatively greater efficiency of the solar modules in tracker configuration is outweighed by the greater number of, and hence yield from, the panels in a fixed array, thereby resulting in a greater estimated net saving of emissions if panels are installed in a fixed array. It is likely that a combination of tracker and fixed configuration would be preferred. Under such circumstances, the total emissions, and savings, would be within the ranges presented in this assessment.

- 7.10.95 Whilst the carbon intensity of electricity generated by the Scheme is higher than the lifecycle data for alternative low carbon forms of generation such as nuclear and onshore wind, it should be noted that NPS EN-1 (Ref 7-14) emphasises that to ensure reliable electricity systems during the transition to net zero 2050, the UK must adopt a diverse mix of renewable energy sources (including solar projects) to come forward.

### Climate Change Risk Assessment

- 7.10.96 Potential climate risks to the construction, operation and maintenance and decommissioning phases and the likelihood, consequence and significance of these risks are detailed in **Table 7-17** and **Table 7-19**.
- 7.10.97 Future climate change projections have been reviewed and the sensitivity of Scheme components have been examined, before commenting on the adequacy of the climate change resilience measures built into the Scheme.
- 7.10.98 The receptor for the review of climate change resilience is the Scheme itself, including all infrastructure, assets, and workers on-site during construction, operation, and decommissioning. The sensitivity of the receptors has been evaluated based on their vulnerability, susceptibility to climate change associated impacts and their overall importance.

**Table 7-29 Sensitivity of receptors**

| Receptors                                                                | Vulnerability | Susceptibility | Importance | Overall Sensitivity |
|--------------------------------------------------------------------------|---------------|----------------|------------|---------------------|
| Buildings and infrastructure including equipment and building operations | Moderate      | Moderate       | High       | Medium              |
| Human Health including construction workers and site users               | Moderate      | Moderate       | High       | Medium              |

- 7.10.99 The Climate Change risk assessment has considered the measures which are embedded into the design (see Section 7.9). These are considered an adequate response to the projected climate change impacts to which the Scheme would be exposed.
- 7.10.100 As a result of the proposed resilience measures no significant climate change risks during the construction, operation and maintenance or decommissioning phase have been identified.

### Construction (2027 - 2029)

- 7.10.101 Due to projected changes in climate and increased environmental extremes; sensitive receptors during the construction process may be vulnerable. The climate risks are summarised in the table below.

**Table 7-30 Construction Phase Climate Risk.**

| Climate Risk                                    | Receptor                     | Consequence                                                                                        |
|-------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------|
| Increased probability of extreme weather events | Buildings and Infrastructure | Restriction to site access and working hours causing delay to construction.<br>Damage to materials |
| Increased temperatures and heatwaves            | Human Health                 | Poor working conditions impacting specific construction activities.                                |
| Increase rainfall events                        | Human Health                 | Poor working conditions impacting specific construction activities.                                |

- 7.10.102 The climatic changes expected to take place during the construction phase have the potential to cause delays to the construction schedule due to the occurrence of severe weather events. The extreme weather conditions may also impact the health and safety of the workers on site. Nonetheless, the construction phase takes place within the early stages of the 2020 – 2039 range of climate scenarios as detailed in **Table 7-11**. As a consequence, the expected climate changes are not as severe and will likely be able to be mitigated against.

Operation (2029-2089)

- 7.10.103 The projected changes in climate and increased environmental extremes are likely to be more severe during the estimated 60 years life span of the Scheme. The climate risks are summarised in the table below.

**Table 7-31 Operation and Maintenance Phase Climate Risk**

| Climate Risk                                 | Receptor                     | Consequence                                                                                                           |
|----------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Increased frequency of severe weather events | Buildings and Infrastructure | Damage to infrastructure/assets due to heat stress or storm/flood damage                                              |
| Increased summer and winter temperatures     | Buildings and Infrastructure | Increase in the ambient temperature of energy storage units, resulting in higher ventilation and cooling requirements |
| Increased summer temperatures                | Human Health                 | Health and safety risk due to increased risk of fire                                                                  |
| Increased winter precipitation               | Human Health                 | Health and safety risk due to increase in surface water                                                               |

| Climate Risk | Receptor | Consequence                                            |
|--------------|----------|--------------------------------------------------------|
|              |          | flooding and standing water leading to land subsidence |

#### Decommissioning

- 7.10.104 During the decommissioning phase, the risks will be the same as those in the construction phase identified in **Table 7-30**.
- 7.10.105 However, the impacts of climate change are expected to worsen and increase based on the currently available projections. This may increase the vulnerability of sensitive receptors mentioned above for the construction process, however this has been factored in and does not change the outcome of the assessment.

