Fosse Green Energy

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Preliminary Environmental Information Report

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Chapter 6: Climate Change

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Prepared for:

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6. Climate Change

6.1 Introduction

6.1.1 This chapter of the Preliminary Environmental Information Report (PEI Report) presents a preliminary assessment of the likely significant effects on Climate as a result of the Proposed Development, through the completion of a Lifecycle greenhouse gas (GHG) impact assessment. This chapter also presents a Climate Change Risk Assessment (CCRA) which considers the impact of Climate Change on the Proposed Development and on resources and receptors in the surrounding environment as identified in the following PEI Report Chapter:

a. **PEI Report Volume 1, Chapter 9: Water Environment**.

6.1.2 This chapter should be read in conjunction with the description of Proposed Development, provided in **PEI Report Volume 1, Chapter 2: The Site and Surroundings** and **Chapter 3: The Proposed Development**.

6.1.3 This chapter identifies and proposes mitigation measures to address the potential impacts and likely significant effects of the construction, operation, and decommissioning phases of the Proposed Development on Climate Change.

6.1.4 No figures and drawings have been prepared in support of this chapter.

6.1.5 This chapter is supported by the following appendices (**PEI Report Volume 3**):

a. **Appendix 6-A: Climate Change Policy and Legislation**; and

b. **Appendix 6-B: Climate Change Risk Assessment.**

6.2 Legislation and Planning Policy

6.2.1 Legislation, planning policy and guidance relating to the assessment of Climate Change effects and pertinent to the Proposed Development comprises the documents listed below. More detail regarding these policies can be found in **PEI Report Volume 3**, **Appendix 6-A: Climate Change Policy and Legislation**.

Legislation

a. The Paris Agreement (Ref 6-1) and UK Nationally Determined Contribution (Ref 6-2) ;

b. The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017: Section 5(2) and Schedule 4, clauses 4 and 5 (Ref 6-3);

c. The Climate Change Act (2008) (Ref 6-4) and Climate Change Act (2050) Target Amendment Order 2019 (Ref 6-5);
d. The Carbon Budgets Order 2009 (Ref 6-7);
e. Carbon Budget Order 2011 (Ref 6-8);
f. Carbon Budget Order 2016 (Ref 6-9);
g. The Carbon Budget Order 2021 (Ref 6-10);
h. Environment Act 2021 (Ref 6-11); and.
i. Energy Act 2016 (Ref 6-12).

National Planning Policy

a. The Overarching National Policy Statement for Energy Infrastructure (NPS EN-1) (Ref 6-13);
b. The National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (Ref 6-14);
c. The National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref 6-17);
d. The National Planning Policy Framework (NPPF) (Ref 6-18).
e. UK Climate Change Risk Assessment (2022) (Ref 6-19);
f. Energy white paper: Powering our Net Zero future (2020) (Ref 6-20);
g. Powering Up Britain: Net Zero Growth Plan (2023) (Ref 6-21);

National Guidance

a. Planning Practice Guidance, Climate Change (Ref 6-18).
b. Net Zero Strategy (2021) (Ref 6-22);
c. Institute of Environmental Management and Assessment (IEMA) (2022) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (Ref 6-24); and
d. IEMA (2020) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (Ref 6-25).

Local Planning Policy

a. Bassingham Neighbourhood Plan 2016-2036 (2017) (Ref 6-27);
b. Central Lincolnshire Local Plan (2023) (Ref 6-28);
c. Lincolnshire County Council Green Masterplan 2020-2025 (2020) (Ref 6-30);
d. Lincolnshire County Council Carbon Management Plan (2019) (Ref 6-29);

e. North Kesteven District Council (NKDC) Climate Emergency Strategy (2023) (Ref 6-26) and NKDC Climate Emergency Action Plan (2023) (Ref 6-27).

6.2.2 Where required, relevant Neighbourhood Plans and Supplementary Planning Documents (SPDs)/Guidance (SPGs) will be considered.

6.3 Consultation

6.3.1 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023. Comments received in the EIA Scoping Opinion (**PEI Report Volume 3, Appendix 1-B**) in relation to the Climate Change assessment, are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses.**

6.4 Assessment Methodology

6.4.1 This section sets out the scope and methodology for the preliminary assessment of the lifecycle GHG impacts of the Proposed Development, as well as the impact of Climate Change on the Proposed Development identified through the CCRA.

Study Area

Lifecycle GHG Impact Assessment

6.4.2 The study area for the GHG impact assessment covers all direct GHG emissions arising from activities undertaken at the Proposed Development Site during the construction, operation (including maintenance), and decommissioning of the Proposed Development. It also includes indirect emissions embedded within the construction products (e.g. Solar Photovoltaic (PV) Panels, battery energy storage system (BESS) and cables) and construction materials (e.g. the steel required to construct the PV mounting structures) arising as a result of the energy used for their production, as well as emissions arising from the transportation of products and materials, waste and construction workers.

6.4.3 The environmental impact associated with GHG emissions is a national and global issue. Consequently, the significance of the Proposed Development's lifecycle GHG emissions is assessed by comparing the estimated GHG emissions from the Proposed Development against the reduction targets defined in the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref 6-5), associated five year, legally-binding carbon budgets (Ref 6-7to Ref 6-10) and the UK's forecast trajectory towards net zero.

Climate Change Risk Assessment (CCRA)

6.4.4 The study area for the CCRA is the land within the Proposed Development Site, i.e., it covers the construction, operation and decommissioning of all assets and infrastructure which constitute the Proposed Development.

In-Combination Climate Change Impact (ICCI) Assessment

6.4.5 The study area for the ICCI assessment will be defined in each discipline's assessment within the Environmental Statement (ES), and includes all environmental receptors identified within the assessments undertaken by the environmental disciplines.

6.4.6 ICCI assessments are undertaken in liaison with the technical specialists responsible for preparing the applicable technical chapters. The outcomes of the likely in-combination effects of Climate Change with the impact of the Proposed Development to the receptors is not presented within this PEI Report but will be reported within the ES, when the design of the Proposed Development is further developed.

Sources of Information

6.4.7 The following sources of information have been used to inform the baseline and preliminary assessment presented within this chapter.

Lifecycle GHG Impact Assessment

6.4.8 Where available, data required to undertake the lifecycle GHG impact assessment was provided by the project design team and analysed using the methodology outlined below in this section. Where data was unavailable, reasonable assumptions have been made based on professional judgement, the details of which are outlined in the Assumptions and Limitations section in **Section 6.4**.

Climate Change Risk Assessment and In-combination Climate Change Impact Assessment

6.4.9 Historic climate data obtained from the Met Office website (Ref 6-32) has been used to determine the current baseline conditions.

6.4.10 In line with National Policy Statement (NPS) EN1 requirements to use the latest credible scientific evidence in relation to Climate Change (outlined in **PEI Report Volume 3: Appendix 6-A**), UK Climate Projections 2018 (UKCP18) (Ref 6-32) data was obtained to determine the future baseline conditions.

6.4.11 The Intergovernmental Panel Climate Change (IPCC) Sixth Assessment Report (AR6) Sea Level Projection Tool (Ref 6-34) and ThinkHazard (Ref 6-35) were also used for other projected trends/impacts, and the UK Climate Change Risk Assessment analysed for the current state of nationwide Climate Change risks (Ref 6-36).

6.4.12 Climate Change resilience measures that are embedded within the Proposed Development's design were determined through liaison between the project design team and relevant environmental discipline leads and are set out in **PEI Report Volume 3, Appendix 6-B: Climate Change Risk Assessment**.

Scope of the Assessment

Lifecycle GHG impact assessment

6.4.13 The GHG impact assessment followed a project lifecycle approach to calculate estimated GHG emissions arising from the construction, operation (including maintenance) and decommissioning of the Proposed Development and to identify GHG 'hot spots' (i.e. emissions sources likely to generate the largest amount of GHG emissions). This enabled the identification of priority areas for mitigation in line with the principles set out in the IEMA guidance (Ref 6-24).

6.4.14 In line with the World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines (Ref 6-38), the GHG assessment will be reported as tonnes of carbon dioxide equivalent (tCO_2e) and will consider the seven Kyoto Protocol gases:

a. Carbon dioxide (CO_2);
b. Methane (CH_4);
c. Nitrous oxide (N_2O);
d. Sulphur hexafluoride (SF_6);
e. Hydrofluorocarbons (HFCs);
f. Perfluorocarbons (PFCs); and
g. Nitrogen trifluoride (NF_3).

6.4.15 Expected GHG emissions arising as a result of the Proposed Development, as well as baseline emissions, were quantified using a calculation-based methodology as per the following equation, and aligned with the GHG Protocol:

Activity data x GHG emissions factor = GHG emissions

6.4.16 Where data was not available, benchmarks from similar schemes assessed previously have been utilised, or a qualitative approach to addressing GHG impacts has been followed, in line with the IEMA guidance on assessing GHG emissions in EIA (Ref 6-24).

6.4.17 **Table 6-1** summarises the key anticipated GHG emissions sources associated with the Proposed Development, in line with the British Standard (BS) EN 17472 (**Table 6-2**).

