Chapter H

Climate Change

East Claydon Greener Grid Park Environmental Statement

Chapter H Climate Change

April 2025

Hilson Moran
Shackleton House, Hay's Galleria, 4 Battlebridge Lane, London, SE1 2HP
www.hilsonmoran.com

LICHFIELDS

33659201v1

Contents

H1.0 Introduction

H1.1 This Chapter of the Environmental Statement ('ES') has been prepared by Hilson Moran on behalf of Statkraft ('the applicant'). It assesses the Proposed Development, described in Chapter C, and the impacts on Climate Change.

H1.2 The baseline situation is considered before the likely environmental effects of the Proposed Development are identified during its construction and operational phases. Mitigation measures to reduce any negative environmental effects are identified as appropriate, before the residual environmental effects are assessed.

H1.3 The Climate Change Resilience (CCR) of the Proposed Development is also assessed as part of this Chapter.

H1.4 This Chapter is supported by the following technical appendices provided within Volume 2 to this ES:

- Appendix H1: Legislation, Policy and Guidance
- Appendix H2: Assessment Boundaries
- Appendix H3: Site Layout
- Appendix H4: Embodied Carbon Assumptions

About the Author

H1.5 The authors of the Climate Change ES Chapter include Sian Grimsley and Andy Hart. Sian is an Environmental Consultant with over 4 years technical experience and an MSc in Atmospheric Science, she is also an associate member of the Institute of Environmental Science (AIES).

H1.6 Andy is an Associate Director at Hilson Moran, a Chartered Engineer (CEng) with over 14 years technical experience and a full member of the Engineering Council (EC).

H2.0 Policy Context

H2.1 A summary of the relevant legislation, policy and guidance used to inform the assessment presented within this chapter is provided below. Full details are provided within Appendix H1.

Legislation

H2.2 A summary of the relevant legislation is provided below:

- Climate Change Act (2008) and 2050 Target Amendment (Order 2019);
- Climate Change and Sustainability Energy Act (2006);
- Energy Act (2013);
- Environment Act (1995, 2021).
- EIA Directive (2014/52/EU);
- Town and Country Planning Regulations (EIA) Regulations (2017);
- Infrastructure Planning (EIA) Regulations (2017);

National Policy

H2.3 A summary of the relevant national planning policy is provided below:

- National Planning Policy Framework (2024);
- The National Adaptation Programme and Third Strategy for Climate Adaptation;
- The Clean Growth Strategy; and,
- The Carbon Plan: Delivering Low Carbon Future.

Local Policy

H2.4 A summary of the relevant local planning policy is provided below:

- Buckinghamshire Local Development Scheme;
- Buckinghamshire Council Climate Change and Air Quality Strategy; and,
- Vale of Aylesbury Local Plan:
    (i) Policy S1: Sustainable Development for Aylesbury Vale;
    (ii) Policy C3: Renewable Energy.

Other Relevant Guidance

H2.5 A summary of the relevant guidance is provided below:

- IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (2022);
- IEMA guidance on 'Climate Change Resilience and Adaptation' (2020);
- Building Regulations Part L 'Conservation of fuel and power' (2021); and,

- RICS, 2017. Whole life carbon assessment for the built environment. Professional Statement, 1st ed. Royal Institution of Chartered Surveyors.
- RICS, 2023. Whole life carbon assessment for the built environment. Professional Statement, 2nd ed. Royal Institution of Chartered Surveyors.
- The Institution of Structural Engineers (IStructE), n.d. How to calculate embodied carbon. 2nd ed. The Institution of Structural Engineers.
- British Standards Institution (BSI), 2011. BS EN 15978:2011: Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method. London: BSI.

H3.0 Assessment Methodology & Significance Criteria

Assessment Methodology – GHG

H3.1 The assessment methodology presented in this chapter draws upon the IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their significance'[1]. This document provides guidance on how to assess the impact of climate change, within the context of EIA, emphasising the need for proportionality in the context of nation, sector and local GHG emissions. It sets out advice to the key components necessary to deliver a robust, appropriate and consistent assessment.

H3.2 The following six steps outline the framework that has been followed within this assessment of GHG emissions:

- Define the scope and boundaries of the GHG assessment;
- Develop the baseline;
- Determine the emissions calculation methodologies;
- Data collection;
- Calculate and determine the GHG emissions inventory; and,
- Consider mitigation opportunities and assessment of residual effects.

H3.3 GHG emissions associated with the construction, operation and decommissioning of the Proposed Development are quantified and assessed within this chapter. GHG is assessed using a whole-life approach (i.e. from cradle to grave), including GHG emissions (direct and indirect) and embodied carbon associated with the Proposed Development, to develop a GHG footprint for the Proposed Development.

Assessment Scope and Boundaries

H3.4 The scope of this assessment reflects the WLC approach throughout the construction and operation of the Proposed Development. **Appendix H2** presents the modular approach of the life-cycle stages that are used to set the boundaries of this GHG assessment presented in **Table H3.1**.

H3.5 The assessment scope includes emissions arising from material production, transportation, construction activities, equipment installation (life-cycle phases A1 to A5).

H3.6 Emissions arising from the use, maintenance, repair and operation of the onsite systems (B1-B6) over a lifespan of 20 years. The 60-year lifespan is also present which reflects the length of the Applicant's tenure of the Site (3 life-cycles of 20 years).

H3.7 Operational emissions (B6) include energy loses associated with the onsite systems as well as electricity used for any onsite heating, cooling and control systems. Operational energy will also consider the carbon associated with charging/discharging the batteries to demonstrate the benefit of BESS sites on the UK Net Zero Carbon Commitments.

H3.8 The scope also includes emissions generated throughout the end-of-life stage (C1-C4) associated with the decommissioning and deconstruction of the BESS.

Table H3.1 GHG Assessment Boundaries

Product Stage (A1-A3)	**Emissions released through the extraction and processing of raw materials, manufacturing of products (e.g., battery units) and the transportation of materials to the manufacturing site.**
Transport (A4)	Emissions from transporting construction materials, components and equipment to the site, modelled based on average distances and vehicle emissions.
Construction and Installation (A5)	Emissions generated from on-site construction activities, including any fuel/gas combusting processes and the installation of battery and supporting infrastructure.
Use, Maintenance, Repair and Refurbishment (B1-B5)	Emissions associated with the maintenance and repair of any onsite systems, including transport emissions from maintenance vehicles, and the embodied carbon associated with the replacement machinery. Emissions arising from waste generation onsite (e.g., general waste and mixed recycling) arising from onsite offices and welfare facilities. Fugitive emissions attributed to the operational energy losses of the onsite systems.
Operational Energy (B6)	Emissions from operational energy losses during the battery charge and discharge cycles as well as electricity used for any onsite cooling, heating, control, CCTV and lighting systems during the BESS operation.
End of Life Stage (C1-C4)	Emissions arising from the deconstruction and demolition of the BESS site, transportation of materials and machinery to waste processing facilities, waste processing (reuse, recovering or recycling) and disposal.

H3.9 The Proposed Development will not be provided with a mains water supply and therefore operational water use (B7) has been scoped out of this assessment. The Site will be unoccupied and controlled remotely.

Temporal Scope

H3.10 The GHG emissions are quantified and assessed over a period of 20 years, which is the estimated lifetime of the batteries and equipment on-site. A study period of 60-years is also presented and assessed which accounts for the length of the land-lease at the Site. It is acknowledged that the length of permission is 40 years. This assessment therefore accounts for a worst-case scenario with three lifespans of the BESS assuming that the batteries, MVS and power modules will be replaced every 20 years (60 years).

Defining Baseline

H3.11 For the purpose of this assessment a baseline is defined against which the impact of a new project can be compared against. The IEMA guidance (2022) requires the baseline of an assessment should either be determined based on available data or alternatively to be represented as zero, where data is not available or where no physical development or activity is taking place. The assessment should determine the baseline GHG emissions based on the current existing projects (i.e. energy consumption of building scheduled for deconstruction for a complete redevelopment) and infrastructure (i.e. current operational and use emissions of a road due to be upgraded) within the Site boundary.