#### Overall CCR Impact

- 7.10.106 Based on the above assessment, without appropriate mitigation the Scheme is at high risk to climate change impacts.
- 7.10.107 Embedded mitigation measures to increase the resilience of the Scheme to climatic changes are outlined in previous sections and summarised in **Table 7-32** and **Table 7-33**.
- 7.10.108 The CCR review has considered the measures which are integrated into the design (see Section 7.9) and based on the outcomes of the assessment, are considered an adequate response to the projected climate change impacts to which the Scheme would be exposed.
- 7.10.109 Detail of the risks, mitigation and likely significance is contained in **Table 7-32** for the construction and decommissioning phases and **Table 7-33** for the operation and maintenance phase.

**Table 7-32 Potential Climate Change Impacts and Embedded Mitigation Measures during Construction and Decommissioning phase**

| Climate hazard    | Potential Climate Change Impact | Receptor                                                           | Potential Climate Change Risk to Scheme                                                                 | Embedded mitigation measure                                                                                                                                                                                                                   | Likelihood of Significant Effect | Consequence   | Significance    |
|-------------------|---------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------|-----------------|
| High temperatures | Increase in annual temperature  | Solar PV Panels, Construction Compounds, Site workers and visitors | Overheating of electrical equipment.<br><br>Damage to materials.<br><br>Risk of overheating to workers. | External contractors appointed by the Applicant will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> . | Low                              | Minor adverse | Not Significant |
|                   | Increase in summer temperature  | Buildings , Infrastructure, Site workers and visitors              | Overheating of electrical equipment.<br><br>Damage to materials.<br><br>Risk of overheating to workers. | External contractors appointed by the Applicant will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> . | Low                              | Minor adverse | Not Significant |
|                   | Increase in heat waves          | Workers, staff and visitors on Site                                | Increased heat stress/heat exhaustion for workers.                                                      | External contractors appointed by the Applicant will monitor weather forecasts and plan works accordingly,                                                                                                                                    | Low                              | Minor adverse | Not Significant |

| Climate hazard     | Potential Climate Change Impact | Receptor                                                                                                                     | Potential Climate Change Risk to Scheme                                                                                                                                     | Embedded mitigation measure                                                                                                                                                                                                                                                       | Likelihood of Significant Effect | Consequence   | Significance    |
|--------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------|-----------------|
|                    |                                 |                                                                                                                              |                                                                                                                                                                             | protecting workers and resources from any extreme weather as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> .                                                                                                                                                           |                                  |               |                 |
|                    |                                 | Plant and vehicles, physical structures, materials,                                                                          | Overheating of electrical equipment. Damage to materials                                                                                                                    | External contractors appointed by the Applicant will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather. Equipment has cooling systems where necessary as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> . | Low                              | Minor adverse | Not Significant |
| High precipitation | Increase to winter rainfall     | Plant and vehicles, physical structures, materials, and access routes to Solar PV Sites and access routes to Solar PV Sites. | Viability of and access to Solar PV Sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of Solar PV Sites). | External contractors appointed by the Applicant will monitor weather forecasts and receive Environment Agency's (EA) flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions                                                | Low                              | Minor adverse | Not Significant |

| Climate hazard              | Potential Climate Change Impact                                                           | Receptor                                                                                 | Potential Climate Change Risk to Scheme                                                                                                                                                                         | Embedded mitigation measure                                                                                                                                                                                                                                                                            | Likelihood of Significant Effect | Consequence      | Significance    |
|-----------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|-----------------|
|                             |                                                                                           |                                                                                          |                                                                                                                                                                                                                 | such as storms, flooding as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> .                                                                                                                                                                                                                 |                                  |                  |                 |
| Increase in storm intensity | Stronger winds, heatwaves, heavy precipitation                                            | Plant and vehicles, physical structures, materials, and access routes to Solar PV Sites. | Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high winds increasing dust (and other debris) and storm surge. | External contractors appointed by the Applicant will monitor weather forecasts and receive Environment Agency flood warnings and alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> . | Low                              | Moderate adverse | Not Significant |
| Increased fire risk         | Drier and hotter conditions leading to increased risk of wildfires and uncontrolled fires | Buildings, Infrastructure, Site workers and visitors                                     | Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks.                                                                            | Fire suppression system on site to rapidly action in case of fire as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> .                                                                                                                                                                        | Very Low                         | Moderate adverse | Not Significant |

