The Great Grid Upgrade

North Humber to High Marnham

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19. Climate Change

19.1 Introduction

19.1.1 This chapter of the Environmental Statement (ES) presents the assessment of the likely significant climate change effects that could result from the North Humber to High Marnham Project (the Project) as described in **Application Document 6.4 Chapter 4 Description of the Project**.

19.1.2 This chapter describes relevant legislation and policy, the scope of the assessment, the methodology used, the datasets that have informed the assessment, the baseline conditions, mitigation measures, and the climate change residual significant effects that could result from the Project.

19.1.3 The Order Limits, which illustrate the boundary of the Project, are shown on **Application Document 6.1.F1 Figure 1.1 Project Location and Route Sections**.

19.1.4 This chapter should be read in conjunction with the following ES chapters:

- **Application Document 6.2 Chapter 2 Legislation and Policy Context**;
- **Application Document 6.3 Chapter 3 Main Alternatives Considered**;
- **Application Document 6.4 Chapter 4 Description of the Project**;
- **Application Document 6.5 Chapter 5 EIA Approach and Methodology**;
- **Application Document 6.6 Chapter 6 Landscape**;
- **Application Document 6.7 Chapter 7 Visual**;
- **Application Document 6.8 Chapter 8 Ecology**;
- **Application Document 6.10 Chapter 10 Cultural Heritage**;
- **Application Document 6.11 Chapter 11 Water Environment**;
- **Application Document 6.12 Chapter 12 Geology and Hydrogeology**;
- **Application Document 6.13 Chapter 13 Agriculture and Soils**;
- **Application Document 6.14 Chapter 14 Traffic and Transport**;
- **Application Document 6.15 Chapter 15 Air Quality**;
- **Application Document 6.16 Chapter 16 Noise and Vibration**;
- **Application Document 6.20 Chapter 20 Intra-project Cumulative Effects**; and
- **Application Document 6.21 Chapter 21 Inter-project Cumulative Effects**.

19.1.5 This chapter is supported by the following appendices:

- **Application Document 6.19.A1 Appendix 19.1 Regional and Local Planning Policy**;

- **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**;
- **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**; and
- **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**.

19.1.6 This chapter is supported by the following application documents:

- **Application Document 7.2 Outline Code of Construction Practice**;
- **Application Document 7.3 Register of Environmental Actions and Commitments**;
- **Application Document 6.5.A1 Appendix 5.1 Environmental Impact Assessment Scoping Report**;
- **Application Document 6.5.A2 Appendix 5.2 Scoping Opinion**;
- **Application Document 6.5.A3 Appendix 5.3 Scoping Response Tables**;
- **Application Document 7.4 Outline Construction Traffic Management Plan**.
- **Application Document 7.5 Outline Soil Management Plan**;
- **Application Document 7.8 Outline Landscape and Ecology Management Plan**; and
- **Application Document 7.13 Flood Risk Assessment**.

19.2 Regulatory and Planning Context

19.2.1 This section sets out the legislation and planning policy that is relevant to the climate change assessment. A full review of compliance with relevant national, regional, and local planning policy is provided within **Application Document 5.5 Planning Statement** as part of the application for development consent.

19.2.2 **Application Document 6.2 Chapter 2 Legislation and Policy Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy, and planning guidance relevant to the assessment of climate change effects of the Project is presented below.

Legislation

19.2.3 The legislation listed below has been considered when identifying potential constraints to the Project, design options and mitigation technical guidance in the form of legislation to inform the preliminary assessment of effects with respect to climate change.

The Climate Change Act 2008 (2050 Target Amendment) Order 2019

19.2.4 The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (HM Government, 2019), contains a duty for the Secretary of State (SoS) to ensure that the net United Kingdom (UK) carbon account for the year 2050 is at least 100 per cent lower than the 1990 baseline.

19.2.5 The target is supported by a system of legally binding five-year 'carbon budgets' governed by the Carbon Budget Orders and an independent body to monitor progress, the Climate Change Committee (CCC). The UK carbon budgets restrict the amount of greenhouse gas (GHG) emissions the UK can legally emit in a defined five-year period.

19.2.6 The carbon budget orders are listed below.

The Carbon Budget Orders

19.2.7 The following summarises the Carbon Budget Orders from 2009 up to 2026:

- The Carbon Budgets Order 2009 (HM Government, 2009) sets the carbon budget totals for the First (2008-2012), Second (2013-2017) and Third (2018-2022) Carbon Budget periods.
- The Carbon Budget Order 2011 (HM Government, 2011) sets the carbon budget total for the Fourth (2023-2027) Carbon Budget period.
- The Carbon Budget Order 2016 (HM Government, 2016) sets the carbon budget total for the Fifth (2028-2032) Carbon Budget period.
- The Carbon Budget Order 2021 (HM Government, 2021) sets the carbon budget total for the Sixth (2033-2037) Carbon Budget period, which is inclusive of the scenarios for a 'Balanced Net Zero Pathway' model.
  - In December 2020, the Sixth Carbon Budget for the 2033-2037 period was published by the CCC and is the first budget to reflect the amended trajectory to net zero by 2050 (Climate Change Committee, 2020).
- The Carbon Budget Order 2026 (HM Government, 2026) came into force on 26 June 2026 and sets the carbon budget total for the Seventh (2038 - 2042) Carbon Budget. The total is in line with the advice on the level of the Seventh Carbon Budget given by the CCC in its statutory report to the UK Government, which progresses the Balanced Pathway.
  - The Seventh Budget period is the first in which the lower costs of the clean energy transition are expected to be delivered or that its achievement is very much predicated on delivery of the investment in low carbon electricity generation and transmission.

The Paris Agreement

19.2.8 The Paris Agreement (United Nations Framework Convention on Climate Change, 2015) (enforced since 2016) is a legally binding agreement within the United Nations Framework Convention on Climate Change (UNFCCC) (United Nations, 1992) dealing with GHG emissions mitigation, adaptation and finance starting in the year 2020. It requires all signatories to set a target known as a nationally determined contribution (NDC), which strengthens their climate change mitigation efforts to keep global warming to well below 2°C this century and to pursue efforts to limit global warming to 1.5°C. The agreement contains a 'ratchet' mechanism by which NDCs must be strengthened every five years.

UK's 2035 Nationally Determined Contribution (updated January 2025)

19.2.9 In January 2025, the UK's Department for Energy Security & Net Zero communicated its new Nationally Determined Contribution (NDC) to the UNFCCC, with updates in the commitments to reduce GHG emissions by at least 81 per cent by 2035 compared to 1990 levels (HM Government, 2025).

National Policy

National Policy Statements

19.2.10 National Policy Statements (NPSs) set out the primary policy tests against which the application for a Development Consent Order (DCO) for the Project will be considered.

19.2.11 Table 19.1 and Table 19.2 provide details of the elements of the Overarching NPS for Energy (EN-1) (Department for Energy Security & Net Zero, 2025) referred to hereafter as NPS EN-1, and NPS for Electricity Networks Infrastructure (EN-5) (Department for Energy Security & Net Zero, 2025), referred to hereafter as NPS EN-5, that are relevant to the assessment of the Project on climate change and how and where related information is provided in the ES and application.

Table 19.1 – NPS EN-1 sections relevant to climate change

NPS EN-1 section	Where this is covered in the application
2.2.3 '*In June 2019, the UK became the first major economy to legislate for a 2050 net zero Greenhouse Gases ('GHG') emissions target through the Climate Change Act 2008 (2050 Target Amendment) Order 2019.*' 2.2.4 '*In December 2020, the UK communicated its Nationally Determined Contributions to reduce GHG emissions by at least 68 per cent from 1990 levels by 2030. In April 2021, the government legislated for the sixth carbon budget (CB6), which requires the UK to reduce GHG emissions by 78 per cent by 2035 compared to 1990 levels*.'	This chapter assesses the Project's GHG emissions in the context of the legally binding GHG reduction targets and carbon budgets, in line with the Institute of Environmental Management and Assessment's (IEMA) (now Institute of Sustainability and Environmental Professionals (ISEP))[1], GHG assessment guidance (Institute of Environmental Management and Assessment, 2022). The methodology of the assessment is presented in section 19.4 of this chapter, and residual effects are presented in section 19.9. In addition, a GHG reduction strategy is provided within **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**.
3.2.1 '*The government's objectives for the energy system are to decarbonise power generation to meet the Clean Power 2030 Mission, ensuring our supply of energy always remains secure, reliable, affordable, and*	This chapter assesses the Project's GHG emissions in the context of the legally binding GHG reduction targets and carbon budgets, in line with IEMA GHG assessment guidance (Institute of Environmental Management and

[1] The Institute of Environmental Management Assessment (IEMA) has changed its name to the Institute of Sustainability and Environmental Professionals (ISEP). Where general reference is made to the institute within this ES, the following distinction has been made: ISEP (formerly IEMA). When referencing legacy IEMA documents, this distinction is not made.