Methods of Assessment

H3.12 The metric for assessing climate change impacts of GHG emissions in this assessment is Global Warming Potential (GWP), expressed as tonnes of carbon dioxide equivalent (tCO_2e) in total or per annum. This accounts for six key GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

H3.13 The calculation for determining GHG emissions is based upon the multiplication of relevant emission factors with the activity producing GHG emissions, with the units used to report GHG emissions as tonnes of CO2 equivalent (tCO_2e), for example:

Electricity consumed (kWh) x electricity emission factor (tCO2e per kWh) = total tCO2e

H3.14 Embodied Carbon calculations have been undertaken using the industry recognised and approved tool for assessing environmental impacts over a project lifecycle: etoolLCD. This tool aligns with international standards ISO 14044 '*Environmental management – Life Cycle Assessment – Requirements and Guidelines*' and EN 15978 '*Sustainability of Construction works – Assessment of Environmental Performance of Buildings – Calculation Methods'*.

H3.15 Embodied carbon calculations were performed using the latest carbon database available in eToolLCD, the United Kingdom LCI – V19 – Life Cycle Strategies. Additionally, the carbon database was supplemented with relevant carbon factors from widely accepted industry publications, such as the IStructE Guide: How to Calculate Embodied Carbon (2nd edition) and the UK CARES report: Carbon Steel Reinforcing Bar (Secondary Production Route, Scrap), Sector Average – September 2023.

H3.16 The quantification of annual emissions for the assessment is carried out to allow comparison of the Proposed Development's GHG emissions to regional and national annual emissions and targets.

Identification of Receptor Sensitivity

H3.17 GHG emissions arising from the construction and operation of the Proposed Development are considered the key impacts, with the principal receptor being the 'global atmosphere'. The consequence of GHG emissions associated with the Proposed Development is that atmospheric GHG emissions are pushed closer towards their environmental limit, triggering subsequent detrimental effects on the global climate system.

H3.18 In line with the IEMA (2022) guidance, the sensitivity of the receptor (i.e. the global atmosphere) in relation to GHG emissions is always considered to be 'high', based on the following conclusions:

- Value of the resource: the atmosphere and its role in regulating the global climate is of high ecological, social and economic value and underpins life on the planet, therefore is of global critical value;
- Vulnerability: it is recognised by the Paris Agreement (2015) that the GHG concentrations in the atmosphere are already approaching their environmental limit and the effects of climate change are already evident; and

- Reversibility of the effect: climate change is considered irreversible, with a delayed effect in any actions or technologies employed to reduce concentrations of GHG emissions already in the atmosphere.

Determining Magnitude of Effect

H3.19 In accordance with IEMA guidance (2022) the nature of the effect (*i.e.* beneficial, or adverse) is determined by whether the greenhouse gas (GHG) emissions contribute positively or negatively to the achievement of climate-related targets and objectives. An effect is generally considered beneficial if it leads to a reduction in GHG emissions or supports climate change mitigation efforts. Conversely, an effect is considered adverse if it results in an increase in GHG emissions or hinders efforts to mitigate climate change. The following terms have been used to define the level of the effects identified locally and nationally, on a Borough or the UK level, respectively:

- Major effect: where the Proposed Development is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity;
- Moderate effect: where the Proposed Development is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability;
- Minor effect: where the Proposed Development is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Development is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change; and,
- Negligible: where the Proposed Development is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change.

H3.20 The level of effect has been informed by the magnitude of change due to the Proposed Development and the evaluation of the sensitivity of the receptor. The level of effect has been determined using professional judgement and the criteria set out in Table H3.2.

Table H3.2 Determining Level of Effect in EIA

		Sensitivity			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change (Effect)	Large	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate - Major	Moderate	Minor	Negligible
	Small	Minor - Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

H3.21 As recommended by IEMA guidance (2022), the magnitude of effect has been considered in relation to the context of where the Proposed Development is located. The GHG emissions generated during the construction, operation and decommissioning of the Proposed Development have been considered in the context of CO2e emissions for Buckinghamshire and the wider UK carbon budgets.

H3.22 The incremental GHG emissions have been assessed in the relation to Buckinghamshire Council's annual emissions (2022, latest available dataset) and the UK's seventh carbon budget. This will place the GHG emissions impact into context and demonstrate its magnitude and level of contribution.

H3.23 To determine the magnitude of effect of GHG emissions, the criteria detailed in Tables H3.3 and H3.4 has been used.

Table H3.3 Magnitude of Effect against Buckinghamshire's GHG carbon budget

Magnitude of Change (Effect)	**Criteria**
Major Adverse	Emissions for Proposed Development above 1% of annual Buckinghamshire emissions (2,991.3 ktCO2e).
Moderate Adverse	Emissions for Proposed Development above 0.1% of annual Buckinghamshire emissions (2,991.3 ktCO2e).
Minor Adverse	Emissions for Proposed Development above 0.1% of annual Buckinghamshire emissions (2,991.3 ktCO2e).
Negligible	Emissions for Proposed Development above 0.01% of annual Buckinghamshire emissions (2,991.3 ktCO2e).

Table H3.4 Magnitude of Effect against UK's GHG carbon budget

Magnitude of Change (Effect)	**Criteria**
Major Adverse	Emissions for Proposed Development above 1% of Nationwide annual emissions (535 MtCO2e).
Moderate Adverse	Emissions for Proposed Development above 0.1% of Nationwide annual emissions (535 MtCO2e).
Minor Adverse	Emissions for Proposed Development above 0.1% of Nationwide annual emissions (535 MtCO2e).
Negligible	Emissions for Proposed Development above 0.01% of Nationwide annual emissions (535 MtCO2e).

Determining Significance

H3.24 As recommended by IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance', the assessment will take a highly precautionary approach where any net increase in GHG emissions is treated as having a likely significant effect.

H3.25 The guidance sets out in EIA context relative significance descriptors to assist GHG assessments (beneficial, negligible, minor adverse, moderate adverse, major adverse), major or moderate adverse effects and beneficial effects are considered significant. Minor adverse and negligible effects are not considered to be significant.

H3.26 The levels of significance are not solely based on the Proposed Development's GHG emissions alone, but on the developments contribution towards limiting global warming to 1.5°C and the transition towards net-zero.

Summary of Data

H3.27 A summary of the data used within this assessment is provided below with supporting benchmarks, drawings and tables included within the in Appendices.

Product Stage

H3.28 Design Drawings provided by the Applicant were analysed and used as the foundation for deriving the quantities of materials required on the Site, see Site Layout in **Appendix H3 and Appendix C1**. Where specific data and information related to certain materials was not provided, generic data from approved LCA tools such as etoolLCD were used to calculate the embodied carbon emission within the product stage. See **Appendix H4** for a summary of the material inputs for the embodied carbon assessment.

H3.29 Due to the limited availability of carbon data reflecting the Global Warming Potential (GWP) of Lithium Battery Units, four different Environmental Product Declarations (EPDs) with characteristics similar to the battery units planned for installation were analysed. The averaged carbon factors derived from these EPDs were then used to calculate the product stage emissions for the Battery Units and MV Skids.

Transport

H3.30 Construction vehicle movements were provided by the project Transport Consultant (WSP), and vehicle distances were assumed based on the Applicant commitment to where possible utilising a local supply chain. Construction traffic emissions were calculated using the factors presented in Table H5.

H3.31 RICS PS 'Whole life carbon assessment for the built environment' was used to gather data for the globally manufactured elements, *i.e.*, transport of battery and MVS components. These components were assumed to have travelled approximately 10,000 kms by seaways and 200kms by roadways.

H3.32 Operational traffic will be minimal comprising of two transit vans per month for maintenance purposes, *i.e.*, four movements a month in total. Operational traffic emissions were also calculated using the factors presented in H3.5.

Table H3.5 Transport Emission (Carbon) Factors 2024 – Construction & Operational Traffic

Mode	Type	Unit	2024 BEIS Factor (kg CO2e)
LGVs / Transit Van	Van – Average (up to 3.5 tonnes)	km	0.24771
HGV	All HGVs – 100% Laden	km	0.98641
	All HGVs – 0% Laden	Km	0.64392

Construction

H3.33 GHGs associated with the construction of the Proposed Development include those embedded in the materials used during construction. As well as emissions generated from on-site construction activities including fuel and gas combustion processes and emissions from construction vehicles.