| Climate hazard | Potential Climate Change Impact | Receptor | Potential Climate Change Risk to Scheme             | Embedded mitigation measure | Likelihood of Significant Effect | Consequence | Significance |
|----------------|---------------------------------|----------|-----------------------------------------------------|-----------------------------|----------------------------------|-------------|--------------|
|                |                                 |          | Threat to health and safety of workers and visitors |                             |                                  |             |              |

**Table 7-33 Potential Climate Change Impacts and Embedded Mitigation Measures during Operation and Maintenance phase**

| Climate hazard     | Potential Climate Change Impact                          | Receptor                                                     | Potential Climate Change Risk to Scheme                                                                                                                                                                 | Existing or embedded mitigation measure                                                                                                                                                                                                                                                                                                                                       | Likelihood of Significant Effect | Consequence      | Significance    |
|--------------------|----------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|-----------------|
| High temperatures  | Increase in summer temperature and increase in heatwaves | All receptors (infrastructure, buildings, workers and staff) | <p>Increase in air conditioning requirements.</p> <p>Overheating of electrical equipment.</p> <p>Risk of overheating to workers.</p>                                                                    | <p>BESS Area systems would include HVAC systems and these would be contained within the individual equipment containers as well as other measures outlined in the <b>Outline Battery Safety Management Plan (BSMP)</b> [EN010168/APP/7.21].</p> <p>Workers and staff to forecasts and plan works accordingly as described in the <b>Outline CEMP</b> [EN010168/APP/7.12].</p> | Low                              | Moderate adverse | Not Significant |
| High precipitation | Increase to winter rainfall                              | All receptors (infrastructure, buildings, workers and staff) | <p>Surface water flooding and standing waters.</p> <p>Deterioration of structures or foundations due to increase in soil moisture levels.</p> <p>Damage to building surfaces/exposed utilities from</p> | <p>The <b>Outline Water Resources Strategy (WRS)</b> [EN010168/APP/7.25] accompanying the DCO application, describes water management measures to control</p>                                                                                                                                                                                                                 | Low                              | Minor adverse    | Not Significant |

| Climate hazard              | Potential Climate Change Impact                                        | Receptor                                                                                 | Potential Climate Change Risk to Scheme                                                                                                                                                                                                                                                                                                       | Existing or embedded mitigation measure                                                                                                                                                        | Likelihood of Significant Effect | Consequence      | Significance    |
|-----------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|-----------------|
|                             |                                                                        |                                                                                          | increased drying/wetting and increase frost penetration                                                                                                                                                                                                                                                                                       | surface water run-off and drain hardstanding and other structures.                                                                                                                             |                                  |                  |                 |
| Low precipitation           | Decrease to summer rainfall                                            | All receptors (infrastructure, buildings, workers and staff)                             | Water shortages.<br>Deterioration of structures or foundations due to decrease in soil moisture levels.                                                                                                                                                                                                                                       | Not Applicable                                                                                                                                                                                 | Very Low                         | Minor adverse    | Not Significant |
| Increase in storm intensity | Stronger winds, heatwaves, heavy precipitation                         | Plant and vehicles, physical structures, materials, and access routes to Solar PV Sites. | Surface water flooding and standing waters.<br>Deterioration of structures or foundations due to increase in soil moisture levels.<br>Damage to building surfaces/exposed utilities from increased drying/wetting and increase frost penetration or tree falls.<br>Strong winds damaging structures directly or via falling trees and debris. | The <b>Outline WRS [EN010168/APP/7.25]</b> accompanying the DCO application, describes water management measures to control surface water run-off and drain hardstanding and other structures. | Low                              | Minor adverse    | Not Significant |
| Increased fire risk         | Drier and hotter conditions leading to increased risk of wildfires and | Buildings, Infrastructure, Site workers and visitors                                     | Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks.                                                                                                                                                                                                          | Fire suppression system on site to rapidly action in case of fire as described in the <b>Outline CEMP [EN010168/APP/7.12]</b> .                                                                | Very Low                         | Moderate adverse | Not Significant |

| Climate hazard | Potential Climate Change Impact | Receptor | Potential Climate Change Risk to Scheme             | Existing or embedded mitigation measure | Likelihood of Significant Effect | Consequence | Significance |
|----------------|---------------------------------|----------|-----------------------------------------------------|-----------------------------------------|----------------------------------|-------------|--------------|
|                | uncontrolled fires              |          | Threat to health and safety of workers and visitors |                                         |                                  |             |              |