Table 6-1: Potential Sources of GHG Emissions

Lifecycle Stage	Activity	Primary emission sources
Product stage	Raw material extraction and manufacturing of products required to build the equipment for the	Embodied GHG emissions from energy use in extraction of materials and manufacture of components and equipment.

Lifecycle Stage	Activity	Primary emission sources
	Proposed Development. Transportation of materials for processes/manufacturing (where available).	Emission of potent GHGs during manufacture, such as sulphur hexafluoride (SF_6). GHG emissions from transportation of products and materials during their processing and manufacture.
Construction process stage	On-site construction activity including emissions from construction compounds. Transportation of construction materials to the Proposed Development Site. Due to the nature of the equipment required, this could require shipment of certain aspects over significant distances. Transportation of construction workers to and from the Site.	Energy (electricity, fuel, etc.) consumption from plant and vehicles, generators on-site, and construction worker commuting. GHG emissions from transportation of materials to the Proposed Development Site. GHG emissions from transportation of workers to the Proposed Development Site.
	Disposal of any waste generated by the construction processes. Land use change. Water use.	GHG emissions from disposal and transportation of waste. GHG emissions from net loss of carbon sink. Provision of potable water, and treatment of wastewater.
Operation and Maintenance stage	Operation of the Proposed Development. Maintenance of the Proposed Development.	GHG emissions from energy consumption, provision of potable water, and treatment of wastewater. These operational aspects are expected to be negligible in the context of overall GHG emissions of the Proposed Development's lifecycle. Leakage of potent GHGs during operation, such as SF_6 (derived from certain electric items such as gas-insulated switchgear and gas-insulated transformers during production, operation through leakage, and dismantling).

Lifecycle Stage	Activity	Primary emission sources
		GHG emissions from energy consumption, material use and waste generation as a result of site maintenance.
Decommissioning stage	On-site decommissioning activity.	Energy (electricity, fuel, etc.) consumption from plant, vehicles and generators within the Proposed Development Site.
	Transportation and disposal of waste materials.	GHG emissions from disposal and transportation of waste.
	Transportation of workers.	GHG emissions from transportation of workers to the Site.

Climate Change Risk Assessment

6.4.18 The Infrastructure Planning (EIA) Regulations 2017 requires the inclusion of information on the vulnerability of the Proposed Development to Climate Change. Consequently, a CCRA for the Proposed Development has been conducted which identifies potential Climate Change impacts. In the EIA Scoping Report (**PEI Report Volume 3, Appendix 1-A**) this was referred to as the Climate Change Resilience Review, but terminology has been updated to reflect the recent update to guidance published by IEMA (Ref 6-24).

6.4.19 The CCRA presented in the chapter includes consideration of all infrastructure and assets associated with the Proposed Development. It covers resilience against both gradual Climate Change, and the risks associated with an increased frequency of extreme weather events as per the UK Climate Projections 2018 (UKCP18) projections.

6.4.20 The review of potential impacts and the Proposed Development's vulnerability considers the embedded mitigation measures that have been designed into the Proposed Development, discussed in **Section 6.6**.

6.4.21 The assessment has considered climate projections over a 60-year period from the Proposed Development's completion, assumed to be 2033.

6.4.22 Climate parameters considered in the CCRA during the construction, operation (including maintenance) and decommissioning of the Proposed Development include the following:

a. Extreme weather events;
b. Flood risk;
c. Sea level rise (SLR);
d. Wind pattern;
e. Temperature change; and
f. Precipitation change.

6.4.23 The CCRA was undertaken for the Proposed Development to identify potential Climate Change impacts on the Proposed Development and associated receptors, and to consider their potential consequence and likelihood of occurrence, taking account of the adaption measures embedded into the design of the Proposed Development (Section 6.6).

6.4.24 Climate Change projections for the Proposed Development during the enabling works and construction phase have been examined against receptors. Construction phase receptors of the Proposed Development include the workforce, plant, machinery, and materials.

6.4.25 Heatwaves and other extreme weather events could present a risk to site workers. Climate Change impacts during construction (assumed to be approximately two years from 2031 to 2033) have therefore been considered in the CCRA, covering effects like heat exhaustion and exposure to dangerous weather conditions.

6.4.26 For the operational phase of the Proposed Development, potential Climate Change impacts on the Proposed Development have been identified using relevant projections from UKCP18 and the CCRA considers their potential consequence to receptors and likelihood of occurrence, taking account of the measures incorporated into the design of the Proposed Development where available. The CCRA therefore considers the impact of Climate Change on the Proposed Development itself including the Proposed Development's infrastructure (for example the Solar PV Panels and other equipment), the workers on site, during operation, maintenance, and refurbishment and any landscaping and habitat creation being undertaken as part of the Proposed Development.

ICCI Assessment

6.4.27 The ICCI assessment will consider the ways in which projected Climate Change will influence the significance of the impact of the Proposed Development on receptors in the surrounding environment. The assessment will consider the existing and projected future climate conditions for the geographical location and assessment timeframe. It also identifies the extent to which identified receptors in the surrounding environment are potentially vulnerable to and affected by these factors. The ICCI Assessment will be presented in the ES.

Summary of Elements Scoped in and Scoped Out

6.4.28 A summary of the elements scoped in and out of the assessment of Climate Change are presented in **Table 6-2**:

Table 6-2: Elements Scoped in and out of the assessment of Climate Change

Element	Scoped in / Scoped Out
GHG Impact Assessment	Scoped in and covers all aspects of the Proposed Development from raw products, manufacture, and waste of materials, through to construction, operation and maintenance, and decommissioning.

Climate Change Risk Assessment	Scoped in. This considers the vulnerability of the Proposed Development to extreme weather events and predicted future changes in temperature, precipitation, wind pattern, and sea level rise.
In-Combination Climate Impact Assessment	Scoped in, however not presented in the PEI Report. The ICCI assessment will be presented in the ES and will cover climate parameters as assessed in the CCRA, except changes in wind pattern. Assessment of changes in wind patterns has been scoped out as agreed in the EIA Scoping Opinion **(PEI Report Volume 3, Appendix 1-B**).

Impact Assessment Methodology

Lifecycle GHG impact assessment

6.4.29 The sensitivity of the receptor (global climate) to increases in GHG emissions is always defined as 'high'" as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet its future 5-year carbon budgets. Also, the extreme importance of limiting global warming to below 2°C this century is broadly asserted by the international Paris Agreement (Ref 6-1) and the climate science community.

6.4.30 The UK Carbon Budgets (Ref 6-7 to Ref 6-10) are currently only available to 2037 (6th Carbon Budget). Where further Carbon Budgets are not available (7th, 8th and 9th Carbon Budget periods), these will be projected based on data published by the Climate Change Committee (CCC). Totals for these periods have not been approved or ratified and are not legally-binding, but indicative figures can provide valuable context at this stage.

6.4.31 When evaluating significance of the GHG emissions, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible. Guidance published by IEMA states *"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"*.

6.4.32 The IEMA guidance (Ref 6-24) describes five distinct levels of significance which are not solely based on whether a project emits GHG emissions alone, but how the project makes a relative contribution towards achieving a science-based 1.5°C aligned transition towards Net Zero.

6.4.33 **Table 6-3** presents the different significance levels as per the latest version of the IEMA guidance (Ref 6-24). 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." Moderate and Major adverse impacts and beneficial impacts are considered to be significant, while all other significance levels are deemed to be not significant. The following significance criteria will be used to determine the Proposed Development's whole life GHG emissions and how these align with the UK's net zero compatible trajectory.

Table 6-3: Definition of Levels of Significance

Significance Level	Effects	Example in the IEMA Guidance	Description in the IEMA Guidance
Significant	Major adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.	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.
	Moderate adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.	
Not significant	Minor adverse	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.	A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant.

Significance Level	Effects	Example in the IEMA Guidance	Description in the IEMA Guidance
			It may have residual emissions but is doing enough to align with and contribute to the relevant transition scenario, keeping the UK on track towards net zero by 2050 with at least a 78 % reduction by 2035 and thereby potentially avoiding significant adverse effects.
	Negligible	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.
Beneficial	Significant	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.	A project that causes GHG emissions to be avoided or removed from the atmosphere. Only projects that actively reverse (rather than only reduce) the risk of severe Climate Change can be judged as having a beneficial effect.

6.4.34 The IEMA guidance (Ref 6-23) also states it is down to the professional judgement of the practitioner to determine how best to contextualise a project's GHG impact and assign the level of significance. It is suggested that sectoral, local, or national carbon budgets can be used, as available and appropriate, to contextualise a project's GHG impact and determine the level

of significance. The approach adopted for the purposes of this assessment is outlined below.

6.4.35 Where available, UK national Carbon Budgets (Ref 6-7 to Ref 6-10) have been used for the purposes of this assessment to represent future emissions inventory scenarios for the UK. These legally-binding targets, which outline the total amount of GHGs that the UK can emit over a 5-year period, are currently available to the 6th Carbon Budget period (2033-2037). The UK is currently in the 4th Carbon Budget period, which runs from 2023 to 2027. The 3rd, 4th and 5th Carbon Budgets reflect the previous 80 % reduction target by 2050. The 6th Carbon Budget aligns with the legislated 2050 net zero target.