H3.34 Carbon arising from the energy consumption by on-site machinery during installation and wastage was estimated using eToolLCD default carbon rates and the closest available datasets. Where on-site installation and wastage activities (A5) were not available on eToolLCD, typical industry fuel use, energy consumption, and wastage rates were considered. This approach incorporated 5% of the manufacturing emissions.

Maintenance, Repair and Refurbishment

H3.35 Over the lifetime of the Proposed Development, emissions arising from the maintenance, repair and operation of the onsite systems (B1-B6) were calculated over a lifespan of 20 years. The 60-year lifespan is also assessed to consider the operational timescale of the Proposed Development (three life cycles of 20 years) to reflect the length of the Applicant's tenure of the Site.

H3.36 General site and Ancillary Buildings described in within Appendix H4 are also subordinated to replacements rates through its lifetime, the lifespan of materials and future replacement assumptions were made in accordance with the 1st edition of the RICS PS "Whole life carbon assessment for the built environment".

H3.37 Appropriate allowances for future material maintenance and repair have been made in accordance with the default rates included in the selected etoolLCD database.

Operational Energy

H3.38 Operational GHG emissions from the Proposed Development have been calculated using information provided by the Applicant. At this stage, the Applicant could not provide detailed information of the operation of the Proposed Development, instead data was provided from similar BESS sites operated by Statkraft to ensure the most accurate data is utilised. This was then analysed and scaled to reflect the size of the Proposed Development (500 MW).

H3.39 Emissions arising from refrigerant use (B1) within the battery cooling systems have been calculated using usage data from another similar site and scaled to reflect the operation of the Proposed Development. The proposed BESS systems will use approximately 2.3kg of R134a refrigerant in each cabinet.

H3.40 The most significant operational energy emissions will be from the losses associated with charging and discharging of the batteries and ancillary plant. Energy emissions from 'small power' systems, i.e. control and lighting systems were also incorporated into the assessment of operational energy. However, these emissions are anticipated to have minimal contribution to the overall carbon footprint of the Proposed Development as the Site will be unoccupied.

End of Life Stage

H3.41 The 'end-of-life' stage accounts from carbon emissions arising from the decommissioning and deconstruction of the Proposed Development and the processing and disposal of materials (C1-C4).

H3.42 GHG Emissions associated with building decommissioning of the Proposed Development have been obtained from the embodied carbon calculation using etoolLCD database, where assumptions have been made, they are aligned with the guidance of section 3.5.4 of RICS Professional Standard: Whole Life Carbon Assessment for the Built Environment, 1st Edition.

Assessment Methodology - Climate Change Resilience – Implications of Climate Change Adaptation

H3.43 The Proposed Development's Climate Change Resilience (CCR) has also been assessed as part of this ES Chapter. The approach to assessing the potential impact of climate change on the Proposed Development has been undertaken in line with IEMA guidance 'Climate Change Resilience and Adaptation', which presents a framework for the consideration of climate change resilience and adaptation within the EIA process.

H3.44 The IEMA guidance indicates key steps within the assessment of CCR:

- Pre-EIA Stage: Embedding building climate resilience and adaptation into the project design;
- Scoping climate change adaptation into the EIA;
- Defining the future (climate) baseline;
- Identifying and determining sensitivity of receptors (Vulnerability);
- Reviewing and determining magnitude of the effects;
- Determination of significance;
- Developing additional adaptation and mitigation measures; and
- Post-EIA Stage: Monitoring and Adaptive Management.

H3.45 The IEMA guidance recommends considering and assessing the 'in-combination' climate impacts as well as the possibility of new significant effects arising throughout the Proposed Developments lifetime. The assessment should assess whether additional effects of future climate impacts will alter the sensitivity or magnitude of the effects, and consequently the significance of effects.

H3.46 The CCR assessment examines how climate change may pose risk to the Proposed Development in relation to the following areas (scoped-in EIA disciplines):

- Landscape and Visual Impact;
- Noise;
- Biodiversity and Ecology;
- Traffic and Transport;
- Archaeology (Below Ground Heritage); and

H3.47 For each topic listed above, the CCR assessment will aim to:

- Identify and determine sensitivity of receptors;
- Review and determine the magnitude of effect;
- Determine the significance of effect; and,
- Identify appropriate mitigation (adaptation) measures.

H3.48 The CCR assessment considers whether the effect on receptors by potential impacts of the Proposed Development under the current condition (without climate change) are likely to be different under an alternative future climate baseline. A key aspect of the assessment (for each of the technical topics considered) has been to identify the likely effect of those receptors considered more vulnerable to changes in climate, having taken into account the resilience and adaptive measures proposed for the scheme in order to mitigate the risk presented by climate change.

H3.49 Due to uncertainty in both the future climate projections and the effect of future climate conditions of receptors, the assessment is qualitative and based on objective professional judgement, unless where there is published, accepted quantifiable methods available. Adaption and resilience measures are also outlined.

Identification of Receptor Sensitivity

H3.50 The CCR aims to identify potential receptors to the effects of future climate change. Potential receptors relevant to the location, nature and scale of the Proposed Development will be identified. These receptor groups may include:

- Buildings and infrastructure (including equipment and building operations);
- Human health receptors (e.g., construction workers and site users);
- Environmental receptors (e.g., habitats and species); and,
- Climatic systems (i.e., the atmosphere).

H3.51 The sensitivity of the receptors or receiving environment refers to how strongly it responds to change, as well as its ability to adapt to and recover from that change once impacted. In ascribing the sensitivity of receptors in relation to potential climate change effects, the following factors must also be considered:

- Susceptibility of the receptor (*e.g.*, ability to be affected by a change) (opposite of resilience); and,
- Vulnerability of the receptor (*e.g.*, potential exposure to a change).

H3.52 The susceptibility of a receptor can be determined using the following scale:

- High susceptibility: receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevailing climatic factors (*e.g.*, lose much of its original function and form).
- Moderate susceptibility: receptor has some limited ability to withstand/no be altered by the projected changes to the existing/prevailing 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/prevailing climatic factors (*e.g.*, retain much of its original function and form).

H3.53 The vulnerability of a receptor can be defined using the following scale:

- High vulnerability: receptor is directly dependent on existing/prevailing climatic factors and reliant on these specific existing climate conditions continuing in future (*e.g.*, river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions.
- Moderate 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 (consider whether it is justifiable to assess such receptors further within the context of EIA – *i.e.*, it is likely that such issues should have been excluded through the EIA scoping process).

Determining Magnitude of Effect

H3.54 A combination of susceptibility and vulnerability in addition to value/importance of the receptor should be used to reach a reasoned conclusion on sensitivity.

H3.55 The magnitude is the degree of change from the determined baseline conditions which drives from the construction, operation and decommissioning of a development. A combination of probability and consequence should be used to reach a reasoned conclusion on the magnitude of effect. Professional judgement should be applied to assign magnitude.

Determining Significance

H3.56 Once the sensitivity and magnitude have been determined, these should be combined to reach an overall judgement on the significance of the likely environmental effect. As there is no legislative definition of 'significance', the conclusion of whether an effect is significant/the level of significance is down professional judgement of the sustainability consultant evaluating, in conjunction with the EIA Coordinator. An explanation of the outcomes of the assessment should be clearly set out.

Consultation

H3.57 The EIA Scoping Report (see Appendix B1 of the ES) identified the proposed scope and approach of the Climate Change Assessment that was submitted to Buckinghamshire Council. A response from the council was received on 14/11/2024 and the comments regarding climate change impacts have been considered throughout this assessment.