### **In-Combination Climate Change Impact Assessment**

- 7.10.110 The greatest risk of in combination effects are increased flooding events from extreme weather arising from a changing climate.
- 7.10.111 There is potential for in-combination effects on receptors, including flood risk to future people and/or property at the Solar PV Sites and surrounding areas, construction workers and construction equipment, and local watercourses and groundwater bodies. These effects may arise in conjunction with Ecology (**ES Volume 1, Chapter 9: Ecology and Biodiversity [EN010168/APP/6.1]**), particularly regarding impacts on watercourses and associated sensitive habitats, and Ground Conditions (**ES Volume 1, Chapter 19: Ground Conditions and Contamination [EN010168/APP/6.1]**), with respect to interactions with groundwater and soil stability.
- 7.10.112 Referring to the list of receptors in **ES Volume 1, Chapter 21: Cumulative Effects and In-Combination Effects [EN010168/APP/6.1]**, there is potential for in-combination effects with Ecology and Biodiversity, Ground Conditions and Hydrology and Flood Risk.
- 7.10.113 The in-combination with climate change effects have been assessed in relevant chapters of this ES as set out below, focused on the operation and maintenance phase:
- **Chapter 9: Ecology and Biodiversity [EN010168/APP/6.1]** in relation to potential climate change impacts on habitats and/or species. Furthermore, habitats might become more threatened or rare over time, especially wetland or woodland habitats which are relatively uncommon within the Order Limits;
  - **Chapter 11: Hydrology, Flood Risk and Drainage [EN010168/APP/6.1]** in relation to potential increases in flood risk when accounting for climate change scenarios, to future people and property at the Solar PV Sites and surrounding areas, construction workers and equipment, local watercourses, and groundwater bodies. Chapter 11, assesses the impact of climate change on flood risk using the latest Environment Agency guidance (Flood Risk Assessments: Climate Change Allowances, Environment Agency, February 2023). For example, drainage measures have been sized to contain the 1 in 100-year rainfall event plus 45% climate change uplift without uncontrolled runoff;
  - **Chapter 13: Transport and Access [EN010168/APP/6.1]** in relation to construction vehicles greenhouse gas emissions which have an impact on the global climate; and
  - **Chapter 19: Ground Conditions [EN010168/APP/6.1]** in relation to potential changes in ground conditions (e.g. disturbance of potentially

contaminated land, mobilisation of pollutants, alteration of drainage pathways).

- 7.10.114 Following the respective mitigation measures outlined in those chapters, the impacts of the Scheme when accounting for climate change, are considered to be effectively managed and mitigated.

## **7.11 Additional Mitigation**

- 7.11.1 While worst case assumptions have been made for the purpose of the GHG vehicle type around use of HGVs for transport of construction materials, wherever possible vehicles with lower carbon emissions would be used. This should be achievable as technology improves and lower emission HGVs become more available.
- 7.11.2 As discussed in Paragraph 7.9, the Scheme incorporates embedded GHG mitigation measures that prioritise the use of low-carbon design materials and construction practices.
- 7.11.3 Other embedded GHG mitigation measures include construction phase waste reduction, the use of low-carbon materials, and transport emission controls, as well as climate resilience measures such as flood risk management. Based on the conclusions of the assessment, no additional mitigation measures are required in terms of Climate Change.

### **Monitoring**

- 7.11.4 Monitoring the weather is essential and it is described in the **Outline CEMP [EN010168/APP/7.12]**, **Outline OEMP [EN010168/APP/7.13]** and **Outline DS [EN010168/APP/7.14]**. This includes regularly monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways. Monitoring weather forecasts will be integral to planning works accordingly and safeguarding against extreme weather conditions. As detailed in the **Outline CEMP [EN010168/APP/7.12]**, **Outline OEMP [EN010168/APP/7.13]** and **Outline DS [EN010168/APP/7.14]**, this proactive approach ensures the safety of workers and the protection of infrastructure. Additionally, external contractors appointed by the Applicant will be responsible for monitoring weather forecasts and receiving Environment Agency flood warnings and alerts. This ensures that all works are planned and executed in a manner that minimizes risks associated with adverse weather. By responding appropriately and in a timely manner to varying weather conditions, the Scheme can effectively mitigate potential disruptions and ensure the continuity and safety of its operations.