6.4.36 The appropriate UK national Carbon Budgets that span the construction programme of the Proposed Development (2031 to 2033), are the 5th and 6th Carbon Budgets (2028 to 2032 and 2033 to 2037). The annual average GHG impact of the Proposed Development has been compared against the annualised Carbon Budget for the period in which the emissions arise to allow separate assessment of each lifecycle stage.

6.4.37 Where possible, operational GHG emissions as a result of the Proposed Development (assumed to be fully operational by 2033) have been compared to the available Carbon Budgets within the design life of the Proposed Development: the 6th Carbon Budget (2033 to 2037).

6.4.38 In order to illustrate the Proposed Development trajectory towards net zero by 2050, the CCC Balanced Net Zero Pathway is utilised post-2037, in the absence of any nationally legally-binding carbon budgets after the 6th Carbon Budget.

6.4.39 The CCC Balanced Net Zero Pathway is divided into 5-year periods between 2037 and 2050, to match the time period of the legally-binding UK national Carbon Budgets, and the proposed budgets up to 2050 are in line with the UK's 1.5-degree trajectory as detailed in **Table 6-4**.

6.4.40 However, it should be noted that the CCC's proposed budgets beyond 2037 have not been formally adopted by the government or legislated for by Parliament and can therefore only be used as an indicative measure to contextualise the Proposed Development's progress toward the national net zero trajectory.

6.4.41 It is noted that the contribution of most individual projects to national-level budgets will be small and so the UK context will have limited value. This GHG impact assessment therefore uses the IEMA guidance to assess the significance of effects (**Table 6-3**), with the national Carbon Budgets being used to provide context to the GHG emissions (**Table 6-4**).

Table 6-4: UK Carbon Budgets and indicative carbon budgets based upon the CCC's balanced net zero pathway

Carbon Budget	UK Carbon Budget ($MtCO_2e$)	Indicative Carbon Budget totals based upon the CCC's Balanced Net Zero Pathway ($MtCO_2e$)
3rd (2018-2022)	2,544	-
4th (2023-2027)	1,950	-
5th (2028-2032)	1,725	-
6th (2033-2037)	965	-
7th (2038-2042)	-	526
8th (2043-2047)	-	195
9th (2048-2050)	-	17

6.4.42 In addition to providing advice that underpins setting national Carbon Budgets, the CCC also provides sector-specific decarbonisation pathways (Ref 6-39). **Table 6-5** presents the electricity generation sector-specific carbon budgets as further context to the GHG emissions, however, it should be noted that these are not legislated like the national-level budgets. The sector-specific carbon budget periods began in 2020.

Table 6-5: Sector-specific electricity generation carbon budgets based upon the CCC's Balanced Net Zero Pathway

Carbon budget period	Recommended Carbon Budget (MtCO2e)
2020 - 2022	105.45
2023 - 2027	189.16
2028 - 2032	92.56
2033 - 2037	35.74
2038 - 2042	23.22
2043 - 2047	12.36
2048 - 2050	4.03

Climate Change Risk Assessment

6.4.43 The receptor for the CCRA is the Proposed Development itself including its construction, operation (including maintenance) and decommissioning. The CCRA provides a description of how the Proposed Development has been designed to be more resilient to the Climate Change impacts identified during the review of the UKCP18 data (Ref 6-33).

6.4.44 The following key terms and definitions relating to the assessment have been used:

a. Climate Risk – a weather or climate related event, which has potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation;

b. Climate Impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose; and

c. Climate Consequence – any effect on the receptor or asset resulting from the climate hazard having an impact.

6.4.45 A staged approach has been used to assess the impacts of Climate Change on the Proposed Development:

a. Identify potential climate hazards and associated Climate Risks;

b. Identify likelihood of Climate Impact occurring;

c. Identify consequence of Climate Impact on the Proposed Development; and

d. Identify significance of the Climate Impact (likelihood of impact occurring x consequence of impact).

6.4.46 Once potential climate hazards have been identified (e.g. heatwaves), the likelihood of their occurrence during each project phase (construction, operation, and decommissioning) is categorised.

6.4.47 The criteria which have been used to determine the likelihood of a Climate Risk occurring are detailed in **Table 6-6**. This is in line with the definitions presented in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (Ref 6-34). For example, a climate hazard could be: increased summer temperatures, leading to the climate risk of a heatwave, while the Climate Change Impact is the impact on the Proposed Development, e.g. overheated electrical equipment.

Table 6-6: Likelihood of a Climate Risk Occurring

Likelihood of event	Qualitative description	Description (probability of occurrence)
Very likely	Likely that the event will occur many times (reoccurs frequently)	>90-100% probability that the impact will occur
Likely	Likely that the event will occur sometimes (reoccurs infrequently).	>66-90% probability that the impact will occur
Possible, about as likely as not	Possible that the event will occur (has occurred rarely)	>33-66% probability that the impact will occur
Unlikely	Unlikely that the event will occur (not known to have occurred).	>10-33% probability that the impact will occur
Very unlikely	Almost inconceivable that the event will occur.	0-10% probability that the impact will occur

6.4.48 Following identification of climate hazards and risks, the likelihood of occurrence and consequences of Climate Impacts have been assessed according to **Table 6-7** and **Table 6-8**. For example, permanent damage to electrical equipment from heatwaves causing complete loss of operation. The categories and descriptions provided below are based on the IEMA Climate Change Resilience and Adaptation guidance (Ref 6-25).

Table 6-7: Level of Likelihood of a Climate Impact Occurring

Consequence of impact	Description
High	Likelihood of climate hazard occurring is high and impact is always/ almost always going to occur.
Moderate	Likelihood of climate hazard occurring is high and impact occurs often or the likelihood of climate hazard occurring is moderate and impact is likely to occur always/ almost always.
Low	Likelihood of climate hazard occurring is high but impact rarely occurs or the likelihood of climate hazard occurring is moderate and impact sometimes occurs or the likelihood of climate hazard occurring is low and impact is likely to occur always/ almost always.
Negligible	All other eventualities - highly unlikely but theoretically possible.

Table 6-8: Level of consequence of a Climate Impact occurring

Consequence of impact	Description
High	Permanent damage to structures/assets; Complete loss of operation/service; Complete/partial renewal of infrastructure; Exceptional environmental damage; and/or Extreme financial impact.
Moderate	Partial infrastructure damage and some loss of service; Some infrastructure renewal; Adverse impact on the environment; and/or Moderate financial impact.
Low	Localised infrastructure disruption and minor loss of service; No permanent damage, minor restoration work required; Slight adverse environmental effects; and/or Small financial losses.
Negligible	No damage to infrastructure; No impacts on the environment; No adverse financial impact.

6.4.49 The significance in the CCRA is determined as a function of the likelihood of a climate change risk occurring and the consequence to the receptor if the risk occurs. The significance is detailed in **Table 6-9**. The assessment takes

into account confirmed design and mitigation measures (referred to as embedded mitigation as set out in **Section 6.6**).

Table 6-9: Significance of effect matrix

		Likelihood of Climate Impact occurring			
		Negligible	Low	Moderate	High
Consequence of a Climate Impact	Negligible	Negligible (NS)	Low (NS)	Low (NS)	Low (NS)
	Low	Low (NS)	Low (NS)	Low (NS)	Medium (NS)
	Moderate	Low (NS)	Low (NS)	Medium (NS)	High (S)
	High	Low (NS)	Medium (NS)	High (S)	High (S)

**NS= Not Significant; S=Significant*

In-Combination Climate Impact Assessment

6.4.50 The receptors for In-combination Climate Change Impacts (ICCI) are receptors within the surrounding environment that will be impacted by the Proposed Development in combination with future climatic conditions. Baseline conditions for the ICCI assessment are determined using the climate change projections data from UKCP 18 (Ref 6-33).

6.4.51 Once potential ICCIs have been identified in relation to the Proposed Development, the likelihood of their occurrence during construction, operation and decommissioning phases is categorised. This is the same process as was undertaken for the CCRA, as detailed in **Table 6-6**, above.

6.4.52 In consideration of the likelihood of the Climate Risk occurring, and the sensitivity of the receptor, the likelihood of a Climate Impact occurring to the receptor is then defined. This includes consideration of any embedded mitigation measures and good practice. These classifications are defined in **Table 6-10**.

Table 6-10: Likelihood of a Climate Risk occurring

Level of likelihood of climate hazard	Qualitative description	Quantitative description
Very likely	Likely that the event will occur many times (reoccurs frequently)	>90-100% probability that the impact will occur
Likely	Likely that the event will occur sometimes (reoccurs infrequently).	>66-90% probability that the impact will occur
Possible, about as likely as not	Possible that the event will occur (has occurred rarely)	>33-66% probability that the impact will occur

Level of likelihood of climate hazard	Qualitative description	Quantitative description
Unlikely	Unlikely that the event will occur (not known to have occurred).	>10-33% probability that the impact will occur
Very unlikely	Almost inconceivable that the event will occur.	0-10% probability that the impact will occur

6.4.53 The likelihood of a Climate Risk occurring and the likelihood of a Climate Impact to a receptor is then combined to determine the likelihood of an ICCI occurring. This is illustrated in **Table 6-11**.