Assumptions and limitations

GHG Assessment

H3.58 The metric for assessing climate change impacts of GHG emissions within this assessment is Global Warming Potential (GWP), expressed as tonnes of carbon dioxide equivalent (tCO_2e) in total or per annum. This accounts for six key GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

H3.59 This assessment is based on information available at this stage of development. Where site specific information was not available, data from similar Statkraft BESS sites was provided by the Applicant to incorporate into the assessment and provide the most accurate data possible. The use of industry benchmarks and preliminary modelling results have supported the development of the assessment. The findings arising from this assessment can provide insight as to the priority areas for reducing the impact of GHG emissions resulting from the Proposed Development.

H3.60 The assumed lifespan of the Proposed Development is 60-years to reflect the Applicant's land lease period. The 60-year period accounts for three 20-year lifespans of the BESS and assumes that the batteries, MVS and power modules will be replaced every 20 years. The length of planning permission sought is 40 years, and therefore this Chapter presents conservative 'worst-case' scenario impacts.

H3.61 The assessment presents total carbon emissions generated throughout the construction, operational and end-of-life phases of development. The annual carbon footprint of each stage has been compared to the local (Buckinghamshire 2022 annual emissions - latest available dataset) and national (UK's seventh carbon budget) emissions. The emissions from all stages have annualised using the operational lifetime (60 years).

H3.62 It is important to note that the electricity emission (carbon) factors change on an annual basis, with factors lowering year on year as the grid transitions to cleaner methods of generating energy, this has been considered when calculating the operational carbon of the Proposed Development.

H3.63 Battery technology is rapidly changing in performance and embodied carbon content, therefore quantifying embodied carbon emissions at this stage associated with the battery technology is an estimate that will continue to evolve.

Embodied Carbon Assessment

H3.64 Given the lack of granular data, several key assumptions have been made to complete the embodied carbon calculations, a full breakdown of the assumptions made are provided in **Appendix H4** and a summary is provided below.

H3.65 Material quantities for the general site such as foundation areas, topsoil movements, and steelwork were provided by the design team. However, electrical components of battery and MVS units and materials involved in the construction of ancillary buildings were estimated based on provided specifications, drawings, and industry standards.

H3.66 In cases where detailed drawings or specifications were unavailable, assumptions were made using typical material densities and project's overall scale. Additionally, transportation emissions were modelled assuming an average transport distance from the procurement route, using standard emission data from etoolLCD. The Applicant's local supply chain was incorporated into these calculations.

H3.67 To address data gaps and associated uncertainties, a contingency factor was applied in line with the methodology outlined in the 'RICS Professional Standard: Whole Life Carbon Assessment for the Built Environment, 2nd Edition.' A 25% uncertainty margin was added to all A1-A5 emissions to account for possible inaccuracies in material quantities, transportation distances, and equipment energy consumption. In addition to this, a 10% contingency factor was directly applied to the ancillary buildings and general site works that were not confirmed by the design team. The elements were the 10% contingency factor was included, is listed in Table H3.6:

Table H3.6 Embodied Carbon Assessment – Site Boundaries

Site Element	Sub-Element
General Site	Access Road, Fencing, Drainage Ditch, Cable Route to POC, Security Systems & Lighting
Ancillary Buildings & Main Transformer (Traffo)	Metering Room, Comms & LIV, Operation Room, 33kV Switch Gear Room, Control Containers, HV Yard, Main Traffo, LV Traffo, Aix Traffo and Genset.

Climate Resilience Assessment

H3.68 The UK Climate projections have been used with the CCR assessment in line with UKCP18 modelling, which assumes different Representative Concentration Pathways (RCP). This CCR follows the RCP 8.5 which is the highest-impact scenario and therefore takes a worst-case approach. It is important to note that because the assessment is based on projections and modelling, fluctuations are expected and therefore uncertainties are inherently present within the modelling and CCR assessment.

H3.69 The assessment takes a long-term view approach and therefore, the receptor types considered within the assessment may be more broadly defined, as opposed to other ES Chapters that are more specific in the receptors identified.

H3.70 The mitigation measures proposed within this CCR assessment are provided as advisory and as non-committing recommendations. It is not stipulated by policy the requirement for a Climate Change Adaptation Plan nor the requirement for monitoring the Proposed Development's resilience over time. Therefore, the advised mitigation measurements are not mandatory but should be considered for best practice and long-term resilience.

H4.0 Baseline Conditions

H4.1 For the purpose of this assessment a baseline is defined against which the impact of a new project can be compared against. As described within the IEMA guidance, the baseline for the assessment should either be determined based on available data or alternatively to be zero, where data is not available or where no physical development or activity is taking place. The assessment should determine the baseline GHG emissions based on the current existing projects (i.e. energy consumption of building scheduled for deconstruction for a complete redevelopment) and infrastructure (i.e. current operational and use emissions of a road due to be upgraded) within the Site boundary.

Current Conditions

H4.2 The Site is located within the Aylesbury Vale area of Buckinghamshire, approximately 120m north-west of the National Grid East Claydon substation, and 650m north-east of East Claydon Village. The Site is currently comprised of agricultural fields (grade 3b – moderate), separated by landscape planting, trees and hedgerows around their perimeters.

H4.3 Agricultural activities can store carbon during farming practices. Emissions are also generated by agricultural machinery used for harvesting crops, however these are anticipated to be minimal.

H4.4 Based on the existing uses of the site the current baseline GHG emissions are determined to be zero.

Assumed Baseline

H4.5 The assumed baseline position for the GHG assessment is that the National Grid replacement substation is operational at the same time as the Proposed Development. It is assumed that the existing substation will be decommissioned once the replacement substation is in use (set out in Chapter B of this ES). This Chapter assesses the GHG emissions of the Proposed Development against local carbon budgets (Buckinghamshire 2022 annual emissions), which is assumed to have already accounted for the existing substation's operation. Therefore the 'assumed baseline' position has been taken into account within this assessment.

H4.6 The assumed baseline scenario is not relevant to the CCR part of the assessment.

Future Baseline

GHG

H4.7 The future baseline assumes that the Proposed Development is not constructed, and therefore the conditions will remain the same as the current baseline.

H4.8 No change in GHG emissions would be anticipated in this scenario based on the current agricultural uses at the Site that do not contribute to GHG emissions.

Climate Resilience

H4.9 In line with the guidance, a baseline has been established and a future climate scenario has been developed using the future climate projections published by the Met Office (UK Climate Projections (UKCP18)). The results include projections for several variables including annual mean temperatures, annual changes in summer and winter precipitation. Data is provided for different time periods, from 1961 until 2100, under different scenarios with different probability levels within each scenario. In alignment with guidance, a high emissions scenario is used (RCP8.5) for the 2080 future baseline year, considered most relevant to the Proposed Development. The projected change to the range of climatic conditions has adopted the 50% probability level, which is a central estimate adopted given the level of uncertainty associated with predicting the modelled scenarios.

H4.10 The variations in temperature and precipitation for Southeast England area, where the Site is located, can be seen in the table below. The 'UKCP18 Factsheet: Derived Projections' (August 2022) was used to inform the table and CCR assessment, as it provided an accessible and clear summary.

Table H4.1 UK Climate Projections for Southeast England following the RCP8.5 Scenario

Variable	Project Change in Trend		
	10th Percentile	50th Percentile	90th Percentile
Temperature (°C)			
Mean Annual Temperature	↑	↑	↑
Mean Summer Temperature	↑	↑	↑
Mean Winter Temperature	↑	↑	↑
Precipitation (%)			
Mean Summer Precipitation	↓	↓	↑↓
Mean Winter Precipitation	↑↓↑↓	↑	↑

Temperature

H4.11 Overall UKCP18 derived projects in the UK for 2°C of global mean warming include:

- The largest warming in the UK will be in the Southeast where summer temperatures may increase another 3 to 4°C relative to present day (1981-2000);
- Median warming will be at least 1 to 2°C throughout the year across the whole of the UK;
- Winter cool days will warm by 1 to 1.5°C across the country, whilst temperatures on warmer winter days increase by less than 1°C; and,

- In summer both hot and cool days warm by 1 to 1.5°C across Scotland and 1.5 to 2°C across England.