## 7.12 Residual Effects and Conclusions

### GHG Assessment

#### *Residual Effects*

- 7.12.1 This section summarises the residual significant effects of the Scheme on Climate Change following the implementation of embedded and additional mitigation.
- 7.12.2 During the different stages of the Scheme (construction, operation, and decommissioning), GHG emissions will be generated byproducts, transport, energy, and fuel-use used by the Scheme.
- 7.12.3 Significant residual effects are defined as **significant and beneficial** for the whole Scheme lifecycle for the GHG assessment. For Construction and Decommissioning residual effects are defined as **Minor adverse** and are listed in **Table 7-34**. **Table 7-35** lists the residual effects for the operation and maintenance phase, which are defined as **significant and beneficial**.

#### *Conclusions*

- 7.12.4 The GHG assessment findings indicate the Scheme will yield beneficial impacts and achieve a net reduction in GHG emissions. This is compared to a scenario without the Scheme, where energy would need to be generated using the grid methods.
- 7.12.5 The scheme does not directly remove greenhouse gases (GHGs) from the atmosphere. Rather, its climate benefit arises from generating electricity from a low-carbon source, thereby displacing electricity that would otherwise be supplied by the projected UK electricity grid. It is therefore appropriate to compare the lifecycle emissions of the Scheme with a scenario in which the Scheme is not developed and where an equivalent quantity of electricity is supplied by the projected UK grid carbon intensity at the time of first generation.
- 7.12.6 Compared with the projected UK grid in the no-project scenario, the Scheme is estimated to deliver a net lifecycle saving of 266,507 tCO<sub>2e</sub> over the assessment period. It should be recognised that this comparison is based on different accounting boundaries. The projected UK grid carbon intensity reflects territorial emissions associated with electricity generation, whereas the Scheme lifecycle assessment includes global emissions associated with the manufacture, transport, construction, operation and decommissioning of the Scheme. A substantial proportion of the Scheme's embodied carbon, including the manufacture of photovoltaic modules and associated overseas transport, occurs outside the UK and would not be included within UK territorial emissions. Consequently, the comparison is conservative because the Scheme is assessed using a global lifecycle boundary, whereas the projected UK grid carbon intensity reflects only UK territorial emissions.

7.12.7 The calculated net saving does not capture the wider benefits of the Scheme. In particular, the inclusion of the BESS supports grid balancing and can reduce reliance on higher carbon intensity electricity generation. Increasing the supply of low carbon electricity is vital for the decarbonisation of other sectors, including heating and transport, where electrification is expected to play a key role in achieving economy wide emissions reductions.

7.12.8 As set out in **7.1 Statement of Need [REP1-085]**, the Scheme has been designed to contribute towards the UK's statutory commitment to achieve net zero greenhouse gas emissions by 2050. The role of the Scheme extends beyond decarbonising the electricity sector; a secure and abundant supply of low carbon electricity is essential to enable wider transition away from fossil fuels across the economy, supporting emissions reductions in sectors that cannot be decarbonised through changes to electricity generation alone.

### **Climate Change Risk Assessment**

#### *Residual Effects*

7.12.9 The climate change risk assessment has considered the measures which are integrated into the design (see Section 7.9). These measures are considered adequate to address the projected climate change impacts to which the Scheme would be exposed.

7.12.10 The design incorporates climate resilience through embedded design mitigation measures.

#### *Conclusions*

7.12.11 The Scheme's design and integrated mitigation measures effectively address climate change risks. No significant climate change risks during the construction, operation and maintenance or decommissioning phase have been identified.

7.12.12 See **ES Volume 1, Chapter 22: Summary of Significant Effects [EN010168/APP/6.1]** for a summary of significant effects.