NPS EN-1 section	Where this is covered in the application
consistent with net zero emissions in 2050 for a wide range of future scenarios, including delivery of our carbon budgets and Nationally Determined Contributions.' 3.2.2 '*We need a range of different types of energy infrastructure to deliver these objectives. This includes the infrastructure described within this NPS but also more nascent technologies, data, and innovative infrastructure projects consistent with these objectives.*'	Assessment, 2022). The methodology of the assessment is presented in section 19.4 of this chapter, and the residual effects are presented in section 19.9. In addition, a GHG reduction strategy is provided within **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**.
3.3.66 '*The security and reliability of the UK's current and future energy supply is highly dependent on having an electricity network which will enable new renewable electricity generation, storage, and interconnection infrastructure that our country needs to meet the rapid increase in electricity demand required to transition to net zero while maintaining energy security. The delivery of this important infrastructure also needs to balance cost to consumers, accelerated timelines for delivery and the minimisation of community and environmental impacts.*' 3.3.70 '*As all new grid projects have a role in efficiently constructing, operating and connecting low carbon infrastructure to the National Electricity Grid, the scope of networks CNP* [critical national priority] *infrastructure is not limited to those associated specifically with a particular project.*'	The climate change assessment has considered both the adverse effects and the benefits of the Project during all its lifecycle phases. This assessment has evaluated the Project's impact on the climate and its resilience to climate change, in accordance with IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020), as set out in the methodology detailed in section 19.4 of this chapter. The Project supports the wider transition to a low-carbon energy system by enabling the transmission of renewable electricity within the national electricity network, as set out in **Application Document 7.17 Strategic Options Report Including Needs Case.**
4.10.5 '*In certain circumstances, measures implemented to ensure a scheme can adapt to climate change may give rise to additional impacts, for example as a result of protecting against flood risk, there may be consequential impacts on coastal change. In preparing measures to support climate change adaptation, applicants should take reasonable steps to maximise the use of nature-based solutions alongside other conventional techniques.*' 4.10.6 '*Integrated approaches, such as looking across the water cycle, considering coordinated management of water storage, supply, demand, wastewater, and flood risk can provide further benefits to address*	The climate change assessment has considered both the adverse effects and the benefits of the Project during all its lifecycle phases. This assessment has evaluated the Project's impact on the climate and its resilience to climate change, in accordance with IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020), as set out in the methodology detailed in section 19.4 of this chapter. **Application Document 7.13 Flood Risk Assessment** and **Application Document 6.11 Chapter 11 Water Environment** assesses flood risk from all relevant forms of

NPS EN-1 section	Where this is covered in the application
multiple infrastructure needs, as well as carbon sequestration benefits.' 4.10.7 '*In addition to avoiding further GHG emissions when compared with more traditional adaptation approaches, nature-based solutions can also result in biodiversity benefits and net gain, as well as increasing absorption of carbon dioxide from the atmosphere*.'	flooding, including consideration of climate change. A range of controls and mitigation measures to manage flood risks are set out in **Application Document 7.2 Outline Code of Construction Practice** and **Application Document 7.3 Register of Environmental Actions and Commitments**, and are outlined in section 19.8 of this chapter. This includes measures associated with nature-based solutions and biodiversity benefits, set out in **Application Document 6.8 Chapter 8 Ecology** and net gain as set out in **Application Document 7.1 Biodiversity Net Gain Report**. The Project proposes to deliver a minimum of 10 per cent Biodiversity Net Gain (BNG), with potential for wider environmental and societal benefits, on a voluntary basis. Detail on the Project's approach to voluntary BNG is provided in **Application Document 7.20 Design Development Report – 2025** and **Application Document 7.1 Biodiversity Net Gain Report**.
4.10.8 '*New energy infrastructure will typically need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the direct (e.g. site flooding, limited water availability, storms, heatwave and wildfire threats to infrastructure and operations) and indirect (e.g. access roads or other critical dependencies impacted by flooding, storms, heatwaves or wildfires) impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure*.' 4.10.9 '*The ES should set out how the proposal will take account of the projected impacts of climate change, using government guidance and industry standard benchmarks such as the Climate Change Allowances for Flood Risk Assessments, Climate Impacts Tool, and British Standards for climate change adaptation, in accordance with the EIA Regulations*.' 4.10.10 '*Applicants should assess the impacts on and from their proposed energy project*	This assessment has considered the resilience of the Project to the potential effects of future climate change throughout all phases of its lifecycle. In accordance with the IEMA Climate Change Resilience and Adaptation Guidance (Institute of Environmental Management and Assessment, 2020), and as set out in the methodology detailed in Section 19.4 of this chapter, the assessment has evaluated the Project's vulnerability and resilience to relevant climate-related hazards and the potential risks these may pose to the Project. Relevant information, including from **Application Document 7.13 Flood Risk Assessment, Application Document 6.11 Chapter 11 Water Environment** and **Application Document 7.3 Register of Environmental Actions and Commitments** where applicable, has been taken into account to inform the assessment of the Project's climate change resilience. **Application Document 7.13 Flood Risk Assessment** and **Application Document 6.11 Chapter 11 Water Environment**

NPS EN-1 section	Where this is covered in the application
across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time.' 4.10.11 '*Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections*.' 4.10.12 '*Where energy infrastructure has safety critical elements, the applicant should apply a credible maximum climate change scenario. It is appropriate to take a risk-averse approach with elements of infrastructure which are critical to the safety of its operation*.'	assesses flood risk from all relevant forms of flooding, including consideration of climate change. A range of controls and mitigation measures to manage flood risks are outlined in section 19.8 of this chapter.
4.10.13 '*The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the EA's* [Environment Agency's] *Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period*.'	The climate change assessment has considered both the adverse effects and the benefits of the Project during all its lifecycle phases. This assessment has evaluated the Project's impact on the climate and its resilience to climate change, in accordance with IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020), as set out in the methodology detailed in section 19.4 of this chapter, inclusive of the potential impacts of climate change using the latest UK Climate Projections, UKCP18 (Met Office, 2018). A range of appropriate mitigation and adaptation measures to effectively control risks related to climate change are set out in, and secured through, **Application Document 7.3 Register of Environmental Actions and Commitments**. Measures are also set out in section 19.8 of this chapter. Decommissioning has been scoped out of the assessment as explained in **Application Document 6.5 Chapter 5 EIA Approach and Methodology**.
4.10.19 '*Adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the more extreme impacts of*	The assessment of vulnerability of the Project to climate change (adaptation) follows the requirements as set out in The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, Regulation 5(2) and

NPS EN-1 section	Where this is covered in the application
climate change, including credible maximum climate change scenarios, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to keep the need for the adaptation measure under review, and ensure that the measure could be implemented should the need arise, rather than at the outset of the development (for example increasing height of existing, or requiring new, sea walls).'	Schedule 4, paragraphs 4 and 5 (HM Government, 2017), which sets out relevant adaptation measures. A range of controls and mitigation measures to manage climate hazards and associated potential climate impacts to and from the Project are set out in **Application Document 7.3 Register of Environmental Actions and Commitments** and in section 19.8 of this chapter. This is inclusive of the need for the adaptation measures under review, and measures which could be implemented should the need arise, rather than at the outset of the development. The In-Combination Climate Change Impact (ICCI) Assessment, presented in **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**, has also provided the relative impacts of the Project on environmental receptors.
4.11.3 '*To support the achievement of the transition to net zero, government is accelerating the co-ordination of the development of the grid network to facilitate the UK's net zero energy generation development and transmission*.' 4.11.4 '*Transmission network infrastructure, and related network reinforcement and upgrade works, associated with nationally significant low carbon infrastructure is considered as CNP Infrastructure.*	The Project is classed as critical national priority (CNP) infrastructure, as it will provide network reinforcement supporting the wider transition to a low-carbon energy system by enabling the transmission of renewable electricity within the national electricity network, as set out in **Application Document 7.17 Strategic Options Report Including Needs Case.** This chapter assesses the Project's GHG emissions in the context of the legally binding GHG reduction targets and carbon budgets, in line with IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022). The methodology of the assessment is presented in section 19.4, and residual effects are presented in section 19.9. In addition, a GHG reduction strategy is provided within **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**.
5.3.4 '*All proposals for energy infrastructure projects should include a GHG assessment as part of their ES (See Section 4.3). This should include:* • *A whole life GHG assessment showing construction, operational and*	This chapter assesses the Project's GHG emissions in the context of the legally binding GHG reduction targets and carbon budgets, in line with IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022). The methodology of the assessment is presented in section 19.4 of this