Table 6-11: Level of likelihood of an ICCI occurring

Level of likelihood of climate impact occurring	Definition of likelihood
High	Likelihood of climate hazard occurring is high and impact is always/ almost always going to occur.
Moderate	Likelihood of climate hazard occurring is high and impact occurs often or the likelihood of climate hazard occurring is moderate and impact is likely to occur always/ almost always.
Low	Likelihood of climate hazard occurring is high, but impact rarely occurs or the likelihood of climate hazard occurring is moderate and impact sometimes occurs or the likelihood of climate hazard occurring is low and impact is likely to occur always/ almost always.
Negligible	All other eventualities – highly unlikely but theoretically possible.

6.4.54 Once the likelihood of an ICCI has been identified the assessment then considers how this will affect the significance of the identified effects.

6.4.55 The ICCI consequence criteria are defined in **Table 6-12** below and are based on the change to the significance of the impact already identified by the environmental discipline. To assess the consequence of an ICCI each discipline has assigned a level of consequence to an impact based on the criteria description and their discipline assessment methodology.

Table 6-12: Consequence criteria for ICCI assessment

Consequence	Consequence criteria
High	The Climate Change parameter in-combination with the effect of the Proposed Development causes the significance of the impact of the Proposed Development on the resource/receptor, as defined by the topic, to increase from negligible, low, or moderate to major.

Consequence	Consequence criteria
Moderate	The Climate Change parameter in-combination with the effect of the Proposed Development causes the effect defined by the topic to increase from negligible or low, to moderate.
Low	The Climate Change parameter in-combination with the effect of the Proposed Development, causes the significance of effect defined by the topic, to increase from negligible to low.
Negligible	The Climate Change parameter in-combination with the effect of the Proposed Development does not alter the significance of the effect defined by the topic.

6.4.56 The significance of potential effects is determined using the matrix in **Table 6-13**. Where an effect has been identified as moderate or high, against the matrix in **Table 6-13**, these will be classed as a likely significant ICCI effect. If likely significant ICCI effects are assessed, then appropriate additional mitigation measures (secondary mitigation) are identified.

Table 6-13: ICCI significance criteria (where 'S' is significant and 'NS' is not significant)

		Likelihood of climate-related impact occurring			
		Negligible	Low	Moderate	High
Level of consequence	Negligible	NS	NS	NS	NS
	Low	NS	NS	NS	S
	Moderate	NS	NS	S	S
	High	NS	S	S	S

**NS= Not Significant; S=Significant*

Assessment Assumptions and Limitations

6.4.57 This chapter forms a preliminary assessment which has been based on information available at the time of preparing this PEI Report. Further assessment is being undertaken as part of the EIA and will be reported in the ES that will be submitted with the DCO application.

6.4.58 At this stage, and consistent with the preliminary nature of this assessment, a fully quantified GHG impact assessment of the Proposed Development has not yet been undertaken. As stated in the latest IEMA guidance (Ref 6-23), where specific activity data is currently unavailable, an acceptable alternative approach is to use publicly available information of comparable developments that best represents the Proposed Development.

6.4.59 The GHG impact assessment presented in this PEI Report chapter has therefore relied on available information from comparable schemes being brought forward in the UK rather than project specific data. The benchmarked schemes (Sunnica, Longfield, Tillbridge and Gate Burton Solar Farms) used within the assessment are the solar Nationally Significant Infrastructure Projects (NSIPs) accepted by the Planning Inspectorate which have been assessed by AECOM and include BESS (Ref 6-41 to Ref 6-43).

6.4.60 The benchmark generated was weighted by the first year of electricity generation of the above four schemes, as they were broadly similar in scale (approximately 400–500MW capacity), and for each solar aspect. This benchmarking methodology controls for minor differences in scheme complexities and scales. Furthermore, due to the difference between solar farm and BESS aspects across the schemes, using separate benchmarks more accurately represents the GHG emissions of the Proposed Development design. In addition, the scope of each scheme was reviewed to maintain consistency.

6.4.61 The DC generating capacity of the fixed south facing panels option is estimated as 428 MW and single axis trackers option as 368 MW. The storage capacity of battery is assumed to be two hours' worth of peak generation. Where other information is not available regarding energy use, types and quantities of materials used, or the embodied carbon of key features of the assets, precautionary assumptions were made based on industry approximations and professional best practice. For example, the PV emissions factor from all four benchmarked schemes were adjusted from an Environmental Product Declaration (EPD) based on a Chinese solar farm scheme (Ref 6-44) to account for the lower solar insolation in the UK. The PV modules and BESS were assumed to have the same emissions factor based on the adjusted average of the four benchmarked schemes.

6.4.62 To estimate energy generation over the lifetime of the Proposed Development, a degradation rate of 2% has been assumed for the first year, and a rate of 0.45% has been applied for each year thereafter, up to year 30. Since the PV modules are assumed to be replaced after 30 years (which is halfway through the Proposed Development lifetime), to provide a worst case assumption for calculating embedded carbon, the same degradation rates were applied to the period from years 31 to 60. However, assuming the same energy generation as the current modules beyond year 31 is considered to be conservative, as the panels of the future are expected to be more efficient as a result of continued technological improvement over time.

6.4.63 Emissions from the decommissioning process at the end of the design life are very difficult to estimate due to the substantial uncertainty surrounding decommissioning methodologies, approaches and carbon intensities of activities in the future. It has been assumed in the benchmarked schemes that the resources and effort required for decommissioning will be equivalent to those required for construction. This is considered to be a worst-case scenario, as future developments in methodologies and technological advances are likely to reduce the carbon impact of decommissioning, which

will take place after the date by when the UK must achieve net zero emissions.

6.4.64 The land will be returned to its original state following decommissioning of the Proposed Development. Net impact of GHG emissions associated with land use change (e.g., agricultural activity and carbon sequestration from vegetation) are expected to be minor.

6.4.65 The latest IEMA guidance on assessing GHG emissions (Ref 6-24) states that where there are no physical developments or activity taking place directly on the identified Site, it may not be possible to report on current baseline emissions. As this is the case for the Proposed Development Site, a baseline of zero GHG emissions is reported, again in line with IEMA guidance.

6.4.66 The preliminary assessment provided in this chapter is therefore considered to provide a robust assessment and a satisfactory basis on which consultees can provide comments on the Proposed Development.

6.4.67 Given the nature of ICCIs, ongoing surveys and monitoring by the contributing technical disciplines must be completed before the influence of Climate Change combined with potential impacts from the construction, operation (including maintenance), and decommissioning of the Proposed Development on sensitive receptors can be assessed. However, with the currently limited available information, the assessment outcome of likely ICCIs are to be updated at the ES stage when the design of the Proposed Development is further progressed.

6.5 Baseline Conditions

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

Existing Baseline

Lifecycle GHG impact assessment

Current Baseline

6.5.2 For the GHG impact assessment, the baseline is a ‘no-development’ scenario whereby the Proposed Development is not implemented. The baseline comprises existing carbon stock and sources of GHG emissions resulting from the existing activities within the Proposed Development Site, as well as the emissions that may be avoided as a result of the Proposed Development, i.e. existing emissions from the generation of grid electricity if the Proposed Development does not go ahead. As described in **Section 6.4**, the baseline data available at this stage of the Proposed Development’s design is limited. A full assessment of the ‘no-development’ baseline scenario will be undertaken within the ES.

6.5.3 The current land use within the Site consists of arable land, interspersed with individual trees along field boundaries, hedgerows and linear tree belts, The

abundance of vegetation within the Proposed Development Site suggests a carbon sink potential. Also, current land use within the Proposed Development Site has minor levels of associated GHG emissions as the land use is largely agricultural. Baseline agricultural GHG emissions are dependent on soil and vegetation present, fuel use for the operation of vehicles and machinery, and other inputs such as fertiliser and pesticide use.

Future Baseline

6.5.4 The future baseline for the GHG assessment is a business-as-usual position whereby the Proposed Development is not implemented. This includes the operational emissions from the generation of electricity that would occur should the Proposed Development not go ahead but which will be displaced in the case of the Proposed Development being delivered.

6.5.5 The current land use within the Proposed Development Site will have minor levels of associated GHG emissions from agricultural activities and minor carbon sequestration from vegetation. Therefore, for the purpose of the GHG assessment, embodied GHG emissions are considered zero in the future baseline.

Climate Change Risk Assessment and In-Combination Climate Change Impact Assessment

Current Baseline

6.5.6 The baseline for the CCRA and ICCI assessments is the climate in the location of the Proposed Development for the 30-year period of 1981 to 2010 (the standard baseline for climate data). Historic climate data recorded by the closest meteorological station to the Proposed Development (Waddington) for the 30-year period of 1981 to 2010 was obtained from the Met Office website (Ref 6-32) and is summarised in **Table 6-14**, below.