**Table 7-34 Summary of Significant Residual Effects (Construction and Decommissioning)**

| Receptor                                                                                                                        | Sensitivity (value) | Description of impact                                                                                                                   | Mitigation/Enhancement measure                                                                                                                                                                                                                                                                                                                                             | Residual effect after mitigation                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Global Climate                                                                                                                  | High                | GHG emissions arising principally from the embodied carbon of materials. Particularly embodied carbon of Solar PV Panels and batteries. | Reduce waste, maximizing reuse and recycling, and reducing emissions from construction activities and transportation. Measures to be contained in the <b>Outline CEMP [EN010168/APP/7.12]</b> , the <b>Outline DS [EN010168/APP/7.14]</b> and the <b>Outline Site Waste Management Plan [EN010168/APP/7.16]</b> .                                                          | Minor Adverse residual effect, as every GHG emission pose a risk to the global climate. Despite this, the emissions generated during the construction will be totally offset during the operation and maintenance phase as the Scheme will result in lower emissions compared to not building the Scheme. |
| Scheme (Plant and vehicles, physical structures, materials, and access routes to sites) and Workers, staff and visitors on site | Moderate            | Stronger winds, heatwaves, heavy precipitation and increased risk of fires/wildfires.                                                   | Resilient design of infrastructure.<br>The contractors will monitor weather forecasts and receive Environment Agency's (EA) flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms. Measures to be contained <b>Outline CEMP [EN010168/APP/7.12]</b> and the <b>Outline DS [EN010168/APP/7.14]</b> . | Not significant                                                                                                                                                                                                                                                                                           |

**Table 7-35 Summary of Significant Residual Effects (Operation and Maintenance)**

| Receptor                                                                                                                        | Sensitivity (value) | Description of impact                                                                                                                                                    | Mitigation/Enhancement measure                                                                                                                                                                                                                                                                                        | Residual effect after mitigation                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Global Climate                                                                                                                  | High                | GHG emissions arising principally from the embodied carbon of materials that need to be replaced during the Scheme lifespan. Particularly batteries and Solar PV Panels. | Reduce waste, maximizing reuse and recycling, and reducing emissions from operation. Measures to be contained CEMP, OEMP.                                                                                                                                                                                             | <b>Significant beneficial effect.</b> The emissions generated will be totally offset as the Scheme will result in lower emissions per kWh compared to not building the Scheme. |
| Scheme (Plant and vehicles, physical structures, materials, and access routes to sites) and Workers, staff and visitors on site | Moderate            | Stronger winds, heatwaves, heavy precipitation and increased risk of fires/wildfires.                                                                                    | Resilient design of infrastructure.<br>The contractors will monitor weather forecasts and receive Environment Agency's (EA) flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms. Measures to be contained within the detailed CEMP and OEMP. | Not significant                                                                                                                                                                |

## 7.13 Cumulative Effects Assessment

### Inter-Project Cumulative Effects

- 7.13.1 This section presents an assessment of cumulative effects between the Scheme and other proposed and committed plans and projects.
- 7.13.2 This assessment has been made with reference to the methodology and guidance set out in **ES Volume 1, Chapter 6: EIA Methodology [EN010168/APP/6.1]** and shortlist of cumulative plans and projects identified in **ES Volume 3, Appendix 21-1: Long List of In-Combination Effects and Cumulative Developments [EN010168/APP/6.3]**.
- 7.13.3 For individual receptors, this cumulative effect assessment identifies where the assessed effects of the Scheme could interact with effects arising from other plans and/or projects on a spatial and/or temporal basis.
- 7.13.4 The receptor for the GHG Assessment is the global atmosphere. All projects worldwide have the potential to contribute to cumulative impacts on the global climate through their GHG emissions. As per ISEP and precedent, and supported in case law, it is not appropriate to undertake a cumulative assessment for GHG assessments, as the climate is global and so a cumulative assessment would require an assessment of all potential worldwide future developments which is not feasible. Instead, the appropriate approach is to consider the Scheme's emissions in the context of Carbon budgets as they are considered to be inherently cumulative. This has been done in **Section 7.10** of this chapter.
- 7.13.5 The receptor for the Climate Resilience Review is the Scheme itself. As the effects being judged are to the project itself there can be no cumulative effects to other receptors.

### In-Combination Cumulative Effects

- 7.13.6 In-combination cumulative effects are those where impacts from two or more environmental disciplines are considered likely to result in a new or different likely significant effect, or an effect of greater significance, than any one of the impacts on their own. The identified in-combination effects are set out within **ES Volume 1, Chapter 21 Cumulative and In-Combination Effects [EN010168/APP/6.1]**.
- 7.13.7 No in-combination effects alongside climate change have been identified as a result of the Scheme.