NPS EN-1 section	Where this is covered in the application
decommissioning GHG impacts, including impacts from change of land use. • *An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages.* • *Measurement of embodied GHG impact from the construction stage.* • *How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures.* • *How operational emissions have been reduced as much as possible through the application of BAT [best available techniques] for that type of technology.* • *Calculation of operational energy consumption and associated carbon emissions.* • *Whether and how any residual GHG emissions will be (voluntarily) offset or removed using a recognised framework.* • *Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if sectoral targets are developed.'*	chapter, and residual effects are presented in section 19.9. In addition, a GHG reduction strategy is provided in within **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy** which sets out measures to drive down carbon across the scoped in life cycle stages including the application of BAT where necessary. This chapter also sets out a whole life GHG assessment including operational emissions and are compared against carbon budgets at a national and sectoral level as set out in section 19.9. There is no requirement for residual GHG emissions to be offset.
5.3.5 '*A GHG assessment should be used to drive down GHG emissions at every stage of the proposed development and ensure that emissions are minimised as far as possible for the type of technology, taking into account the overall objectives of ensuring our supply of energy always remains secure, reliable and affordable, as we transition to net zero*.' 5.3.6 '*Applicants should look for opportunities within the proposed development to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning*.' 5.3.7 '*Steps taken to minimise and offset emissions should be set out in a GHG Reduction Strategy, secured under the Development Consent Order. The GHG Reduction Strategy should consider the*	This chapter assesses the Project's GHG emissions in the context of the legally binding GHG reduction targets and carbon budgets, in line with IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022). The methodology of the assessment is presented in section 19.4 of this chapter, and residual effects are presented in section 19.9. In addition, a GHG reduction strategy is provided within **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**. The Applicant has and will continue to review opportunities for technological solutions to mitigate construction stage emissions. Measures associated with nature-based solutions and biodiversity benefits are set out

NPS EN-1 section	Where this is covered in the application
creation and preservation of carbon stores and sinks including through woodland creation, hedgerow creation and restoration, peatland restoration and through other natural habitats.'	in **Application Document 6.8 Chapter 8 Ecology** and **Application Document 7.1 Biodiversity Net Gain Report**. The Project proposes to deliver a minimum of 10 per cent BNG, with potential for wider environmental and societal benefits, on a voluntary basis. Detail on the Project's approach to voluntary BNG is provided in **Application Document 7.20 Design Development Report – 2025** and **Application Document 7.1 Biodiversity Net Gain Report**.

Table 19.2 – NPS EN-5 sections relevant to climate change

NPS EN-5 section	Where this is covered in the application
Paragraphs 2.3.1 to 2.3.3 consider climate change adaptation and resilience. 2.3.1 '*Section 4.10 of EN-1 sets out the generic considerations that applicants and the Secretary of State should take into account in order to ensure that electricity networks infrastructure is resilient to the effects of climate change*.' 2.3.2 '*As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to:* • *Flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change;* • *The effects of wind and storms on overhead lines;* • *Higher average temperatures leading to increased transmission losses;* • *Earth movement or subsidence caused by flooding or drought (for underground cables); and* • *Coastal erosion – for the landfall of offshore transmission cables and their*	The Climate Change Risk Assessment (CCRA) set out in section 19.9, **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment,** and **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment** has assessed the Project's impact on the climate and the Project's resilience to climate change, and extreme weather events such as flooding, in accordance with IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020). Climate change may lead to increased temperatures in the area of the Project, which could impact the structural integrity of materials. This has been considered in the climate resilience assessment presented in sections 19.7 and 19.9.

NPS EN-5 section	Where this is covered in the application
associated substations in the inshore and coastal locations respectively.' 2.3.3 '*Section 4.10 of EN-1 advises that the resilience of the project to the effects of climate change must be assessed in the Environmental Statement (ES) accompanying an application. For example, future increased risk of flooding would be covered in any flood risk assessment (see Section 5.8 in EN-1). …*'	

National Planning Policy Framework

19.2.12 The National Planning Policy Framework (NPPF) as revised in August 2026 (Ministry of Housing, Communities & Local Government, 2026) sets out national planning policies that reflect priorities of the Government for the operation of the planning system and the economic, social, and environmental aspects of the development and use of land. The NPPF (Ministry of Housing, Communities & Local Government, 2026) has a strong emphasis on sustainable development, with a presumption in favour of such development. Although the NPSs set out the primary policy tests for the Project, the NPPF (Ministry of Housing, Communities & Local Government, 2026) has the potential to be considered important and relevant to the consideration of the Project by the SoS.

19.2.13 Table 19.3 provides details of the elements of the NPPF (Ministry of Housing, Communities & Local Government, 2026) that relate to the climate change assessment, and how and where they are addressed in the ES and the application.

Table 19.3 – NPPF sections relevant to climate change

NPPF section	Where this is covered in the application
Section 5. Meeting the challenge of climate change. Plan-making policies: Policy CC1 paragraph 1 states "*Development plans should take a proactive approach to mitigating climate change and supporting the transition to net zero, in accordance with the objectives and provisions of the Climate Change Act 2008*".	The climate assessment considers the Project's GHG emissions in the context of the UK's legally binding net zero target, carbon budgets and interim emissions reduction targets established under the Climate Change Act 2008 (HM Government, 2019). In accordance with IEMA guidance (Institute of Environmental Management and Assessment, 2022), the assessment considers the Project's contribution to GHG emissions and demonstrates how climate change mitigation has been embedded into the design and assessment process. The Project has been developed following a mitigation hierarchy that seeks to avoid and reduce emissions where reasonably practicable and supports the transition to a net zero economy. Embedded, control and management and

NPPF section	Where this is covered in the application
	additional mitigation measures are identified in section 19.8 of this chapter. The GHG assessment presented in section 19.9 considers the Project's emissions in the context of the UK's legally binding net zero target, carbon budgets and emissions reduction commitments established under the Climate Change Act 2008. Section 19.8 demonstrates how emissions have been avoided and reduced through design optimisation, embedded mitigation and further reduction measures, supporting the transition to a net zero economy. **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy** provides further support to show potential carbon reductions that will be considered as the Project develops.
Section 5. Meeting the challenge of climate change. Plan-making policies: Policy CC1 paragraph 1 also states that development plans "*should also take a proactive approach to adapting to climate change, taking into account the implications of extreme weather and long-term climate trends including overheating, wildfires, drought, flood risk, coastal change, water* *supply, biodiversity and landscapes*."	The CCRA reported in section 19.9 (inclusive of **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**, and **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**) assesses the Project's impact on climate change and the Project's resilience to climate change, and extreme weather events such as flood risk, overheating, wildfires and more in accordance with climate change resilience and adaption (Institute of Environmental Management and Assessment, 2020). Impacts associated with nature-based solutions and biodiversity benefits are set out in **Application Document 6.8 Chapter 8 Ecology** and net gain as set out in **Application Document 7.1 Biodiversity Net Gain Report**. The approach outlined in the NPPF (Ministry of Housing, Communities & Local Government, 2026) to decrease vulnerability to current and future impacts of climate change and flood risk has been applied using the latest climate projections data from UKCP18 (Met Office, 2018), using the Representative Concentration Pathway (RCP) 8.5 scenario.
Section 5. Meeting the challenge of climate change. Plan-making policies: Policy CC1 paragraph 1.a.i. states that development plans should take a proactive approach to mitigating climate change and supporting the transition to net zero by	The Project was optimised throughout the design development process to minimise land use impacts and reduce embodied carbon where reasonably practicable. This included consideration of alternative design solutions, optimisation of asset length and configuration, and reducing material requirements whilst balancing