Future Baseline

6.5.7 The future baseline is expected to differ from the present-day baseline described above. UKCP18 (Ref 6-33) provides probabilistic Climate Change projections for pre-defined 30-year periods for annual, seasonal and monthly changes to mean climatic conditions over land areas. For the purpose of the assessments, UKCP18 probabilistic projections for pre-defined 30-year periods for the following average climate variables have been obtained:

a. Mean annual temperature;
b. Mean summer temperature;
c. Mean winter temperature;
d. Maximum summer temperature;
e. Minimum winter temperature;
f. Mean annual precipitation;
g. Mean summer precipitation;
h. Mean winter precipitation;

i. Wind pattern;

j. Sea level rise; and

k. Extreme weather events e.g. heat waves, storm surges etc.

6.5.8 Projected temperature and precipitation variables are presented in **Table 6-14**. UKCP18 probabilistic projections have been analysed for the 25km^2 grid square within which the Proposed Development Site is located. These figures are expressed as temperature/ precipitation anomalies in relation to the 1981 to 2010 baseline.

6.5.9 UKCP18 uses a wide range of possible scenarios, classified as Representative Concentration Pathways (RCPs), to inform differing future emission trends. These RCPs "… specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels." RCP8.5 has been used for the purposes of this assessment as a worst-case as this predicts a high-emissions or 'business-as-usual' scenario.

6.5.10 As the design life of the Proposed Development is 60 years, the CCRA has considered a scenario that reflects a high level of GHG emissions at the 10th, 50th, and 90th percentile levels for the pre-defined 30-year periods up to 2099 to assess the impact of Climate Change over the assessed lifetime of the Proposed Development.

6.5.11 Construction risks are assessed against the 2010 to 2039 projection data, while operation and decommissioning are assessed against 2040 to 2069 and 2070 to 2099 projection data, respectively, as a conservative worst-case scenario.

Table 6-14: Climate Baseline and Projection Data

Climate Variable	Baseline (1981–2010)	Climate Change Projection (2010-2039)	Climate Change Projection (2010–2069)	Climate Change Projection (2070–2099)	Projected Change in Likelihood	Climate Projection Source
Temperature						
Mean annual maximum daily temperature (°C)	13.5	+0.9 (+0.3 to +1.4)	+2.0 (+1.0 to +3.1)	+3.8 (+2.2 to +5.6)	↑	UKCP18 RCP 8.5
Mean summer maximum daily temp (°C)	20.4	+1.1 (+0.2 to +1.9)	+2.6 (+0.9 to +4.4)	+5.2 (+2.3 to +8.2)	↑	UKCP18 RCP 8.5
Mean winter minimum	1.4	+0.6 (-0.03 to +1.4)	+1.7 (+0.4 to +3.1)	+3.1 (+1.0 to +5.5)	↑	UKCP18 RCP 8.5

Climate Variable	Baseline (1981–2010)	Climate Change Projection (2010-2039)	Climate Change Projection (2010–2069)	Climate Change Projection (2070–2099)	Projected Change in Likelihood	Climate Projection Source
daily temp (°C)						
Number of days of air frost per annum	40.4	Reports have shown that the number of frost air and ground frost days have decreased since the 1960s. These long-term trends, combined with detailed studies, point to a long-term warming trend of the UK's climate and a reduction in cold events.			↓	
Highest temperature for baseline period (°C)	21.3 (July)	-	-	-	-	-
Lowest temperature for baseline period (°C)	1.2 (February)	-	-	-	-	-
Rainfall						
Mean annual rainfall levels (mm)	614.6	+0.7% (-4.6 to +6.0%)	-2.8 (-11.7 to +6.0%)	-2.1% (-13.1to +9.0%)	↓	UKCP18 RCP 8.5
Mean summer rainfall (mm)	58.9	3.5%% (-19.1to +11.2%)	-16.1% (-40.9 to +9.5%)	-30.1% (-57.9 to +0.8%)	↓	UKCP18 RCP 8.5
Mean winter rainfall (mm)	45.5	+3.4% (-4.9 to +12.3%)	+7.2% (-3.8 to +19.9%)	+17.4% (-0.6 to +39.0%)	↑	UKCP18 RCP 8.5
Wettest month on average (mm)	55.5 (November)	-	-	-	-	-
Driest month on average (mm)	38.3 (February)	-	-	-	-	-
Other						

Climate Variable	Baseline (1981–2010)	Climate Change Projection (2010-2039)	Climate Change Projection (2010–2069)	Climate Change Projection (2070–2099)	Projected Change in Likelihood	Climate Projection Source
Sea level rise (m)[1]	-	0.12	0.27	0.43	↑	IPCC 6th assessment for 2050 decade
Mean monthly wind speed at 10m (knots)	7.3	The Met Office has projected an increase in near surface wind speeds over the UK for the second half of the 21st century for the winter season when more significant impacts of wind are experienced. However, the increase in wind speeds is modest compared to natural variability from month to month and season to season, so confidence is low.			-	UK Met Office
Storms	The UKCP18 model suggest a small contribution from storm surges, however it is unclear if the frequency and severity of future storm surges is going to change. Although, rising sea levels due to climate change are expected to worsen the impacts of storm surges.				↑	UKCP18 RCP 8.5
Heatwaves	Under a high emissions scenario, it is estimated that by the end of the 21st Century, all areas of the UK are projected to be warmer with hotter, drier summers and heatwaves likely to become more common and intense.				↑	UKCP18 RCP 8.5
Wildfires	ThinkHazard has classified the wildfire hazard in Lincolnshire as High, according to currently available information.				↑	Think Hazard

6.6 Embedded Mitigation Measures

6.6.1 The Proposed Development is being developed through an iterative EIA and design process which involves seeking to avoid or reduce and, if possible, offset potential environmental effects. Where possible, these measures will be incorporated into the form or design of the Proposed Development, for example through the appropriate routing and placement of infrastructure.

6.6.2 Once these measures are incorporated into the design, they are termed ‘embedded measures’. Embedded measures relevant to the construction

[1] Note: the sea level rise projection differs from the other variables in that it is given for the decade (2020, 2050 and 2080), rather than a 30-year period. The scenarios used for sea level rise are the IPCC’s latest 6th Assessment Report scenario SSP8.5 (very high GHGs). The scenarios used for sea level rise are the IPCC's latest 6th Assessment Report scenarios: SSP5-8.5 (very high GHGs).

phase are described within each technical chapter of this PEI Report. For the operational phase, such embedded measures will be represented primarily in the design, for example through the choice of infrastructure components. Embedded measures are therefore either incorporated into the design from the outset or identified through the assessment process.

6.6.3 Along with any measures required for legislative compliance, the Proposed Development will also incorporate industry standard control measures, which are common practice on construction sites, into the embedded measures. These are described in each technical chapter of this PEI Report.

Greenhouse Gas Assessment

6.6.4 A range of embedded mitigation is being considered for incorporation into the design to mitigate the impacts of the Proposed Development on the climate. These are the measures included in the Framework Construction Environmental Management Plan (CEMP) (refer to **PEI Report Volume 3, Appendix 3-A**):

a. Increasing recyclability by segregating construction waste to be re-used and recycled where reasonably practicable;

b. Designing, constructing and implementing the Proposed Development in such a way as to minimise the creation of waste and maximise the use of alternative materials with lower embodied carbon, such as locally sourced products and materials with a higher recycled content where feasible;

c. Reusing suitable infrastructure and resources where possible to minimise the use of natural resources and unnecessary materials (e.g. reusing excavated soil for fill requirements);

d. Liaising with construction personnel for the potential to implement staff minibuses and car sharing options;

e. Implementing a Travel Plan in the Construction Traffic Management Plan (CTMP) to reduce the volume of construction staff and employee trips to the Proposed Development, while encouraging the use of lower carbon modes of transport by identifying and communicating local bus connections and pedestrian/cycle access routes to/ from the Proposed Development to all construction staff, and providing appropriate facilities for the safe storage of cycles;

f. Switching vehicles and plant off when not in use and ensuring construction vehicles conform to current EU emissions standards; and

g. Conducting regular planned maintenance of the construction plant and machinery to optimise efficiency.