## 7.14 References

- Ref 7-1 United Nations (1998) Kyoto Protocol. Available at: [redacted] [Accessed 19 June 2025].
- Ref 7-2 United Nations Framework Convention on Climate Change (UNFCCC) (2015) Paris Agreement. Available at: [redacted] [Accessed 19 June 2025].
- Ref 7-3 United Nations Framework Convention on Climate Change (UNFCCC) (2021) Glasgow Climate Pact. Available at: [redacted] [Accessed 19 June 2025].
- Ref 7-4 United Nations Framework Convention on Climate Change (UNFCCC) (2022) Sharm El-Sheikh Implementation Plan. Available at: [redacted] [Accessed 19 June 2025].
- Ref 7-5 HM Government (2017). The Infrastructure Planning (Environmental Impact Assessment) Regulations. Available at: <https://www.legislation.gov.uk/ukxi/2017/572/contents> [Accessed 19 June 2025].
- Ref 7-6 HM Government (2008). Planning Act 2008. Available at: <https://www.legislation.gov.uk/ukpga/2008/29/contents> [Accessed 19 June 2025].
- Ref 7-7 HM Government (2008) Climate Change Act 2008. Available at: <https://www.legislation.gov.uk/ukpga/2008/27/contents> [Accessed 19 June 2025].
- Ref 7-8 HM Government (2019) Climate Change Act 2008 (2050 target amendment). Available at: <https://www.legislation.gov.uk/ukdsi/2019/9780111187654> [Accessed 19 June 2025].
- Ref 7-9 HM Government (2009) Carbon Budgets Order (2009). Available at: <https://www.legislation.gov.uk/ukxi/2009/1259/contents/made> [Accessed 19 June 2025].
- Ref 7-10 HM Government (2011) Carbon Budget Order 2011. Available at: <https://www.legislation.gov.uk/ukxi/2011/1603/contents/made> [Accessed 19 June 2025].
- Ref 7-11 HM Government (2016) Carbon Budget Order 2016. Available at: <https://www.legislation.gov.uk/ukxi/2016/785/contents/made> [Accessed 19 June 2025].

- Ref 7-12 HM Government (2021) Carbon Budget Order 2021. Available at: <https://www.legislation.gov.uk/ukxi/2021/750/contents/made> [Accessed 19 June 2025].
- Ref 7-13 HM Government (2026) Carbon Budget Order 2026. Available at: <https://www.legislation.gov.uk/ukxi/2026/695/contents/made> [Accessed 6 August 2026].
- Ref 7-14 Department for Energy Security and Net Zero (2023) Overarching National Policy Statement for energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf> [Accessed 19 June 2025].
- Ref 7-15 Department for Energy Security and Net Zero (2023) National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: <https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf> [Accessed 19 June 2025].
- Ref 7-16 Department for Energy Security and Net Zero (2023) National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: <https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf> [Accessed 19 June 2025].
- Ref 7-17 Environmental Product Declaration (2025) LONGi MONOCRYSTALLINE TOPCon PV MODULE LR8-66HGD AND LR7-72HYD. Available at: <https://www.environdec.com/library/epd24039> [Accessed 3 June 2026]
- Ref 7-18 Ministry of Housing, Communities and Local Government (2024) National Planning Policy Framework (NPPF). Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2> [Accessed 19 June 2025].
- Ref 7-19 HM Government (2021) Net Zero Strategy. Available at: <https://www.gov.uk/government/publications/net-zero-strategy> [Accessed 19 June 2025].
- Ref 7-20 HM Government (2017) Clean Growth Strategy. Available at: <https://www.gov.uk/government/publications/clean-growth-strategy> [Accessed 19 June 2025].
- Ref 7-21 HM Government (2022) UK Climate Change Risk Assessment. Available at: <https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022> [Accessed 19 June 2025].
- Ref 7-22 HM Government (2021) The UK's Nationally Determined Contribution (NDC). Available at: <https://assets.publishing.service.gov.uk/media/633d937d8fa8f52a5803e63f/uk-nationally-determined-contribution.pdf> [Accessed 19 June 2025].