NPPF section	Where this is covered in the application
"*Proposing development patterns through their spatial strategy and allocations which: Can help contribute to radical reductions in greenhouse gas emissions (which can be informed by an assessment of baseline carbon emissions and the potential effect of development options on future emissions and their mitigation)*".	engineering, environmental and operational constraints. The final design formed the basis of the GHG assessment presented in section 19.7, section 19.8 and **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy** set out the measures incorporated to avoid and reduce emissions during construction and operation, demonstrating how the Project contributes to minimising whole life carbon emissions.
Section 5. Meeting the challenge of climate change. Plan-making policies: Policy CC1 paragraph 1.a.ii. states that development plans should take a proactive approach to mitigating climate change and supporting the transition to net zero by "*Avoid increased vulnerability and improve resilience to the effects of climate change (including through providing for necessary infrastructure improvements and the future relocation of homes and other uses where public safety would be at risk, for example as a consequence of coastal change).*"	As set out in the CCRA reported in section 19.9 (inclusive of **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment** the approach outlined in the NPPF (Ministry of Housing, Communities & Local Government, 2026) to decrease vulnerability to current and future impacts of climate change has been applied using the latest climate projections data from UKCP18 (Met Office, 2018), using the RCP8.5 scenario.
Section 5. Meeting the challenge of climate change. Plan-making policies: CC1 paragraph 1.d. states that development plans should take a proactive approach to mitigating climate change and supporting the transition to net zero by "*Identifying opportunities for green infrastructure provision and nature-based solutions which can safeguard and improve carbon storage, support nature recovery and resilience, and which take account of Local Nature Recovery Strategies in accordance with policy N1*."	Impacts and benefits associated with nature-based solutions, green infrastructure and biodiversity enhancement are assessed in **Application Document 6.8 Chapter 8 Ecology**, with biodiversity net gain outcomes reported in **Application Document 7.1 Biodiversity Net Gain Report**. These measures contribute to ecosystem resilience, support nature recovery and, where applicable, enhance opportunities for carbon sequestration and long-term carbon storage. The Project proposes to deliver a minimum of 10 per cent BNG, with potential for wider environmental and societal benefits, on a voluntary basis. Detail on the Project's approach to voluntary BNG is provided in **Application Document 7.20 Design Development Report – 2025** and **Application Document 7.1 Biodiversity Net Gain Report**.
Section 5. Meeting the challenge of climate change. National decision-making policies:	As set out in section 19.8 of this chapter, the Project incorporates embedded mitigation and management measures to minimise GHG

NPPF section	Where this is covered in the application
Policy CC2 paragraph 1.a. states "*In order to contribute to climate change mitigation and the transition to net zero, development proposals should, where relevant to the proposal, accord with policies TR3 and TR4 so that sustainable patterns of movement are prioritised, opportunities are taken to improve walking, wheeling, cycling and public transport, and infrastructure is provided to support the transition to zero-emission vehicles*".	emissions and promote sustainable travel. The use of electric or other low-carbon plant and equipment is also encouraged where available and practicable. Further measures include preparing and implementing a Construction Logistics Plan to promote the sustainable delivery of goods are set out in **Application Document 7.4 Outline Construction Traffic Management Plan** and **Application Document 7.3 Register of Environmental Actions and Commitments**.
Section 5. Meeting the challenge of climate change. National decision-making policies: Policy CC2 paragraph 1.d. states "*In order to contribute to climate change mitigation and the transition to net zero, development proposals should, where relevant to the proposal, take advantage of opportunities to reuse existing structures and materials, including by reusing non-contaminated excavated soil and hardcore within the site*".	As set out in section 19.8, the Project incorporates measures to minimise material consumption and reduce waste generation through the implementation of a Site Waste Management Plan. Opportunities for the reuse and recovery of excavated materials, soils, aggregates and other construction materials will be maximised where practicable, in accordance with the waste hierarchy, thereby reducing disposal requirements and associated embodied carbon emissions.
Section 5. Meeting the challenge of climate change. National decision-making policies: Policy CC2 paragraph 1.f. states "*In order to contribute to climate change mitigation and the transition to net zero, development proposals should, where relevant to the proposal, contribute to the creation or restoration of habitats which can act as carbon stores, such as through woodland planting and peatland restoration, while avoiding harm to habitats which can act as important carbon stores, including peatland and salt marsh*".	Impacts and benefits associated with creation or restoration of habitats, including support for ecological resilience and nature recovery, are assessed in **Application Document 6.8 Chapter 8 Ecology**. Biodiversity net gain outcomes are presented in **Application Document 7.1 Biodiversity Net Gain Report**. The Project proposes to deliver a minimum of 10 per cent BNG, with potential for wider environmental and societal benefits, on a voluntary basis. Detail on the Project's approach to voluntary BNG is provided in **Application Document 7.20 Design Development Report - 2025** and **Application Document 7.1 Biodiversity Net Gain Report**.
Section 5. Meeting the challenge of climate change. National decision-making policies: Policy CC2 paragraph 1.g. states "*In order to contribute to climate change mitigation and the transition to net zero, development proposals should, where relevant to the proposal, not involve the extraction of fossil*	As set out in section 19.9 of this chapter, although the construction and operation of the Project would directly result in increased GHG emissions, to provide context, consideration also needs to be given to its role in wider UK policy to decarbonise the electricity grid. Over its lifetime, the Project would provide a key contribution to the UK fulfilling its net zero policy and transition away from fossil

NPPF section	Where this is covered in the application
fuels unless it is in accordance with policy M5."	fuels. By reinforcing the electricity transmission network, the Project would facilitate the connection of new renewable and low-carbon energy generation and transmission. Without projects such as this, which facilitate the connection of low-carbon energy generation projects to the network, GHG intensity would not decrease as projected, thereby adversely affecting the UK's ability to meet its carbon reduction targets. This statement is consistent with the position taken in paragraph 150 of the Supreme Court judgment in the case of Finch, on behalf of the Weald Action Group (Appellant) v Surrey County Council and others (Respondents) (Supreme Court of the United Kingdom, 2024).
Section 5. Meeting the challenge of climate change. Adaptation to climate change: Policy CC3 paragraph 1 states "*Development proposals should take into account the current and potential impacts of climate change over the lifetime of the scheme, and in order to minimise vulnerability to these impacts should, where relevant to the proposal*".	The CCRA, reported in section 19.9 of this chapter and supported by **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment** and **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**, considers the current and future impacts of climate change over the lifetime of the Project. The assessment examines the Project's resilience and adaptability to climate-related risks and extreme weather events, including flooding, overheating, drought, wildfire, and severe storms, in accordance with climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020) The CCRA identifies and assesses climate risks to the Project and evaluates the effectiveness of embedded and additional adaptation measures. This ensures that, where relevant, appropriate measures are incorporated to minimise the Project's vulnerability to current and future climate change impacts throughout its operational lifetime.

National Planning Practice Guidance

19.2.14 The NPPF (Ministry of Housing, Communities & Local Government, 2026) is supported by Planning Practice Guidance (PPG), which was first published in March 2014. This guidance is updated on a regular basis and provides advice on a range of topics related to the implementation of NPPF (Ministry of Housing, Communities & Local Government, 2026) policies. The PPGs that are relevant to the climate change assessment are summarised below.

Planning Practice Guidance for Climate Change

19.2.15 The PPG for Climate Change (Ministry of Housing, Communities & Local Government, 2019) describes how to identify suitable mitigation and climate adaptation measures to incorporate into the planning process, stating that '*effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases. … Planning can also help increase resilience to climate change impact through the location, mix and design of development.*'

National strategy

19.2.16 National strategies that have been considered are as follows:

- UK Climate Change Risk Assessment 2022 (HM Government, 2022);
- Net Zero Strategy: Build Back Greener (HM Government, 2021);
- Energy White Paper: Powering Our Net Zero future (HM Government, 2020);
- National Infrastructure Strategy (HM Treasury, 2020);
- Carbon Budget and Growth Delivery Plan (HM Government, 2025);
- Powering Up Britain: Net Zero Growth Plan (Department for Energy Security & Net Zero, 2023); and
- Clean Power 2030 Action Plan: A new era of clean electricity (HM Government, 2024).

Regional and Local Policy

19.2.17 **Application Document 6.2 Chapter 2 Legislation and Policy Context** lists relevant regional and local policy documents.

19.2.18 A range of regional and local planning policies are in place that seek to protect and enhance climate change mitigation and adaptation; these have been given due regard in the climate change assessment and have been considered as part of the design development process of the Project. Full details of local policies relevant to this assessment are presented in **Application Document 6.19.A1 Appendix 19.1 Regional and Local Planning Policy**.

19.3 Scoping Opinion and Consultation

Scoping Opinion

19.3.1 A Scoping Report for the Project was issued to the Planning Inspectorate on 21 August 2023 (**Application Document 6.5.A1 Appendix 5.1 Environmental Impact Assessment Scoping Report**) and a Scoping Opinion was received from the Planning Inspectorate on behalf of the SoS for the Department for Energy Security and Net Zero on 29 September 2023 (**Application Document 6.5.A2 Appendix 5.2 Scoping Opinion**).

19.3.2 **Application Document 6.5.A2 Appendix 5.2 Scoping Opinion** confirmed the scope of the climate change assessment, as no matters were raised that indicated disagreement with the Applicant's proposed approach.

19.3.3 **Application Document 6.5.A2 Appendix 5.2 Scoping Opinion** takes account of responses from prescribed consultees as appropriate.