6.6.5 A Framework CEMP is provided in **PEI Report Volume 3, Appendix 3-A** and will be further refined at the ES stage.

Climate Change Risk Assessment

6.6.6 A range of embedded mitigation has been incorporated to mitigate the impacts of Climate Change:

a. **PEI Report Volume 3 Chapter 9: Water Environment** presents a series of measures to mitigate flood risk. The CEMP will consider the management of activities within floodplain areas (i.e. kept to a minimum and with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable).

b. The Framework CEMP will incorporate measures to prevent an increase in flood risk during the construction works, including the provision of temporary settlement and drainage measures.

c. The CEMP will incorporate measures aimed at preventing an increase in flood risk during the construction works. Measures that could be implemented include:

   i. Storing topsoil and other construction materials outside of the 1 in 100 year floodplain extent where feasible. If areas located within Flood Zone 2 (or 3) are to be utilised for the storage of construction materials, this would be done in accordance with the applicable flood risk activity regulations, if required.

   ii. Conducting regular planned maintenance of the plant and machinery.

   iii. Appointing named person (s) to monitor weather forecasts on a monthly, weekly and daily basis, and plan works accordingly. For example, works in the channel of any watercourse will be avoided or halted were there to be a significant risk of high flows or flooding.

   iv. The construction laydown area site office and supervisor will be notified of any potential flood occurring by use of the Floodline Warnings Direct or equivalent service.

   v. Developing health and safety plans for construction activities to account for potential Climate Change impacts on workers, such as flooding and heatwaves. To include measures such as toolbox talks on training on dangers of extreme weather conditions.

d. To manage flood risk during construction and operation an Framework Surface Water Drainage Strategy will be submitted with the DCO application which will provide for the attenuation of surface water runoff from the Proposed Development, whilst minimising flood risk to the Site and surrounding areas:

   i. All temporary construction compounds will be located outside of areas of fluvial Flood Zone 2 and 3.

   ii. Additional attenuation in the form of SuDS will be incorporated to control any increase in the rate of flow towards receiving watercourses including allowances for climate change.

e. Infrastructure flood resilience methods have been set, including the requirement for Solar PV Panels to be set back by 10m from all water features.

6.6.7 The design of the Proposed Development will incorporate Climate Change projections required by the Environment Agency to ensure flood risk from all sources, including a sea level rise assessment, is accounted for and managed across the lifetime of the Proposed Development so it will remain operational in times of flood.

6.7 Preliminary Assessment of Effects

Greenhouse Gas Assessment

6.7.1 The potential impacts and effects of the Proposed Development have been assessed using the methodology as detailed in **Section 6.4** of this chapter.

Construction (2031-2033)

6.7.2 The GHG effects of construction are taken to be those for which the source begins and ends during the construction stage, and the effects do not endure beyond the completion of the construction phase. The embodied carbon associated with the manufacture of the materials and their components, particularly the manufacturing of the BESS and Solar PV Panels, will have the greatest carbon impact during construction. Transportation of these products will be second greatest contributor, while the remaining impacts will come from worker commuting, waste, and fuel and water use. Other GHG impacts during construction of the Proposed Development are likely to include:

a. Water use in concrete production and the end of construction cleaning cycle. Additional water consumption that contributes to GHG emissions includes water consumption by the workers.

b. Energy and fuel use for construction activities including fuel consumed by construction plant and machinery, fuel use for the transportation of construction materials to the Proposed Development Site, transportation of construction workers to and from the Proposed Development Site, and the transportation and disposal of waste.

c. As concluded within the assessments of the benchmark solar farm schemes, land use change is anticipated to have a beneficial impact during the lifetime of the Proposed Development as grassland that can be grown under the panels has a higher carbon sink value than agricultural land. However, as this beneficial impact is largely reversed during decommissioning, the GHG impact associated with land use change has therefore been excluded from the lifecycle GHG impact assessment. This is assumed to represent a robust worst-case scenario as trees planted during construction are expected to be retained beyond the decommissioning phase.

6.7.3 The details from the assessment of the comparable solar farms are presented in **Table 6-15** and **Table 6-16**. These are solar NSIPs assessed and verified by AECOM. Annual construction emissions (tCO_2e) have been calculated for the solar farms, with opening year generation (MWh) for each scheme to establish an average of 0.59 tCO_2e MWh, and a BESS benchmark has been calculated, assuming a storage capacity of 2 hours peak solar capacity, and construction emissions to yield as 158 tCO_2e per MWh. This benchmark has been applied to the Proposed Development to provide estimated construction emissions.

Table 6-15: Solar Farm Construction GHG emissions

Scheme	Total Construction Emissions (tCO_2e)	Opening Year Generation (MWh)	Benchmark (tCO_2e/MWh)
Sunnica Energy Farm	302,103	643,361	0.47
Longfield Solar Farm	198,675	356,475	0.56
Gate Burton Solar Farm	355,377	479,790	0.74
Tillbridge Solar Farm	539,225	884,075	0.61
Weighted average			0.59

Table 6-16: BESS Construction GHG Emissions

Scheme	Total Construction Emissions (tCO_2e)	BESS MWh Capacity	Benchmark (tCO_2e/MWhp)
Sunnica Energy Farm	149,912	515	291.2
Longfield Solar Farm	170,454	1,600	106.5
Gate Burton Solar Farm	78,882	500	157.8
Tillbridge Solar Farm	370,902	2,268	163.5
Weighted average			157.7

6.7.4 Of the two PV panel options, the south facing option layout includes more panels in the same space. It is considered to be a worst-case scenario with a higher embodied carbon and lower yield, so has been used as the basis for calculations for the Proposed Development. Of the two BESS option of AC coupled and DC coupled, they include the same number of batteries, which means the calculation of GHG emission will be applicable to both options. The Proposed Development is anticipated to generate 407,471MWh of electricity annually, and has estimated carbon emissions of **240,545 tCO_2e** per year. Based on a construction period of two years, total emissions from construction are estimated at **375,496tCO_2e**.

6.7.5 GHG emissions from construction have been assessed to identify the significance of their impact. **Table 6-17** presents the estimated construction

emissions against the carbon budget period during which they are expected to arise (the 5th UK Carbon Budget).

6.7.6 The annual emissions of each phase have been compared to the relevant annualised carbon budgets to enable assessment of the phases individually. The overall significance of GHG emissions in the context of the UK carbon budgets and the national policy environment has been assessed from Paragraph 6.7.30.

Table 6-17: UK carbon budgets relevant to construction period

Relevant UK Carbon Budget	Annualised UK Carbon Budget (tCO_2e)	Annual Construction Emissions During Carbon Budget Period (tCO_2e)	Construction Emissions as a Proportion of Carbon Budget
5th Carbon Budget (2028 to 2032)	345,000,000	187,748	0.054%

Operation (and maintenance) (2033 to 2093)

6.7.7 Operational GHG Impacts are either permanent, endure for a substantial period beyond construction, or represent an extended cumulative effect of construction or decommissioning activity. This includes the effects of the physical presence of the energy infrastructure, and its operation, use and maintenance.

6.7.8 GHG emissions sources within the scope of the operational emissions include operational energy use (i.e. for auxiliary services and standby power) and fuel used for the transportation of workers to the Proposed Development and maintenance activities. Maintenance and transportation cover the following.

a. Embodied carbon in replacement parts;
b. Plant and machinery requirements;
c. Fuel and water use during maintenance activities;
d. Transportation of materials and waste to and from the Site; and
e. Waste management activities.

6.7.9 Operational emissions will predominantly be from the replacement of panels and the associated embodied carbon in the materials, and therefore occur at regular intervals, rather than being ongoing, constant emissions. **Section 14.6** Materials and Waste of **PEI Report Volume 1, Chapter 14: Other Environmental Topics**, provides a review of expected design life and replacement frequency for key components of the Proposed Development.

6.7.10 Total GHG emissions from the operational phase of the benchmarked schemes are presented in **Table 6-18** and **Table 6-19**, along with their average annual MWh production. From these schemes, an annualised benchmark of 0.009 tCO_2e/MWh and 8.8 tCO_2e/MWh for the solar farm and BESS respectively has been calculated.

Table 6-18: Solar Farm Operational GHG emissions

Scheme	Average Annual Operational Emissions (tCO_2e)	Opening Year MWh	Benchmark (tCO_2e/MWh.year)
Sunnica Energy Farm	2,604	643,361	0.0040
Longfield Solar Farm	1,466	356,475	0.0041
Gate Burton Solar Farm	6,032	479,790	0.0126
Tillbridge Solar Farm	10,296	884,075	0.0116
Weighted average			0.0086

Table 6-19: BESS Operational GHG Emissions

Scheme	Annual Operational Emissions (tCO_2e)	BESS MWh Capacity	Benchmark (tCO_2e/MWh.year)
Sunnica Energy Farm	2,617	515	5.1
Longfield Solar Farm	6,304	1,600	3.9
Gate Burton Solar Farm	3,234	500	6.5
Tillbridge Solar Farm	30,882	2,268	13.6
Weighted Average			8.8

6.7.11 Of the two PV panel options, the worst case (fixed south facing) option has a higher embodied carbon and lower yield, so is the basis for calculations for the Proposed Development. Operational emissions will mainly consist of the associated embodied carbon in the replacement of key materials over the operational lifetime. The Proposed Development is expected to produce 407,471MWh in the first year of operation. On this basis the annualised operational emissions from the Proposed Development have been estimated at **11,057.3 tCO_2e**. The operational lifetime of the Proposed Development is expected to be 60 years, hence the total operational GHG emissions are estimated at **663,438 tCO_2e.**

6.7.12 The Proposed Development is expected to be operational by no earlier than 2033, therefore operational emissions up to 2037 (the end of the 6th Carbon Budget) will fall under the 6th UK Carbon Budget, beyond which point no Carbon Budgets have yet been legislated for. **Table 6-20** presents the estimated operational emissions against the Carbon Budget periods during which they arise. The overall significance of GHG emissions in the context of

the UK Carbon Budgets and the national policy environment has been assessed from Paragraph 6.7.29.