- Ref 7-23 HM Government (2021) Climate Change: Third National Adaptation Programme (NAP3) (2023 – 2028) Available at: <https://www.gov.uk/government/publications/third-national-adaptation-programme-nap3> [Accessed 19 June 2025].
- Ref 7-24 HM Government (2024) Clean Power 2030 Action Plan. Available at: <https://www.gov.uk/government/publications/clean-power-2030-action-plan> [Accessed 19 June 2025].
- Ref 7-25 Wiltshire Council (2015). Wiltshire Core Strategy. Available at: <https://www.wiltshire.gov.uk/media/372/Wiltshire-Core-Strategy-adopted-2015/pdf/Wcs.pdf?m=1574343137353> [Accessed 19 June 2025].
- Ref 7-26 Wiltshire Council (2024). Wiltshire Council Local Plan Updates. Available at: <https://www.wiltshire.gov.uk/article/8029/Overview> [Accessed 19 June 2025].
- Ref 7-27 Wiltshire Council (2022). Climate Strategy. Available at: <https://www.wiltshire.gov.uk/article/1004/Climate-strategy-and-delivery-plans> [Accessed 19 June 2025].
- Ref 7-28 Wiltshire Council (2025). Wiltshire Council Climate Adaptation Delivery Plan (2025-29). Available at: <https://www.wiltshire.gov.uk/article/1004/Climate-strategy-and-delivery-plans> [Accessed 19 June 2025].
- Ref 7-29 Wiltshire Council (2025). Climate Strategy. Available at: <https://www.wiltshire.gov.uk/media/15619/Wiltshire-Council-Climate-Adaptation-Delivery-PlanWEB/pdf/Wiltshire-Council-Climate-Adaptation-Delivery-PlanWEB.pdf?m=1743094870287> [Accessed 19 June 2025].
- Ref 7-30 World Business Council for Sustainable Development and World Resources Institute (2004) The GHG Protocol: A Corporate Accounting and Reporting Standard. Revised Edition. Available at: <https://ghgprotocol.org/> [Accessed 19 June 2025].
- Ref 7-31 ISEP (2022a) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition. Institute of Sustainability and Environmental Professionals (ISEP). Available at:  
[REDACTED]  
[REDACTED] [Accessed 19 June 2025].
- Ref 7-32 ISEP (2022b) Climate Change Adaption Practitioner Guidance. Available at:  
[REDACTED]  
[REDACTED] [Accessed 19 June 2025].
- Ref 7-33 ISEP (2020) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.

- Ref 7-34 HM Government (2021) Planning Policy Guidance (PPG) Climate Change. Available at: <https://www.gov.uk/guidance/climate-change> [Accessed 19 June 2025].
- Ref 7-35 Department for Energy Security and Net Zero (2024) UK Government GHG Conversion Factors for Company Reporting.
- Ref 7-36 HM Government (2023). National Travel Survey (NTS). Available at: <https://www.gov.uk/government/statistics/national-travel-survey-2023> [Accessed 19 June 2025].
- Ref 7-37 HM Government (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal> [Accessed 19 June 2025].
- Ref 7-38 United Nations Economic Commission for Europe (2022) Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources. Available at: <https://unece.org/sed/documents/2021/10/reports/life-cycle-assessment-electricity-generation-options> [Accessed 19 June 2025].
- Ref 7-39 UK Met Office (2018) UK Climate Projections 2018 (UKCP18).
- Ref 7-40 UK Met Office (2019) Historic climate data.
- Ref 7-41 UK Met Office (2018b). UKCP18 Guidance: Representative Concentration Pathways.
- Ref 7-42 Brandt, B., Kletzer, E., Pilz, H., Hadzhiyska, D. and Seizov, P. (2019) Silicon-Chemistry Carbon Balance An assessment of Greenhouse Gas Emissions and Reductions EXECUTIVE SUMMARY Covering the Production, Use and End-of-Life of Silicones, Siloxanes and Silane Products in Europe, North America and Japan. Available at:  
[REDACTED]  
[REDACTED] [Accessed 19 June 2025].
- Ref 7-43 Hegedic, M., Opetuk, T., Dukic, G. and Draskovic, H. (2016) Life Cycle Assessment of Power Transformer – Case Study.
- Ref 7-44 HM Government. (2023) Carbon Budget Delivery Plan.
- Ref 7-45 Driver and Vehicle Standards Agency and Department for Transport (2017) In Service Exhaust Emission Standards for Road Vehicles