Statutory Consultation

19.3.4 Statutory consultation for the Project took place between 18 February and 15 April 2025. A summary of the relevant feedback received during statutory consultation relating to climate change is provided in Table 19.4. Further details on how consultation responses have informed the assessment are provided in **Application Document 5.1 Consultation Report**.

Table 19.4 – Assessment aspects raised at statutory consultation and how these have been addressed

Stakeholder	Assessment aspect raised	How this has been addressed
Bassetlaw District Council	Paragraph 19.2.14 [of Chapter 19 Climate Change of the Preliminary Environmental Information Report (National Grid, 2025)] refers to the Sustainability Appraisal of the Bassetlaw Local Plan. We suggest this should be the Main Modifications, August 2023 not the Publication Version Second Addendum, May 2022.	The Sustainability Appraisal of the Bassetlaw Local Plan Main Modifications report, August 2023 (Bassetlaw District Council, 2023), as referenced in the consultation response, was prepared to inform the development of the Bassetlaw Local Plan. The policy changes/modifications it sets out were consequently incorporated into the adopted Bassetlaw Local Plan 2020-2038 (Bassetlaw District Council, 2024). Therefore, the Sustainability Appraisal is not directly discussed in **Application Document 6.19.A1 Appendix 19.1 Regional and Local Planning Policy,** but its outcomes are considered by default through evaluation of the relevant policies within adopted Local Plan.

19.3.5 Further details on how consultation responses have informed the assessment are also provided in the following relevant discipline chapters, which may have relevant climate-related feedback consulted on and dealt with in their response:

- **Application Document 6.6 Chapter 6 Landscape**;
- **Application Document 6.7 Chapter 7 Visual**;
- **Application Document 6.8 Chapter 8 Ecology**;
- **Application Document 6.10 Chapter 10 Cultural Heritage**;
- **Application Document 6.11 Chapter 11 Water Environment**;
- **Application Document 6.12 Chapter 12 Geology and Hydrogeology**;
- **Application Document 6.13 Chapter 13 Agriculture and Soils**;
- **Application Document 6.14 Chapter 14 Traffic and Transport**;

- **Application Document 6.15 Chapter 15 Air Quality**; and
- **Application Document 6.16 Chapter 16 Noise and Vibration**.

Stakeholder Engagement

19.3.6 No stakeholder engagement relating to climate change was requested.

Summary of Scope of Assessment

19.3.7 The following summarises which aspects have been scoped into and out of the assessment through **Application Document 6.5.A1 Appendix 5.1 Environmental Impact Assessment Scoping Report** and **Application Document 6.5.A2 Appendix 5.2 Scoping Opinion**, statutory consultation as set out in Table 19.4.

Aspects scoped into the assessment

19.3.8 This chapter covers effects on the following during construction, operation and maintenance. In line with **Application Document 6.5.A1 Appendix 5.1 Environmental Impact Assessment Scoping Report** and the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) (HM Government, 2017), consideration has been given to climate covering the following assessments:

- Lifecycle Greenhouse Gas (GHG) Impact Assessment: the impact of GHG emissions arising from the Project on the climate over its design life in line with IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022);
- In-Combination Climate Change Impact (ICCI) Assessment: the combined impact of future climate conditions and the Project on receptors in the surrounding environment in line with the IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020).
- Climate Change Risk Assessment (CCRA): the resilience of the Project to future climate impacts, including potential damage to the Project as a result of climate change, in line with IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020).

Aspects scoped out of the assessment

19.3.9 Decommissioning has been scoped out of the assessment as explained in **Application Document 6.5 Chapter 5 EIA Approach and Methodology**.

Consideration of upstream and downstream effects

19.3.10 When interpreting the requirements of the EIA Regulations (HM Government, 2017), the Applicant has also had regard to the judgment of the Supreme Court in R (on the application of Finch on behalf of the Weald Action Group) v Surrey County Council, (Supreme Court of the United Kingdom, 2024) with particular attention to potential upstream and downstream direct and indirect effects. The principles set out in the Finch judgment have been considered in the preparation of this ES and the proposed scope and methodology for each assessment, including (but not limited to) this chapter. Finch was unusually a case in which the likely downstream impacts could be

assessed, because it was inevitable that the oil produced would be refined and, as an end product, would undergo combustion and that that combustion would produce GHGs into the earth's atmosphere which could readily be calculated. On a macro level, the Project would increase capacity in the electricity network, meaning that, in theory, more electricity can be transported and used, increasing the potential for additional activities requiring electricity. It is not considered that the Project, as electricity transmission infrastructure, will be the direct or indirect cause of either upstream electricity generation or downstream electricity consumption. Rather, the Project will facilitate the transport of electricity on the network in response to an increase in electricity generation and in the demand for electricity. Hence, it will not be the direct or indirect cause of GHG emissions from upstream or downstream activities.

19.3.11 It is recognised, however, that following Finch there is some uncertainty as to what are to be regarded as the direct and indirect environmental effects of a project in relation to GHG emissions. Therefore, the Applicant has also considered the position where an increase in the capacity of the electricity network and the potential for additional activities requiring electricity are treated as direct or indirect effects arising from the Project. Having considered various potential scenarios, the Applicant considers that in the case of this Project it is not possible to calculate the likely upstream or downstream direct or indirect effects. As stated, the Project would increase capacity in the electricity network, meaning that, in theory, more electricity could be transported and used, increasing the potential for additional activities requiring electricity. However, whilst information is available at a high level regarding the amount of electricity that could flow as a result of an enhanced transmission network, it is impossible to quantify the amount of either the increase, or more likely decrease, in GHGs that could result from the use of that additional electricity capacity. This is because the transmission network, which is operated by National Grid Electricity Transmission plc (National Grid) within England and Wales and which is provided as the connection point for electricity and demand, consists of a number of different elements including overhead lines, cables, substations, and more recently high voltage direct current systems. National Grid does not control which generators are generating electricity at any one time nor does it control the level of demand that is connected to the system. As a result, National Grid has no way of assessing where the power is generated (and by what means) or more significantly where the power is going (i.e. who will be the end user of or what the ultimate use of that electricity might be), and consequently any related emissions arising from, or more likely being reduced, as a result of such use. This means that the end use of the electricity is unknown. It could be used in a way that reduces GHG emissions that would otherwise be emitted, for example when used to charge electric vehicles, or for powering heat pumps that replace gas central heating.

19.3.12 It is clear in these circumstances that, as a result of insufficient information, and the resultant uncertainty, no meaningful assessment of downstream or upstream impacts can be undertaken in relation to these matters. In these circumstances, any conclusion as to possible effects would be merely conjecture or speculation at best. On the basis that there is insufficient evidence available to find a reasoned conclusion that a possible effect is 'likely', there is no requirement for that effect to be identified and assessed.

19.4 Assessment Approach and Methods

19.4.1 **Application Document 6.5 Chapter 5 Environmental Impact Assessment Approach and Methodology** sets out the overarching approach which has been used in preparing the information in this ES. This section describes the technical methods used to determine the baseline conditions, sensitivity of receptors, and magnitude of impacts and sets out the criteria that have been used for the climate change assessment. Where the assessment criteria terminology differs from the general assessment criteria terminology, as set out in **Application Document 6.5 Chapter 5 Environmental Impact Assessment Approach and Methodology**, justification is provided.

19.4.2 Due to the nature of climate change, its effects are assessed differently from other environmental topics in an EIA. The IEMA guidance (set out in (Institute of Environmental Management and Assessment, 2022) and (Institute of Environmental Management and Assessment, 2020)) for assessing climate impacts (as set out in paragraph 19.4.3) has been followed for this assessment and may result in deviations from the terminologies and methods set out in the overarching approach.

Guidance Specific to the Climate Change Assessment

19.4.3 Relevant guidance, specific to climate change that has informed the approach to the assessment in this chapter comprises:

- IEMA Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2nd Edition (IEMA GHG assessment guidance) (Institute of Environmental Management and Assessment, 2022);
- Environmental Impact Assessment Guide to: Climate Chance Risk and Adaptation (IEMA climate change resilience and adaptation guidance) (Institute of Environmental Management and Assessment, 2020);
- The GHG Protocol – A Corporate Accounting and Reporting Standard (GHG Protocol guidelines) (World Resources Institute & World Business Council for Sustainable Development, 2015);
- PAS 2080:2023 Carbon management in buildings and infrastructure (PAS 2080:2023) (British Standards Institution, 2023); and
- Net Zero Strategy: Build Back Greener (HM Government, 2021).