Table 6-20: UK Carbon Budgets relevant to operational period (up to 2037)

Relevant UK Carbon Budget	Annualised UK Carbon Budget (tCO_2e)	Average Annual Operational Emissions for the Proposed Development During Carbon Budget Period (tCO_2e)	Operational Emissions for the Proposed Development as a Proportion of Carbon Budget
6th Carbon Budget (2033 to 2037)	193,000,000	3,516 (Solar Farm)	0.0018%
		7,541 (BESS)	0.0039%

Decommissioning (2093 to 2095)

6.7.13 Sources of emissions during decommissioning within the scope of the GHG impact assessment include worker commuting, water use for decommissioning activities, fuel use on-site, transportation of materials and waste, and waste disposal.

6.7.14 Total GHG emissions from the decommissioning phase of the benchmarked schemes and subsequently accepted by the Planning Inspectorate are presented in **Table 6-21** and **Table 6-22**, along with their average annual MWh production. From these schemes, the benchmarks of 0.014tCO_2e/MWh and 2.2 tCO_2e/MWh has been calculated for the Solar Farm and BESS respectively.

6.7.15 Of the two PV panel options, the worst case fixed south facing option has a higher embodied carbon and lower yield, so is the basis for calculations for the Proposed Development. The Proposed Development is expected to produce 407,471MWh annually and hence, as the decommissioning phase of the Proposed Development is expected to take up to two years, total emissions from decommissioning are estimated at **7,598 tCO_2e.**

Table 6-21: Solar Farm Decommissioning GHG emissions

Scheme	Total Decommissioning Emissions (tCO_2e)	Opening Year (MWh)	Benchmark (tCO_2e/MWh)
Sunnica Energy Farm	10,149	643,361	0.016
Longfield Solar Farm	2,978[2]	356,475	0.008
Gate Burton Solar Farm	9,267	479,790	0.019
Tillbridge Solar Farm	10,529	884,075	0.012

[2] This figure excludes the land use change emissions outlined in the Longfield ES to keep the scopes the same across benchmarked schemes.

Scheme	Total Decommissioning Emissions (tCO_2e)	Opening Year (MWh)	Benchmark (tCO_2e/MWh)
Weighted average			0.014

Table 6-22: BESS Decommissioning GHG Emissions

Scheme	Total Decommissioning Emissions (tCO_2e)	BESS MWh Capacity	Benchmark (tCO_2e /MWh)
Sunnica Energy Farm	5,036	515	9.8
Longfield Solar Farm	2,555	1,600	1.6
Gate Burton Solar Farm	2,057	500	4.1
Tillbridge Solar Farm	1,325	2,268	0.6
Weighted average			2.2

6.7.16 As above for the operational phase, the decommissioning GHG footprint is considered to reflect a robust worst-case scenario as the calculations have been carried out using current emissions factors. By 2093, GHG emissions associated with energy generation, transportation, operation of plant, and waste disposal throughout the supply chain are anticipated to be much lower as a result of grid decarbonisation and machinery and vehicle electrification in line with the UK's net zero carbon emissions target for 2050.

Carbon Intensity of the Proposed Development

6.7.17 Renewable energy generation from the Proposed Development during the first full year of operation is estimated to be 407,471MWh based on the Proposed Development description provided within **PEI Report Volume 1, Chapter 3: The Proposed Development**, and applying a worst-case scenario of using south facing PV panels**.** Taking into consideration a 2% reduction in PV Panel performance during the first year of operation and applying a 0.45% degradation factor for each subsequent year to year 30, then the same assumptions again from year 31 to year 60, this gives a total energy generation figure of 22,459,662MWh over the assessed 60-year Proposed Development lifetime.

6.7.18 A carbon intensity value represents how many grams of CO_2 are released to produce a kilowatt hour (kWh) of electricity. Dividing the lifetime total energy generation figure into the lifetime emissions total of 1,046,532tCO_2e gives a total carbon intensity value for a worst-case scenario of the Proposed Development of 46.6gCO_2e/kWh.

6.7.19 The current UK grid carbon intensity is 212gCO_2e/kWh, however these figures cannot be directly compared as the published UK grid carbon intensity figure only takes into account operational emissions from the generation of electricity, overwhelmingly from the fossil fuels used to power gas-fired and occasionally coal-fired power stations. For a meaningful comparison to be made between the Proposed Development and the UK grid, the operational carbon intensity of the Proposed Development must only include emissions from the ongoing operations of the Proposed Development and exclude emissions from construction and decommissioning.

6.7.20 Over the 60-year lifetime of the project, the lifetime operational carbon intensity has a value of 29.5gCO_2e/kWh.

6.7.21 However, contextualising the carbon intensity of the Proposed Development, a single electricity generating installation, against an average for the entire UK grid, does not provide a particularly useful comparison for two main reasons. This context is provided to highlight the limitations of such a comparison and to underscore the importance of new renewable projects like the Proposed Development in the broader decarbonisation effort. Firstly, UK grid carbon intensity is not static. It changes from year to year as the generation mix changes over time. Over the last decade, there has been significant decarbonisation of the grid. This trend is set to continue into the future, but only if projects such as the Proposed Development are brought forward. Therefore, comparing a low-carbon electricity project such as the Proposed Development against projections of future grid carbon intensity fails to recognise that the grid can only decarbonise if additional renewable generation projects are consented and able to contribute to this ongoing decarbonisation.

6.7.22 Secondly, projects such as the Proposed Development do not seek to displace the average UK generation capacity. Instead, renewable electricity projects such as the Proposed Development can only support ongoing grid decarbonisation if they displace existing higher carbon generating capacity.

6.7.23 The contribution from renewable electricity projects such as the Proposed Development supports ongoing grid decarbonisation by displacing existing higher carbon generating capacity. While recognising that the 2023 NPS EN-1 requires all new combustion power stations with a capacity over 300MW to be constructed Carbon Capture Ready, the current marginal generating capacity (i.e. the generating technology that responds to changes in grid electricity demand) is provided by existing unabated, gas-fired combined cycle gas turbine (CCGT) power stations. As it is almost invariably CCGTs that provide dispatchable generation capacity, it is reasonable to assume that every kWh of electrical energy provided by a new established renewable

installation, such as the Proposed Development, is a kWh that does not have to be generated by an existing CCGT.

6.7.24 On this basis, the GHG assessment assumes the emissions associated with the operation of existing CCGT capacity as the do-nothing counterfactual case for electricity generation. Comparing the Proposed Development against an existing gas fired CCGT generating facility, currently the most carbon-efficient fossil-fuelled technology available, a representative figure for the carbon intensity of a CCGT is 354gCO_2e/kWh (Ref 6-26). The operational intensity of the Proposed Development is therefore 92% lower than that of the CCGT. Each kilowatt hour of electricity generated by the Proposed Development will emit 324g CO_2e less than if it was generated by a gas fired CCGT generating facility.

6.7.25 Combining this figure with the estimated lifetime output from the Proposed Development indicates an overall lifetime carbon reduction, relative to the counterfactual CCGT, of almost 7 million tCO_2e.This represents a 0.72% carbon saving of the 6th Carbon Budget (when construction of the Proposed Development will begin), and will help the UK meet its national and international binding targets including the UK's Carbon Budget and the Nationally Determined Contributions in line with the Paris Agreement.

Additional Carbon Savings from the use of Battery Energy Storage

6.7.26 Use of the BESS provides additional carbon saving opportunities. Relatively fast response power sources such as battery storage have an important role to play in helping to balance supply and demand within the electricity grid. This grid balancing function is often performed using high-carbon intensity power sources such as open cycle gas turbines (OCGT), so the use of a battery charged from solar PV generation can deliver a direct carbon saving relative to an OCGT.

6.7.27 The design of the Proposed Development's BESS is still evolving. It is currently estimated that the BESS capacity will be 856 MWh, with storage capacity of battery assumed to be two hours' worth of peak generation. This may be subject to change at the ES stage when more information will be available.

6.7.28 Should the BESS be charged from the Proposed Development, and discharged back into the grid once each day, at a typical round-trip efficiency of 85% and an overall lifetime degradation rate of 80%, it will be able to supply 12,742 GWh to the electricity grid over its 60-year operational lifetime. As the operational carbon intensity of the Proposed Development is 29.5 gCO_2e/kWh or 0.0295tCO_2e/MWh and the comparable figure for an OCGT is 0.4600tCO_2e/MWh (Ref 6-28); the use of the BESS for grid balancing purposes would deliver a saving of approximately 5,484,759tCO_2e over its operational lifetime.

6.7.29 These figures are inevitably subject to a degree of uncertainty, but they illustrate the fact that the use of the BESS, when used for grid balancing purposes, is likely to result in significant additional carbon savings over its

operational lifetime. These additional carbon savings from use of the BESS for grid balancing are not factored into the overall GHG assessment.

Overall GHG Impact and Significance

6.7.30 In light of the UK's climate objective to achieve net zero carbon by 2050, and in line with IEMA guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance, the UK's 5th and 6th Carbon Budgets have been used to contextualise emissions from the Proposed Development.