H4.12 For overall UK 4°C of global warming, the changes in pattern include:

- All seasons warm, but summers warmer than winters;
- Summer temperatures rise by another 4 to 5°C in the South of England and 3 to 4°C elsewhere in the country;
- Hot summer days warm by 4.5 to 5°C compared to present day (1981-2000), across much of Southern England, possibly exceeding 5°C in some locations;
- Cooler summer days warm by 4 to 4.5°C across England and up to 5°C in the Southeast. Increases reduce toward to north to under 3°C in the far Northwest of Scotland"
- Cool winter days warm by 2.5 to 3°C across the country; and,
- Warm winter days warm by 2.5 to 3°C in England but by 2 to 2.5°C in Wales and Scotland.

Precipitation

H4.13 Overall UKCP18 derived projects in the UK for 2°C of global mean warming include:

- Changes are uncertain, but suggest slightly wetter winters and drier summers, with summer drying more in the South; and,
- Dry days in summer have 30% less precipitation in parts of the Southwest.

H4.14 For overall UK 4°C of global warming, the changes in pattern include:

- Median winter precipitation increases by up to 20% across most of the country;
- Median summer precipitation decreases most in the south with median reductions of up to 20 to 30% across much of the England and Wales;
- Dry summer days decrease in precipitation by up to 50% in summer across much of Southern Wales and England. This drying reducing toward the north to under 20% in Northern Scotland; and,
- The wettest summer days dry by up to 40% on parts of the south coast. This decreases toward zero in the North.

H5.0 Potential Effects

Embedded Mitigation

H5.1 Embedded mitigation measures will be incorporated throughout the construction and operational phases of development to minimise environmental impacts.

Construction Stage

H5.2 To reduce emissions during the construction of the Proposed Development a number of measures have been incorporated into the design:

- Selecting materials with low embodied impact, focusing on key elements of the development that typically have higher carbon impacts;
- Sourcing materials locally to reduce the need for transport;
- Committing to resourcing construction materials through local supply chains;
- Where possible utilise cut and fill civil engineering techniques, to minimise emissions generated by transporting materials throughout the construction phase; and,
- Select materials with long life and require little maintenance.

H5.3 A framework Construction Environmental Management Plan (CEMP) will also be prepared by the Applicant which will detail the measures to be taken in relation to waste management as set out above, and provide the framework for planning and implementing remediation, construction and service utility activities in a way that prevents, minimises and controls potential GHG emissions. Further details on the likely scope of the CEMP are provided in Chapter C (Site and Scheme description) and Chapter L (Summary of Mitigation and Monitoring).

Operational Stage

H5.4 To reduce emissions during the operation of the Proposed Development a number of measures have been embedded into the design:

- The BESS incorporate a number of energy efficient technologies, including efficient battery technologies and low loss systems components (transformers).
- Due to the nature of the proposed uses, the Site will be unmanned and an efficient operation schedule will be implemented to reflect the reduced demand and minimise energy loses during its operation.
- The Proposed Development will be unoccupied and controlled remotely with maintenance visits to the Site twice per month. Minimising emissions generated by maintenance vehicles travelling to and from the Site; and,
- Low energy lights and lighting controls to ensure low operational energy consumption as detailed in the proposed lighting scheme submitted alongside the EIA.

Major Hazards and Accidents

H5.5 It is acknowledged that the potential for fire hazards at BESS sites is increased. A Fire Safety Strategy has been prepared for the Site by DNV (the project Fire Engineers) which is submitted with the planning application documents, in line with the requirements of the National Fire Chief Council's (NFCC) guidance for BESS. The safety features embedded in the design and operating procedures are in line with industry standards and have been agreed with the Buckinghamshire Fire and Rescue Service.

H5.6 In the case of a fire at the Site there will likely be a release of GHG emissions, however these emissions are hard to quantify. On the basis that a fire strategy has been set out to control any potential fires no further consideration has been made.

H5.7 No further consideration of major hazards and accidents has been made within this assessment.

Phasing

H5.8 Phasing of construction is not relevant to the assessment presented within this chapter. This considers the total combined impacts throughout the construction and operation of the Proposed Development.

Project Carbon Footprint

H5.9 The total emissions associated with the construction, operation and decommissioning of the Proposed Development are presented below and compared against local and UK wide carbon budgets.

During Construction

H5.10 Table H5.1 presents a summary of the overall emissions associated with the construction of the Proposed Development compared to Buckinghamshire (local) and UK (national) emissions.

Table H5.1 Summary of Proposed Development Carbon Footprint – Construction Phase

Phase	Baseline	Total Proposed Development Emissions (tCO2e)	Annualised Emissions (tCO2e)	Local 2022 Emissions (tCO2e)	Proposed Development as % of local Emissions	UK 7th Carbon Budget (tCO2e)	Proposed Development as % of UK's Carbon Budget
Embodied Carbon (A1-A5)	0	82, 985.55	1449.76	2,991,298	0.04847%	535,000,000	0.00027%
Construction Traffic	0	652.87	10.88		0.00036%		0.000002%
Total Construction	0	87,638.42	1460.64		0.04883%		0.00027%

Embodied Carbon

H5.11 The assessment of embodied carbon associated with the transport of construction materials and the construction of the Proposed Development (A1- A5) determined total emissions to be 82, 985.55 tCO_2e. With the annual emissions accounting for 0.05% of local emissions and 0.0003% of the UK's latest carbon budget.

H5.12 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, embodied carbon emissions throughout the construction phase are considered to have a **minor adverse** impact (**not significant**) on local carbon budgets, and a **negligible** (**not significant**) impact on the UK budget, without the implementation of mitigation.

Construction Traffic

H5.13 The assessment of traffic associated with the construction of the Proposed Development has been undertaken using vehicle movements provided by WSP as detailed in paragraph H3.30. The total construction traffic emissions were determined to be 652.87 tCO_2e. With annual emissions accounting for 0.0004% of local emissions and 0.000002% of the UK's latest carbon budget.

H5.14 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, emissions generated by construction traffic are considered to have a **negligible** impact (**not significant**) on local and UK carbon budgets.

Summary

H5.15 The total emissions associated with the construction of the Proposed Development were determined to be 87,638.42 tCO_2e. With annualised emissions accounting for 0.05% of local emissions and 0.0003% of the UK's carbon budget.

H5.16 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, the impact of emissions generated throughout the construction phase are considered **minor adverse** (**not significant**) when compared to the local carbon budgets, and a **negligible** (**not significant**) impact on the UK's carbon budget, without the implementation of mitigation.

During Operation

H5.17 Table H5.2 presents a summary of the overall emissions associated with the operation of the Proposed Development compared to Buckinghamshire (local) and UK (national) emissions.

H5.18 Operational embodied carbon emissions include for the repair and maintenance of the Proposed Development as detailed in paragraph H3.35.

Table H5.2 Summary of Proposed Development Carbon Footprint – Operational Phase

Phase	Baseline	Proposed Development Emissions (tCO2e)	Annualised Emissions (tCO2e)	Local 2022 Emissions (tCO2e)	Proposed Development as % of local Emissions	UK 7th Carbon Budget (tCO2e)	Proposed Development as % of UK's Carbon Budget
Embodied Carbon (B1-B5)	0	180,469.99	3007.83	2,991,298	0.10055%	535,000,000	0.00056%
Transport	0	3.57	0.06		<0.00000%		<0.00000%
Operational Energy	0	1,526,458.70	25440.98		0.85050%		0.00476%
Fugitive Emissions	0	167,507.45	2791.79		0.09333%		0.00052%
Total Operation	0	1,874,439.71	31240.66		1.04438%		0.00584%

Embodied Carbon

H5.19 The assessment of embodied carbon associated with the operation of the Proposed Development (B1-B5) determined total emissions to be 180,469.99 tCO_2e. With the annualised emissions accounting for 0.1% of local emissions and 0.0006% of the UK's carbon budget.

H5.20 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, embodied carbon emissions throughout the operational phase are considered to have a **moderate adverse** impact (**significant**) on the local carbon budget, and a **negligible** (**not significant**) impact on the UK's carbon budget, without the implementation of mitigation.