Study Area

Lifecycle Greenhouse Gas Impact Assessment

19.4.4 The study area for the Lifecycle GHG Impact Assessment covers all direct GHG emissions arising from activities undertaken within the Order Limits during the construction, operation and maintenance phases of the Project. It also includes indirect emissions arising outside the Order Limits, for example emissions embedded within the construction materials arising because of the energy used for their production, as well as emissions arising from the transportation of materials, waste, and construction workers.

19.4.5 The study area also considers how the Project contributes to wider grid decarbonisation in the UK.

Climate Change Risk Assessment

19.4.6 The study area for the CCRA (**Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**) is the area within the Order Limits, i.e. it covers the construction, operation and maintenance of all assets and infrastructure which constitute the Project.

In-Combination Climate Change Impact Assessment

19.4.7 The study area for the ICCI Assessment (**Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**) is as defined for the other environmental assessments reported within the ES. The sensitive receptors for the ICCI Assessment are the receptors identified by each discipline in its assessment, with reference to the following chapters:

- **Application Document 6.6 Chapter 6 Landscape**;
- **Application Document 6.7 Chapter 7 Visual**;
- **Application Document 6.8 Chapter 8 Ecology**;
- **Application Document** 6.9 Chapter 9 Ornithology;
- **Application Document 6.10 Chapter 10 Cultural Heritage**;
- **Application Document 6.11 Chapter 11 Water Environment**;
- **Application Document 6.12 Chapter 12 Geology and Hydrogeology**;
- **Application Document 6.13 Chapter 13 Agriculture and Soils**;
- **Application Document 6.14 Chapter 14 Traffic and Transport**;
- **Application Document 6.15 Chapter 15 Air Quality**;
- **Application Document 6.16 Chapter 16 Noise and Vibration**;
- **Application Document 6.17 Chapter 17 Socio-economics, Recreation and Tourism**; and
- **Application Document 6.18 Chapter 18 Health and Wellbeing**.

19.4.8 The methodology used by the environmental disciplines to identify ICCIs is described below. The ICCIs identified by other environmental disciplines are presented in **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**.

Baseline Data Gathering and Forecasting Methods

Data sources

19.4.9 This section presents the sources of published information and data gathering which has been undertaken in order to complete the relevant environmental assessments included in this chapter.

Lifecycle Greenhouse Gas Impact Assessment

19.4.10 To provide an assessment of the significance of GHG emissions from the Project (in terms of climate change), it is necessary to identify and understand the baseline GHG emission conditions in and around the study area.

19.4.11 The GHG baseline conditions are defined as the scenario in which the Project does not go ahead.

19.4.12 The baseline comprises existing carbon stocks[2] and future sources of GHGs within the Order Limits of the Project. The methodology for calculating GHG emissions and removals is consistently used across the construction and operational phases of the Project.

19.4.13 As it is not possible to meaningfully calculate these baseline and future baseline GHG emissions, a conservative approach has been taken in line with best practice guidance whereby the baseline is assumed to be zero.

19.4.14 The Lifecycle GHG Impact Assessment has been informed by data that has been provided by the Project team and analysed using the methodology outlined below. Where data are unavailable, reasonable assumptions have been made based on professional judgement.

19.4.15 Emission factors have been sourced from publicly available sources, including those issued by the Department for Energy Security & Net Zero (Department for Energy Security & Net Zero, 2025), as well as the University of Bath's Inventory of Carbon and Energy (ICE), V4.0 (University of Bath, 2024), and National Grid's internal carbon asset database. Appropriate assumptions for emission factors have been sourced from the Royal Institution of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the Built Environment, 2nd Edition guidelines (Royal Institution of Chartered Surveyors, 2024), and from National Grid's internal carbon factor database.

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

19.4.16 The current baseline for the CCRA is based on historical climate data, for the period 1991-2020, obtained from the Met Office (Met Office, 2023), recorded by the closest meteorological stations to the Project, those being across East Riding of Yorkshire, Lincolnshire and Nottinghamshire. The selected meteorological stations include the following: Hull (Kingston upon Hull) Station (Route Section A), located approximately 12.6 km southeast of Birkhill Wood Substation to which the Project will connect in the north; Cranwell (Lincolnshire) (Route Section F) located approximately 40 km southeast of High Marnham Substation (representing the nearest station to the connection point in the south); and an additional station located in Route Section E, approximately 19 km northeast from High Marnham, at Scampton (Lincolnshire).

19.4.17 As part of the CCRA, this was compared to the future baseline throughout the life of the Project.

19.4.18 In line with NPS EN-1 (Department for Energy Security & Net Zero, 2025), data to determine the future baseline conditions was obtained from UKCP18 (Met Office, 2018). This projection data provides probabilistic indications of how global climate

[2] Carbon stocks are the quantity of carbon stored within vegetation, soils, and other natural reservoirs.

change is likely to affect areas of the UK using pre-defined climate variables and time periods.

19.4.19 Data from the Global Facility for Disaster Reduction and Recovery's (GFDRR's) web tool ThinkHazard! (Global Facility for Disaster Reduction and Recovery, 2025) was also used to assess other projected trends/impacts, and the UK Climate Change Risk Assessment analysed (per the direction in paragraph 4.10.17 of NPS EN-1) (Department for Energy Security & Net Zero, 2025) for the current state of nationwide climate change risks.

Assessment Methods and Criteria

19.4.20 This section sets out the scope and methodology for the assessment of climate effects on the Project and of effects on the climate associated with the Project. It builds on the general assessment methodology presented in **Application Document 6.5 Chapter 5 EIA Approach and Methodology**.

19.4.21 All assessment work has applied a precautionary principle and where required a realistic worst-case scenario has been assessed.

19.4.22 The identification of climate effects is the result of applying professional judgement within an evidence-based assessment process.

19.4.23 The assessment of climate effects considers potential sources of effects, during both construction and operation (and maintenance).

Lifecycle Greenhouse Gas Impact Assessment methodology

19.4.24 The Lifecycle GHG Impact Assessment follows a project lifecycle approach to calculate estimated GHG emissions arising from the construction, operation and maintenance phases of the Project. The calculation outputs are used to identify GHG 'hot spots' (i.e. emissions sources likely to generate the largest amount of GHG emissions). This has enabled the identification of priority areas for mitigation where adverse climate effects have been identified, in line with the principles set out in IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022).

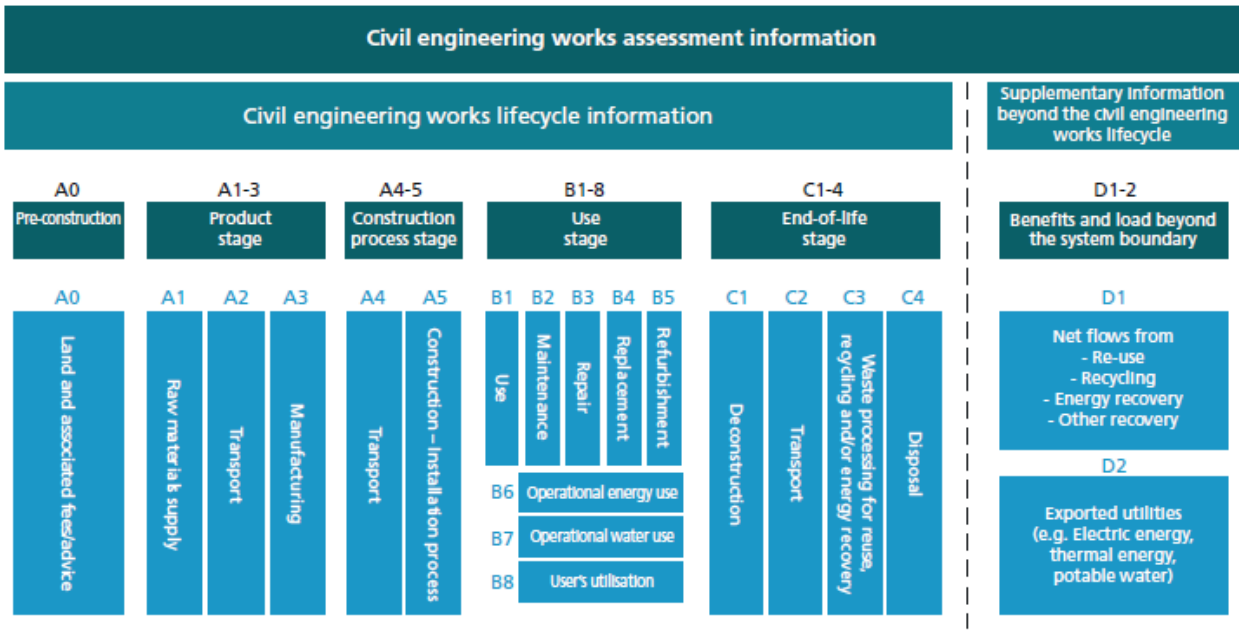
19.4.25 In line with the GHG Protocol guidelines (World Resources Institute & World Business Council for Sustainable Development, 2015), the Lifecycle GHG Impact Assessment is reported as tonnes of carbon dioxide equivalent (tCO_2e) and has considered the seven Kyoto Protocol gases:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

19.4.26 These GHGs are broadly referred to in this chapter under an encompassing definition of 'GHG emissions', with the unit of tCO_2e (tonnes of CO_2 equivalent) or $MtCO_2e$ (mega tonnes of CO_2 equivalent).