6.7.31 Annual emissions from the construction of the Proposed Development (and their magnitude) are compared to the significance definitions outlined in **Table 6-3**. In line with IEMA criteria for assessing the significance of GHG impacts, construction of the Proposed Development can be assumed to be consistent with applicable existing and emerging policy requirements. Emissions from construction are therefore determined to be 'minor adverse' and not significant.

6.7.32 As the Proposed Development directly supports the UK policy environment of decarbonising electricity generation, as laid out in the CCC's Sixth Carbon Budget Advice, Methodology and Policy reports (Ref 6-38), it can be considered to be aligned with the UK's overall trajectory to net zero. The National Grid cannot and will not decarbonise without investments in low carbon electricity generation projects like the Proposed Development.

6.7.33 The lifetime emission of the Proposed Development gives a total of 1,046,532 tCO_2e. Taking into account the annualised emission of different phases and comparing with the estimated overall lifetime carbon reduction, of almost 7 million tCO_2e, it indicates that the Proposed Development will breakeven its estimated lifetime emission within 9 years of operation.

6.7.34 The Proposed Development results in some operational emissions associated with maintenance and worker travel. However, the benefits of generating renewable energy from the Proposed Development far outweigh the associated emissions as demonstrated in Section 6.7.17 to 6.7.25. Annual emissions from the operation of the Proposed Development (and their magnitude) are compared to the significance definitions outlined in **Table 6-3**. As stated in the IEMA guidance on assessing GHG emissions, "*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*".

6.7.35 The Proposed Development's operational phase indirectly causes a reduction in atmospheric GHG concentration compared to the without-project baseline and aligns with a trajectory towards net zero. The GHG impact of the operational phase is therefore considered to be beneficial and significant when compared to the future baseline 'business-as-usual' scenario – as described above from **Section 6.5**.

6.7.36 While there are expected to be GHG emissions associated with the decommissioning phase of the Proposed Development, actual emissions are

anticipated to be lower as the figures presented in **Table 6-22** and **Table 6-23**, which represents a robust worst-case scenario. Therefore, the magnitude of impact is considered to be low.

6.7.37 GHG emissions from the decommissioning phase are therefore considered to have a minor adverse, non-significant effect on Climate Change. As noted in the significance definitions in **Table 6-3**, a negligible effect is not possible where any GHG emissions are released to the atmosphere. However, while there are residual emissions, the Proposed Development is doing enough to align with and contribute to the relevant transition scenario, keeping the UK on track towards net zero by 2050 and thereby potentially avoiding significant adverse effects (Ref 6-24).

6.7.38 The GHG impact of construction and decommissioning are anticipated to result in minor adverse, non-significant effects on the climate. The impact of operations is considered to have a beneficial, significant effect due to the operational carbon intensity remaining below that of a gas fired CCGT generating facility throughout its lifetime, its role in achieving the rate of transition required by nationally set policy commitments and supporting the trajectory towards net zero. The without-project baseline alternative of a CCGT facility would result in substantially higher GHG emissions. As stated in the latest IEMA guidance (Ref 6-24), “a project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant”. This Proposed Development demonstrates an indirect reduction in atmospheric GHG concentration and avoidance of emissions; therefore, it is overall beneficial and has a positive impact on climate which is considered to be significant.

6.7.39 The GHG savings achieved throughout the lifetime of the Proposed Development demonstrate the role solar energy generation has to play in the transition to, and longer-term maintenance of, a low carbon economy. Without low-carbon energy generation projects such as the Proposed Development, the average grid GHG intensity will not decrease as is projected, which would adversely affect the UK’s ability to meet its carbon reduction targets.

6.7.40 **Table 6-23** presents the preliminary effects identified by the GHG assessment.

Table 6-23: Preliminary assessment of effects – GHG assessment

Receptor	Description of impact	Significance of effect without mitigation	Embedded and additional mitigation measure	Residual effect after mitigation
Construction (2031–2033)	GHG emissions as a consequence of construction activities	Minor Adverse	The overall beneficial impact of the Proposed Development itself is considered to offset any GHG emissions during construction	Minor Adverse (not significant)
Operation (2033–2093)	GHG emissions as a consequence of operational activities	Beneficial (significant)	No mitigation required	Beneficial (significant)
Decommissioning (2093–2094)	GHG emissions as a consequence of decommissioning activities	Minor Adverse	The overall beneficial impact of the Proposed Development itself is considered to offset any GHG emissions during decommissioning	Minor Adverse (not significant)
Overall	GHG emissions compared to business-as-usual scenario	Beneficial (significant)	No mitigation required	Beneficial (significant)

Climate Change Risk Assessment

6.7.41 Potential climate risks, including the likelihood, consequence, and significance are detailed in **PEI Report Volume 3, Appendix 6-B**, with the results summarised below.

6.7.42 Future climate projections have been reviewed and the sensitivity of assets have been examined, before commenting on the adequacy of the embedded Climate Change mitigation measures built into the Proposed Development.

Climate Change Risk Assessment - Construction

6.7.43 The risks assessed in the CCRA at the construction phase of the Proposed Development predominantly cover workforce exposure to dangerous working conditions and damage to physical structures/asset damage.

6.7.44 Major climatic variables contributing to these risks include, but are not limited to, increased temperatures, flooding, and storms.

6.7.45 As a result of the embedded Climate Change mitigation measures, no significant Climate Change risks during the construction phase have been identified.

Climate Change Risk Assessment - Operation

6.7.46 The risks assessed in the CCRA at the operational phase of the Proposed Development predominantly encapsulate asset damage from extreme weather conditions and changes in annual precipitation and temperatures, as well as workforce exposure to dangerous working conditions.

6.7.47 Major climatic variables contributing to these risks are temperatures, precipitation, and extreme weather events.

6.7.48 As a result of the embedded Climate Change mitigation measures (as detailed in the Framework CEMP, presented in **PEI Report Volume 3, Appendix 3-A**) **no significant** Climate Change risks during the operation phase have been identified.

Climate Change Risk Assessment - Decommissioning

6.7.49 The risks assessed in the CCRA at the decommissioning phase of the Proposed Development are mainly made up of risks to the workforce.

6.7.50 These risks are driven by climatic variables like increased temperatures, rainfall, and extreme weather events.

6.7.51 As a result of the embedded Climate Change mitigation measures no significant Climate Change risks during the construction phase have been identified.

In-combination Climate Change Impact Assessment

6.7.52 Future climate projections and the sensitivity of receptors to both Climate Change and the Proposed Development will be examined by other

disciplines and the assessment results of potential ICCIs will be included in the ES.

6.8 Additional Mitigation and Enhancement

6.8.1 Additional mitigation measures or enhancement measures are required where significant adverse effects are identified after considering the embedded mitigation measures. No significant adverse effects have been identified in the preliminary assessment therefore no additional mitigation or enhancement measures are identified at this stage. This will be reviewed at the ES stage once the assessments and appropriate identified measures will be applied to the Proposed Development if required.

6.9 Residual Effects and Conclusions

6.9.1 As set out in **PEI Report Volume 3, Appendix 6-B** no likely significant adverse effects of Climate Change to or because of the Proposed Development were identified in the CCRA.

6.9.2 Furthermore, as set out in **Table 6-23** the significant effects on the climate identified in the GHG assessment range from minor adverse to beneficial (significant) owing to atmospheric GHG emissions being avoided by the Proposed Development and the Proposed Development's alignment with the UK's net zero trajectory. The GHG impacts of construction and decommissioning are anticipated to result in minor adverse, non-significant effects on the climate and would be balanced by the beneficial effect during operation.

6.10 Cumulative Assessment

6.10.1 Climate Change is the result of cumulative impacts as it is the result of innumerable minor activities. A single activity may itself result in a minor or insignificant impact, but when combined with many other activities, the cumulative impact could be significant. The nature of GHGs is such that their impact on receptors (the global climate) is not affected by the location of their source. The GHG emissions assessment by its nature is a cumulative assessment and considers whether the Proposed Development would contribute significantly to emissions on a national level.

6.10.2 The global atmosphere is the receptor for Climate Change impacts and has the ability to hold GHG emissions. As noted in the third principle of considering the aspect of significance in the IEMA guidance (Ref 6-24), "*GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant*". While the impact of any individual scheme may be limited, it is the cumulative impact of many schemes over time that could have a significant impact on Climate Change.

6.10.3 As such it is not possible to define a study area for the assessment of cumulative effects on GHG emissions nor to undertake a cumulative effects

assessment, as the identified receptor is the global climate and effects are therefore not geographically constrained. Consequently, consideration of the effects of the Proposed Development together with other developments on GHG emissions is not considered to be applicable.

6.10.4 It should also be noted that other schemes falling under the EIA Regulations will also need to consider Climate Change assessment within their own planning application.

6.10.5 The ICCI assessment is, by nature, a cumulative assessment, and any identified effects will be detailed in the ES.

6.10.6 As the CCRA is only concerned with the assets of the Proposed Development and a broader consideration of existing interdependent infrastructure, a cumulative assessment is not required.

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