Transport

H5.21 The assessment of GHG emissions associated with traffic generated throughout the operation of the Proposed Development determined total emissions to be 3.57 tCO_2e. With the net emissions accounting for <0.00000% of annual local emissions and the UK's carbon budget.

H5.22 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, the impact of embodied carbon emissions throughout the operational phase are considered **negligible** impact (**not significant**) on both local and UK carbon budgets.

Operational Energy

H5.23 The assessment of energy associated with the operation of the Proposed Development (B6) determined the total emissions to be 1,526,458.70 tCO_2e. With the annualised emissions accounting for 0.85% of local emissions and 0.005% of the UK's carbon budget.

H5.24 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, embodied carbon emissions throughout the operational phase are considered **moderate adverse** impact (**significant**) on the local carbon budget, and **negligible** impact (**not significant**) on the UK's carbon budget, without the implementation of mitigation.

Fugitive Emissions

H5.25 The assessment of fugitive emissions associated with the operation of the Proposed Development (B1) determined the total emissions to be 167,507.45 tCO_2e. With the annualised emissions accounting for 0.09% of local emissions and 0.0005% of the UK's carbon budget.

H5.26 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, the impacts of fugitive emissions released throughout the operation of the Proposed Development are considered **negligible** (**not significant**) on both local and UK wide carbon budgets.

During Decommissioning

H5.27 Table H5.3 presents a summary of the emissions associated with the decommissioning of the Proposed Development compared to compared to Buckinghamshire (local) and UK (national) emissions.

H5.28 The assessment of emissions associated with the decommissioning of the Site was undertaken as part of the embodied carbon assessment.

Table H5.3 Summary of Proposed Development Carbon Footprint - End-of-Life Stage

Phase	Baseline	Proposed Development Emissions (tCO_2e)	Annualised Emissions (tCO_2e)	Local 2022 Emissions (tCO_2e)	Proposed Development as % of local Emissions	UK 7th Carbon Budget (tCO_2e)	Proposed Development as % of National Emissions
Embodied Carbon (C1-C4) (Total End of Life)	0	7,843.59	130.73	2,991,298	0.26221%	535,000,000	0.00147%

H5.29 The assessment of embodied carbon arisings associated with the end of life of the Proposed Scheme equate to 7,843.59 tCO2e. With the annual emissions accounting for 0.26% of local emissions and 0.001% of the UK carbon budget.

H5.30 Based on the criteria set out in Tables H3.2, H3.3 and H3.4, the impact of embodied carbon emissions associated with the decommissioning of the Proposed Development are considered **moderate adverse** (**significant**) on the local carbon budget, and **negligible** (**not significant**) on the UK's carbon budget, without the implementation of mitigation.

Carbon Savings

H5.31 As part of this assessment the total carbon savings over the Proposed Development's operational lifetime have been calculated.

H5.32 The purpose of the Proposed Development is to enhance the efficiency of the grid and encourage the implementation of renewable technologies, such as, wind turbines, photovoltaic systems and hydropower.

H5.33 The calculations within this Chapter have estimated the 'baseline' whole life carbon dioxide impact of the Site over a 60-year period (conservative assessment) maintaining the current grid emissions.

H5.34 The total carbon dioxide impact of the system over the 40 to 60-year period with the battery storage assisting the efficiency, stability and decarbonisation of the grid, using predicted UK Government carbon dioxide emission factors was then calculated.

H5.35 This carbon dioxide calculation for the Proposed Development found that the whole life carbon impact will be **positive** (**beneficial**) to the local and UK carbon budgets by curtailing approximately **8.8-13.0 mmtCO2e**[1] emissions over a 40-60 year period, respectively.

Policy-Based Review of Impacts

H5.36 The significance of the potential effects of the project have also been considered within the context of local and nationwide policy goals.

H5.37 A summary of the legislation and policy the Proposed Development has been reviewed against is provided below. Full details are included within Appendix H1.

Policy Context

H5.38 The UK has taken significant legislative steps to address the national climate change emergency that has been declared. The legally binding Climate Change Act 2008, amended 2019 in response to the Paris Agreement, set targets to achieve 'net-zero' GHG emissions by 2050.

H5.39 The Climate Change Committee (CCC) established key carbon budgets to achieve net-zero, with the sixth carbon budget allowing 965 million tCO2e from 2030-2037, and the seventh carbon budget reducing this to 535 million tCO2e from 2038-2042.

H5.40 Decarbonising the economy has been recognised as a priority for achieving the UK's net zero ambitions, focusing on the transition to clean and renewable energy sources such as wind, solar, and nuclear power, while reducing dependence on fossil fuels.

H5.41 Planning policy for England is included in the NPPF which provides the framework to achieving sustainable development nationwide Paragraph 165 of the NPPF states, *'to help increase the use and supply of renewable and low carbon energy and heat, plans should […] b) consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure.'*

H5.42 The Buckinghamshire Climate Change and Air Quality Strategy, outlines the council's commitment to the national target of achieving net-zero carbon emissions by 2050. The council has also set interim targets for the local area including a 75% reducing in emissions by 2030 and a 90% reduction by 2040. The strategy sets out the initiatives in place to achieve local net zero carbon goals.

H5.43 Planning policy for Buckinghamshire is included in the Vale of Aylesbury Local Plan (VALP). Policy S3 of the VALP states that, '*in seeking to achieve carbon emissions reductions, the council will assess developments using an 'energy hierarchy'. An energy hierarchy identifies the order in which energy issues should be addressed and is illustrated as follows:*

[1] Million Metric Tons of Carbon Dioxide Equivalent

- *reducing energy use, in particular by the use of sustainable design and construction measures;*
- *supplying energy efficiently and giving priority to decentralised energy supply; and,*
- *making use of renewable energy.'*

Proposed Development

H5.44 The impact of the Proposed Development will be positive (beneficial) by supporting the decarbonisation of the grid and saving 13 mmtCO2e of carbon during its operational lifetime (see Carbon Savings).

H5.45 The operation of the Site will contribute to the local and nationwide policy ambitions set out above, by supporting the decarbonisation of the grid, allowing for more sustainable use of renewable energies, and reducing the dependence on fossil fuels.

Climate Resilience Potential Effects

H5.46 Receptors and their sensitivity (vulnerability) have been identified in relation to the key topics scoped into the East Claydon Greener Grid Park ES for the Proposed Development. The technical chapters for each of these topics have been used to determine the magnitude and significance of effect in relation to potential climate change impacts, as summarised in Table H5.4.

H5.47 The assessment has undertaken using available information from technical ES Chapters, IEMA guidance and using professional judgement.

Table H5.4 Climate Resilience Assessment

Resource	Sensitive Receptor	Potential Effect of Climate Change	Relative Sensitivity / Risk
Landscape and Visual Impact Biodiversity and Ecology	Ecological sites, habitats and species	Hotter temperatures and periods of drought have the potential to damage soils. This is likely to influence the biodiversity benefits of the Site in supporting existing habitats and species. Prolonged periods of drought and extreme rainfall events will impact ground stability and moisture. This could influence the landscaping proposals. As well as the mobilisation and migration of any contaminants within the ground.	Medium (Minor Adverse)
Noise	Existing residents	Hotter temperatures may cause overheating of existing buildings in the vicinity of the Site, resulting in windows of being left open for longer, leading to increased exposure of noise generated by the Proposed Development. Hotter temperatures may require additional cooling plant/systems to be installed which could increase the noise levels generated by the Proposed Development.	Low (Negligible)
Traffic and Transport	Existing residents Ecological sites, habitats and species	Extreme weather events, such as storms and snowfall, could influence the ability to travel and use roads safely. Hotter temperatures, dry weather and drought is likely to lead to increased dust generation by vehicles on roads adjacent to the Site. This increases the risk of dust soiling impacts on existing buildings, as well as human health and ecological receptors.	Low (Negligible)
Archaeology Built Heritage	Archaeological resources Existing buildings and structures	Hotter temperatures, prolonged periods of drought and extreme rainfall events will impact ground stability and moisture. This could influence the stability and safety of existing structures and archaeological remains at/surrounding the Site.	Medium (Negligible)

Landscape and Visual Impact

H5.48 Changes to weather patterns due to climate change are not expected to have significant or direct effects on the impacts assessed in the Landscape and Visual Impacts Assessment (LVIA).