19.4.27 Greenhouse gas emissions have been calculated according to PAS 2080:2023 Carbon management in buildings and infrastructure (British Standards Institution, 2023). PAS 2080:2023 (British Standards Institution, 2023) sets out lifecycle modules for assessing GHG emissions across the Project lifecycle. The PAS 2080:2023 (British Standards Institution, 2023) lifecycle modules are illustrated in Image 19.1

Image 19.1 – PAS 2080:2023 lifecycle modules



19.4.28 Table 19.5 summarises the key anticipated GHG emissions sources associated with the Project by lifecycle stage, in accordance with PAS 2080:2023 (British Standards Institution, 2023) lifecycle modules.

Table 19.5 – Anticipated lifecycle GHG emissions sources associated with the Project by lifecycle stage

	Activity	Primary emission sources
Production phase A1-A3	A1-A3: Raw material extraction and manufacturing of products required to build the equipment for the Project; Transportation of materials for processes/ manufacturing (where available)	GHG emissions from energy use in the extraction of materials and manufacture of components and equipment. GHG emissions from the transportation of products and materials during their processing and manufacture. Due to the nature of the equipment, this could require shipment of certain aspects over significant distances.

	Activity	Primary emission sources
Construction phase A4-A5	A4: Transportation of construction materials to the site	GHG emissions from the transportation of materials to and from the site.
	A4: Transportation of construction workers to and from the site	GHG emissions from transportation of workers to and from the site.
	A5: On-site construction activity including emissions from construction compounds	Energy (electricity, fuel, etc.) consumption from plant and vehicles and generators on-site.
	A5: Disposal of any waste generated by the construction phase	GHG emissions from disposal and transportation of waste.
	A5: Land use change	GHG emissions from net loss/gain of carbon sink (loss of biological capacity to absorb and process carbon stock loss).
	A5: Water use	Provision of potable water, and treatment of wastewater.
Operation and maintenance phase **B2-B4, B6 and B8**	**B2-B4: Maintenance, repair and replacement**.	**GHG emissions from maintenance (B2) and repair (B3) and replacement (B4) activities have been assumed in line the RICS guidance. Replacement (B4) lifecycles were informed by the design team, and transport scenarios were assumed in line with the assumptions applied in A4.**
	B6: Operational energy use	**At this stage, data on other operational energy sources, such as lighting and CCTV, is not available. However, their impact is expected to be negligible compared to B8 transmission and distribution losses, given the scale (400 kV) and length of the infrastructure**.
	B8: Users' utilisation	Transmission losses[3] were conservatively estimated at 3 per cent, uplifting to account for increased losses of an overhead line system (The Institution of Engineering and Technology, 2025). It is assumed that the conductor is designed for 70 per cent load factor. Department for Energy Security & Net Zero emission factors (Department for Energy Security & Net Zero, 2023) are used which account for anticipated grid decarbonisation over the 80-year reference period.

[3] The proposed overhead line itself will not generate direct greenhouse gas emissions during operation, rather transmission losses are indirect GHG emissions arising from energy lost as heat during power flow.

19.4.29 Altogether, the total expected lifecycle GHG emissions across construction (including the carbon in materials), as well as at the operation and maintenance phases of the Project, have been quantified using a calculation-based methodology as per the following equation, and aligned with the GHG Protocol (World Resources Institute & World Business Council for Sustainable Development, 2015):

Activity data x GHG emissions factor = GHG emissions

19.4.30 When evaluating the significance of the GHG emissions, all new GHG emissions contribute to a negative environmental impact in line with the IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022). The significance of a project's emissions should therefore be based on its net impact over its design life, which may be positive, negative or negligible. 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.

19.4.31 The Project is anticipated to support the UK transition to net zero by 2050 by increasing the capability of the UK national electricity grid to transmit low carbon energy. The GHG benefits associated with this are outside of the system boundary and fall under Module D as per PAS 2080 guidelines (British Standards Institution, 2023) lifecycle modules. Module D is not within the scope of this assessment, and therefore will not be formally assessed. However, the potential benefits of the Project associated with the UK's transition to net zero have been discussed indicatively to inform the evaluation of the significance of impact.

Sensitivity of climate change receptors

19.4.32 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 five-year carbon budgets. Also, the extreme importance of limiting global warming to below 2°C this century is broadly asserted by The Paris Agreement (United Nations Framework Convention on Climate Change, 2015) and the climate science community.

Lifecycle Greenhouse Gas Impact Assessment – significance of effects

19.4.33 The significance of the impact of GHG emissions on the climate has been determined in line with the criteria set out in the IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022).

19.4.34 As per the guidance, any GHG emissions or reductions from a project might be considered to be significant, as all emissions contribute to climate change. The rationale for classification is as follows:

- Any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore the UK's ability to meet its carbon budgets.
- The extreme importance of limiting global warming to below 2°C this century is asserted within The Paris Agreement (United Nations Framework Convention on Climate Change, 2015), national legislation. Additionally, the importance of limiting global warming below 1.5°C was highlighted in a 2018 Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and

efforts to eradicate poverty, by the Intergovernmental Panel on Climate Change (IPCC) (Intergovernmental Panel on Climate Change, 2018).

- A disruption to the global climate is already having diverse and wide-ranging impacts to the environment, society, economic and natural resources. Known effects of climate change include increased frequency and duration of extreme weather events, temperature changes, rainfall and flooding, sea level rise and ocean acidification. These effects are largely accepted to be negative, profound, global, likely, long-term and permanent, and are transboundary and cumulative from many global actions.

19.4.35 The IEMA GHG assessment guidance states that it is challenging to identify fixed numerical thresholds against which to identify the significance of a project regarding the net change in GHG emissions (Institute of Environmental Management and Assessment, 2022). Therefore, the GHG assessment should present context for the GHG emissions, and it is down to the practitioner's professional judgement on how best to contextualise a project's GHG impact.

19.4.36 The Climate Change Act 2008 (HM Government, 2019) established a system of five-yearly carbon budgets. Each carbon budget represents the total amount of GHG emissions that may be emitted by the UK during each five-year period, measured in $MtCO_2e$. The carbon budgets are consistent with furthering the achievement of the UK climate objective and include all GHG emissions. Therefore, to contextualise the impact of the Project's GHG emissions, the assessment has been delivered in the context of the UK's carbon budgets up to 2037, as published by the CCC (Climate Change Committee, 2025).

19.4.37 The level of significance of Project related emissions has been determined using IEMA's five distinct levels of significance, which are not solely based on whether a development emits GHG emissions alone, but how it makes a relative contribution towards achieving a science-based 1.5°C–aligned transition towards net zero. The definitions for IEMA's levels of significance are provided in Table 19.6.

Table 19.6 – Significance of effects for Lifecycle GHG Impact Assessment

Level of significance	Effects	Description
Significant	Major adverse	The GHG impacts of a project are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
	Moderate adverse	The GHG impacts of a project 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 GHG impacts of a project would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with

Level of significance	Effects	Description
		minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
	Negligible	The GHG impacts of a project 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.
Significant	Beneficial	The net GHG impacts of a project 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.

Adapted from the IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022)

19.4.38 The IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022) 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 the magnitude of a project's GHG impact. To determine the level of significance, the magnitude of impact against carbon budgets, alignment with the UK's trajectory to net zero, and how the Project aligns and contributes to UK policy has been considered. The approach adopted for the purposes of this assessment is outlined below.

19.4.39 Where available, UK national carbon budgets (HM Government, 2021) 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 five-year period, are currently available up to the 7th Carbon Budget period (2038-2042) (Climate Change Committe, 2025). The UK is currently in the Fourth Carbon Budget period, which runs from 2023 to 2027 (HM Government, 2011). The Third, Fourth and Fifth Carbon Budgets ((HM Government, 2009), (HM Government, 2011), (HM Government, 2016)) reflect the previous 80 per cent reduction target by 2050. The Sixth Carbon Budget aligns with the legislated 2050 net zero target (Climate Change Committee, 2020).