H5.49 Indirect effects relating ground instability and moisture may influence the landscaping proposals under future climatic conditions.

H5.50 An assessment of Landscape and Visual Impacts (LVIA) was undertaken to consider the potential effects of the Proposed Development on the character of the surrounding landscape, and the potential visual effects on identified key receptors.

H5.51 Full details of the landscape strategy, constraints and opportunities are included within the LVIA report. Measures that will contribute to the resilience of the Site include:

- The retention of existing woodland, tree groups and belts, individual trees and hedges within and adjacent to the boundaries of the Site wherever possibles;
- New native tree and shrub planting of appropriate species characteristic of the local landscape to strengthen the existing mature vegetation to the boundaries of the Site;
- Sowing species of rich wildflower meadow to the areas surrounding the compound to improve biodiversity; and,
- New wetland meadow planting surrounding the proposed waterbodies.

H5.52 Whilst some indirect effects on landscape are considered, it is not anticipated that the conclusions made in the LVIA will change significantly under future climatic conditions.

Biodiversity and Ecology

H5.53 Changes to weather patterns due to climate change are not expected to have significant or direct effects on the impacts assessed within an Ecology Report.

H5.54 Indirect effects relating to damaged soils as a result of prolonged drought is anticipated to influence the biodiversity benefits of the Site in supporting existing habitats and species.

H5.55 An assessment of the Proposed Development in relation to Biodiversity and Ecology has been undertaken. The assessment includes a description of the Site's habitat features and protected species of interest, and a summary of its biodiversity opportunities and constraints.

H5.56 The Site is dominated by arable and improved grasslands habitats of low relative biodiversity. A Biodiversity Net Gain (BNG) assessment of the development was completed which confirms there will be a +58.50% net gain for habitats and a +10.24% net gain for hedgerows.

H5.57 Whilst some indirect effects on biodiversity are considered, it is not anticipated that the conclusions made in the Biodiversity and Ecology ES Chapter will change significantly under future climatic conditions.

Noise

H5.58 Changes in weather patterns due to climate change are not expected to have significant direct effects on noise and vibration levels, as assessed in the Noise ES Chapter.

H5.59 Indirect effects relating to occupants of surrounding receptors and their control of comfort due to increased temperatures are considered.

H5.60 The Noise ES Chapter assesses potential impacts of new noise sources into the area in the form of construction plant and activities during the construction phase, and fixed plant during the operational phase, such as the battery cooling systems, battery inverter/MC transformer units and HV transformers.

H5.61 The nearest noise sensitive receptors were recognised to be residential properties within 1km of the Site, that may be subject to effects of noise from construction and/or operation of the Proposed Development.

H5.62 The geographical location and layout of the Site were carefully considered as to reduce noise exposure at nearby sensitive receptors. Further mitigation measures have been embedded into the design including an acoustic fence and bunds. The proposed plant and systems being installed on Site have been carefully selected with regards to noise levels.

H5.63 Whilst some indirect effects on noise and vibration are considered, it is not anticipated that the conclusions made in the noise assessment will change significantly under future climatic conditions.

Traffic and Transport

H5.64 Changes to weather patterns due to climate change are not expected to have significant direct effects on transport.

H5.65 Indirect effects relating to the mobility of vehicles travelling to the Proposed Development, including maintenance and repair workers, may be impacted due to increased likelihood of extreme weather events.

H5.66 A Traffic and Transport ES Chapter was produced, alongside a Transport Statement, Construction Management Plan and an Abnormal Indivisible Load Assessment Report. The ES Chapter assessed the potential effects of the Proposed Development on transport and access during the construction phase.

H5.67 It was agreed with Buckinghamshire Council that when the Proposed Development is operational, it will generate minimal traffic flows (two monthly trips a month for maintenance workers) and there will be minimal impact on the surrounding highway network.

H5.68 Whilst some indirect effects on travel and transport are considered, it is not anticipated that the conclusions made in the TA will change significantly under future climatic conditions.

Archaeology and Built Heritage

H5.69 Changes to weather patterns due to climate change are not expected to have significant direct effects of archaeology or built heritage.

H5.70 Indirect effects relating to ground instability and moisture may influence the safety and stability of existing structures and archaeological remains at/surrounding the Site.

H5.71 An Archaeological Desk-Based Assessment (DBA) was undertaken at the Site in agreement with the Historic Environment Records Team for Buckinghamshire County Council. There is considered to a medium potential for the presence of previously unknown archaeological remains from the Romano-British period onwards.

H5.72 Built Heritage was scoped into the EIA, and an ES Chapter has been produced to assess the cumulative impacts of the Proposed Development on Built Heritage. It is considered that the Proposed Development will have no adverse effects on Tuckey Farmhouse or designated heritage assets within East Claydon.

H5.73 Whilst some indirect effects on travel and transport are considered, it is not anticipated that the conclusions made in the Archaeological DBA and Built Heritage ES Chapter will change significantly under future climatic conditions

H6.0 Mitigation and Monitoring

GHG

H6.1 It is important to consider measures to reduce GHG emissions as a means to mitigate climate change. The emissions estimated for the Proposed Development may be deemed to be relatively low in relation to the Buckinghamshire and UK carbon budgets, however the sensitivity of the receptor (*i.e.* the global climate) is considered high, resulting in some adverse impacts (significant). This section sets out steps in which the Proposed Development intends to minimise and/or avoid GHG emissions.

H6.2 It is possible to reduce emissions by following the GHG Management Hierarchal approach (adapted by IEMA) illustrated in Figure H6.1.

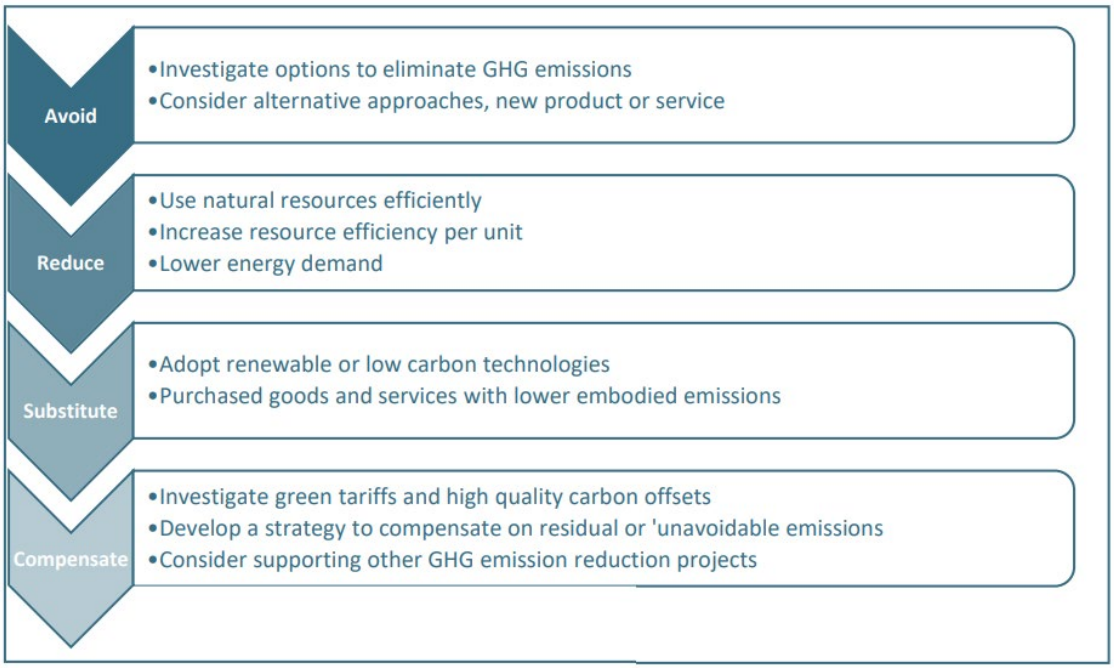

Figure H6.1 IEMA GHG Management Hierarchal Approach.

H6.3 The mitigation measures below will be taken into account by the Applicant in order to reduce emissions related to the Proposed Development. These have been split across construction and operational phases.

During Construction

H6.4 In additional to the measures embedded into the design of the Proposed Development, several additional mitigation measures to reduce emissions during the construction phase will be implemented, these include:

- Waste arising from the construction of the Proposed Development will be managed in accordance with local and national policy and guidance. It shall be managed in accordance with the waste hierarchy;

- The Proposed Development should adhere to sustainable waste management principles with the objective of reducing and recycling materials either on or off site as far as practicable; and,
- Direct emission control to reduce GHG emissions during works.

During Operation

H6.5 Mitigation measures to reduce emissions during the operation of the Proposed Development are identified within the Embedded Mitigation section of this Chapter.

During Decommissioning

H6.6 The Applicant will provide an 'end-of-life plan' for the Site after its operational lifetime to ensure materials are responsibly disposed of and materials are reused and repurposed where possible.

Climate Change Resilience

H6.7 This CCR sets out a number of mitigation measures that can potentially inform a Climate Change Adaptation Plan. Such measures may be additional and aim to mitigate expected effects of climate change onto the Proposed development in the future in order to reduce the significance of effects highlighted.

H6.8 The climate change predictions have been considered inherently uncertain. To manage anticipated effects, mitigation measures have been provided in this section. This allows for appropriate adaption in the future to reflect the realities of changing climate.

H6.9 The IEMA Guidance recommends that a project's ability to adapt to climate change should:

- Consider the whole life of the project (from design stage through to decommissioning);
- Have a 'win-win' outcome that can provide benefits under multiple scenarios, and that can bring economic, social and environmental benefits;
- Favour flexible future options (including building appropriate safety margins), rather than being too prescriptive and specific over options that can be modified in the future;
- Delay details of project elements that are subject to the greatest risk and uncertainty from climate change until later in the programme when more should be known; and
- Follow a hierarchy, whereby avoid, control or manage risk is preferred, enhancement (e.g. to improve the functionality over a project's lifespan), and compensate (e.g. by providing a measure to offset a climate change impact it exacerbates).

H6.10 The IEMA Guidance states the procedure that should be followed is as follows:

- Conceptualise the issues through the assessment across the EIA, and identify the greatest potential impacts and receptors most at risk;
- Manage uncertainty by setting goals/objectives, and action trigger levels, developing a monitoring plan for reviewing updated climate predictions, and define roles, responsibilities and funding streams;

- Implement the plan and monitor/analyse results over the life or the Proposed Development; and
- Review the plan, collate data received, update the plan as necessary, including the need for additional or different mitigation taking into account in-combination impacts.

H7.0 Residual Effects

H7.1 IEMA guidance recommends that mitigation should in the first instance seek to avoid GHG emissions. Where GHG emissions cannot be avoided, the development should aim to reduce the residual significance of a project's emissions at all stages. Where GHG emissions are significant but cannot be reduced, other approaches should be considered that compensate the projects remaining emissions.

H7.2 The findings of the assessment of the Proposed Development's carbon footprint throughout the construction, operational and decommissioning stages include:

- **Moderate adverse** (**significan**t) impacts on the local carbon budget for Buckinghamshire throughout the operational stage (embodied carbon (B1-B5) and operational energy (B6));
- **Moderate adverse** (**significant**) impact on local carbon budget during the decommissioning stage (embodied carbon (C1-C4));
- All other impacts on the local carbon budget were considered **minor adverse** or **negligible** (**not significant**); and,
- All impacts on the UK wide carbon budget are considered **negligible** (**not significant**).

H7.3 Whilst the construction and decommissioning of the Site identified some **moderate adverse** (**significant**) impacts, the operation of the Proposed Development will have an overall positive (**beneficial**) impact on local and UK carbon budgets by curtailing a total of 13 mmtCO2e[2] emissions during its lifetime. Therefore, contributing to local and national policy ambitions, by supporting the decarbonisation of the grid, allowing for more sustainable use of renewable energies, and reducing the dependence on fossil fuels

H7.4 Based on the above, the overarching residual effects of the Proposed Development are considered to be **beneficial** (**significant**).

[2] Million Metric Tons of Carbon Dioxide Equivalent

H8.0 Summary & Conclusions

H8.1 The summary of effects identified throughout the construction, operation and decommissioning stages of development are presented in Table H.810.

H8.2 Whilst the construction and decommissioning of the Site identified some **moderate adverse** (**significant**) impacts, the operation of the Proposed Development will have an overall positive (**beneficial**) impact on local and UK carbon budgets by curtailing approximately 8.8-13.0 mmtCO2e[3] emissions during its lifetime. Therefore, contributing to local and national policy ambitions, by supporting the decarbonisation of the grid, allowing for more sustainable use of renewable energies, and reducing the dependence on fossil fuels.

H8.3 Based on the above, the overarching residual effects of the Proposed Development are considered to be **beneficial** (**significant**).

Table H8.10 Summary of Effects – Project Carbon Footprint Assessment

Receptor	Impact	Potential Effects (taking account of embedded mitigation)	Additional Mitigation and Monitoring	Residual Effects
During Construction				
Global Climate	Embodied Carbon – upfront (A1-A5)	Minor Adverse and Not Significant	Waste management plan, CEMP.	Minor Adverse and Not Significant
Global Climate	Construction Traffic	Negligible and Not Significant	Waste management plan, CEMP.	Negligible and Not Significant
During Operation				
Global Climate	Embodied Carbon – repair, maintenance and refurbishment (B1-B5)	**Moderate Adverse and Significant**	-	**Moderate Adverse and Significant**
Global Climate	Operational Energy (B6)	**Moderate Adverse and Significant**	-	**Moderate Adverse and Significant**
Global Climate	Fugitive Emissions	Negligible and Not Significant	-	Negligible and Not Significant
Global Climate	Operational Traffic	Negligible and Not Significant	-	Negligible and Not Significant
During Decommissioning				
Global Climate	Embodied Carbon – end of life (C1-C4)	Moderate Adverse and Significant	End-of-life plan to dispose of materials and repurpose where possible.	**Moderate Adverse and Significant**

[3] Million Metric Tons of Carbon Dioxide Equivalent

H9.0 Abbreviations & Definitions

Abbreviations

- mmtCO2e - Million Metric Tons of Carbon Dioxide Equivalent
- CCR - Climate Change Resilience
- GHG – Greenhouse Gas

H10.0 References

1 Climate Change Act 2008 (2050 Target Amendment) Order 2019.

2 Change and Sustainable Energy Act 2006.

3 Energy Act 2013.

4 Environment Act 1995.

5 Environment Act 2021.

6 EIA Directive (2014/52/EU).

7 Town and Country Planning (EIA) Regulations (2017).

8 Infrastructure Planning (EIA) Regulations (2017).

9 Ministry of Housing, Communities and Local Government (2024). National Planning Policy Framework.

10 Department for Environment, Food and Rural Affairs (2018). The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting.

11 HM Government (2017). Clean Growth Strategy.

12 HM Government (2011). The Carbon Plan: Delivering our Low Carbon Future.

13 Buckinghamshire Council (2020). Buckinghamshire Local Development Scheme (LDS).

14 Buckinghamshire Council (2024). Buckinghamshire Climate Change and Air Quality Action Plan.

15 Institute of Environmental Management and Assessment (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition. February 2022. IEMA, Lincoln.

16 RICS, 2017. Whole life carbon assessment for the built environment. Professional Statement, 1st ed. Royal Institution of Chartered Surveyors.

17 RICS, 2023. Whole life carbon assessment for the built environment. Professional Statement, 2nd ed. Royal Institution of Chartered Surveyors.

18 The Institution of Structural Engineers (IStructE), n.d. How to calculate embodied carbon. 2nd ed. The Institution of Structural Engineers.

19 British Standards Institution (BSI), 2011. BS EN 15978:2011: Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method. London: BSI.

20 UK CARES, Carbon Steel Reinforcing Bar (secondary production route, scrap), Sector Average – September 2023.