19.4.40 The construction programme for the Project (anticipated to be 2028 to 2033) spans the Fifth Carbon Budget (2028 to 2032). The annual average GHG impact of the Project has been compared against the annualised carbon budget for the period in which the emissions arise to allow separate assessment of each lifecycle stage.

19.4.41 Operation and maintenance GHG emissions as a result of the Project (assumed to be fully operational by 2031) have been compared to all the appropriate and available carbon budgets within the design life of the Project: the, Fifth, Sixth and Seventh Carbon Budgets (2028 to 2032, 2033 to 2037 and 2038 to 2042 respectively).

19.4.42 In order to illustrate the Project's trajectory towards net zero by 2050, the CCC's Balanced Net Zero Pathway has been utilised post-2042 (Climate Change Committee, 2020), in the absence of any nationally legally binding carbon budgets after the Sixth Carbon Budget. Beyond 2050, it is implied that the UK will remain at net zero.

19.4.43 The CCC Balanced Net Zero Pathway (HM Government, 2021) is divided into five-year periods between 2037 and 2050 to match the time period of the legally binding UK national carbon budgets. The proposed budgets up to 2050 are in line with the UK's 1.5°C trajectory.

19.4.44 However, the CCC's proposed budgets beyond 2042 have not been formally adopted by the government or legislated for by Parliament. Therefore, they can only be used as an indicative measure to contextualise the Project's progress toward the national net zero trajectory. The combined UK carbon budget and the CCC's Balanced Net Zero Pathway covering the Project's construction and operational phases can be seen in Table 19.7.

Table 19.7 – UK carbon budgets and indicative carbon budgets based upon the CCC's Balanced Net Zero Pathway

Carbon budget	Cumulative UK carbon budget ($MtCO_2e$)	Cumulative indicative carbon budget totals based upon the CCC's Balanced Net Zero Pathway ($MtCO_2e$)
Fourth (2023-2027)	**1,950**	**-**
Fifth (2028-2032)	**1,725**	**-**
Sixth (2033-2037)	**965**	**-**
Seventh (2038-2042)	**533**	**-**
Eighth (2043-2047)	**-**	**220**
Ninth (2048-2050)	-	**23**

Note: $MtCO_2e$ = Mega tonnes of carbon dioxide equivalent emissions.

19.4.45 In addition to providing advice that underpins the setting of national carbon budgets, the CCC also provides sector-specific decarbonisation pathways (Climate Change Committee, 2025). Table 19.8 presents the sector-specific carbon budgets for electricity generation as further context to the GHG emissions assessment; however, unlike the national carbon budgets, these are not legislated for by Parliament.

Table 19.8 – Sector specific electricity generation carbon budgets based upon the CCC's Balanced Net Zero Pathway

Carbon budget period	Recommended carbon budget ($MtCO_2e$)
Fifth (2028-2032)	68
Sixth (2033-2037)	29
Seventh (2038-2042)	22
Eighth (2043-2047)	10
Ninth (2048-2050)	3

Note: $MtCO_2e$= Mega tonnes of carbon dioxide equivalent emissions.

Climate Change Risk Assessment methodology

19.4.46 A CCRA has been undertaken to identify potential climate impacts on the Project and associated receptors. It considers the potential consequences and likelihood of climate impacts, considering the adaptation measures embedded into the Project's design.

19.4.47 The current baseline for the CCRA is based on historical climate data (1991-2020), obtained from the Met Office (Met Office, 2023), recorded by the closest meteorological stations to each end of the proposed overhead line and connection points (Kingston upon Hull (Route Section A) and Cranwell (Route Section F)), and an interim station positioned close to the route between the two (Scampton (Route Section E)). The selected metrological stations are further described in paragraph 19.4.16.

19.4.48 The CCRA has included all infrastructure and assets associated with the Project. 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) (Met Office, 2018).

19.4.49 The future baseline for the CCRA is based on future UKCP18 (Met Office, 2018). This projection data provides probabilistic indications of how global climate change is likely to affect areas of the UK using pre-defined climate variables and time periods.

19.4.50 For the purpose of the assessment, UKCP18 (Met Office, 2018) probabilistic projections have been obtained for pre-defined 20-year periods for the following average climate variables:

- Mean annual temperature;
- Mean Summer temperature;
- Mean Winter temperature;
- Maximum Summer temperature;
- Minimum Winter temperature;
- Mean annual precipitation;
- Mean Summer precipitation; and
- Mean Winter precipitation.

19.4.51 UKCP18 (Met Office, 2018) probabilistic projections have been analysed across the relevant grid squares within which the Project is located. These figures are expressed as temperature/precipitation anomalies in relation to the 1981–2000 baseline for these data.

19.4.52 UKCP18 (Met Office, 2018) uses a range of possible scenarios, classified as RCPs, to inform differing future emission trends. These RCPs specify the concentrations of GHGs that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels. RCP8.5 is considered to be the worst-case global scenario with the greatest concentration of GHGs in the atmosphere and has been used for the purposes of this assessment as a worst-case scenario.

19.4.53 The CCRA considers the impacts of climate change on the Project over its lifetime by identifying likely changes to the climate and potential climate hazards.

19.4.54 For the CCRA, the receptors are the Project infrastructure (during both construction and operation), the Project workforce, and the equipment need to construct and operate the Project. The sensitivity of receptors is considered in relation to the Project's physical characteristics, design life, and operational requirements. For example, the infrastructure may be sensitive to increases in extreme rainfall due to potential flooding of low-lying areas, and workers may be sensitive to higher temperatures or extreme weather during outdoor construction and maintenance activities.

19.4.55 For the construction phase, receptors include construction workers, plant, machinery, and materials. For the operational and maintenance phases, receptors include the assets (i.e., all major assets, including the proposed overhead line) and any workers on-site.

19.4.56 The following key terms and definitions relating to the CCRA have been adopted:

- Climate hazard – a weather or climate related event, which has the potential to do harm to environmental or Project receptors and assets, for example increased Winter precipitation;
- Climate impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose; and
- Consequence – any effect on the receptor or asset resulting from the climate hazard having an impact.

19.4.57 A stepped approach has been used to assess the impacts of climate change on the Project:

- Identify potential climate hazards and potential resultant climate impacts;
- Identify the likelihood of climate impact occurring on the Project;
- Identify the consequence of impact on the Project; and
- Identify the risk rating and significance of effect (likelihood of impact occurring combined with consequence of impact).

Climate Change Risk Assessment – Significance of climate change impacts

19.4.58 The significance of the impacts associated with climate change is determined by identifying the likelihood and consequences of a climate impact (e.g., increased frequency and severity of extreme weather events) affecting the Project and workers.

19.4.59 In the CCRA, following identification of climate hazards and potential resultant climate impacts, the likelihood of occurrence and consequences of the impact are assessed according to the definitions outlined in Table 19.9 and Table 19.10. The categories and descriptions provided below are based on the IEMA climate change resilience and adaptation guidance (Institute of Environmental Management and Assessment, 2020).

19.4.60 For instance, the permanent damage to electrical equipment caused by heatwaves may lead to a complete loss of operation. The categories and descriptions provided below are based on the EU Technical Guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission, 2021).

19.4.61 The descriptions of consequences from Table 19.10 come from the EU Technical Guidance on the climate proofing of infrastructure (European Commission, 2021).

Table 19.9 – Categories for the likelihood of the climate-related impact occurring

Likelihood category	Qualitative description (frequency of occurrence)	Quantitative description (probability of occurrence)[4]
Rare	Highly unlikely to occur	5%
Low	Unlikely to occur	20%
Moderate	As likely to occur as not	50%
High	Likely to occur	80%
Almost certain	Very likely to occur	95%

Table 19.10 – Description of consequences

Risk areas	Negligible	Minor	Moderate	Major	Catastrophic
Asset damage/ engineering/ operational	Impact can be absorbed through normal activity	An adverse event that can be absorbed by taking business continuity actions	A serious event that requires additional emergency business continuity actions	A critical event that requires extraordinary/ emergency business continuity actions	Disaster with the potential to lead to shut down or collapse or loss of the asset/network
Safety and health	First aid case	Minor injury, medical treatment	Serious injury or lost work	Major or multiple injuries, permanent injury, or disability	Single or multiple fatalities
Environment	No impact on baseline environment. Localised in the source area. No recovery required.	Localised within site boundaries. Recovery measurable within one month of impact.	Moderate harm with possible wider effect. Recovery within one year.	Significant harm with local effect. Recovery longer than one year. Failure to comply with environmental regulations/consent.	Significant harm with widespread effect. Recovery longer than one year. Limited prospect of full recovery.
Social	No negative social impact	Localised, temporary social impacts	Localised, long-term social impacts	Failure to protect poor or vulnerable groups. National, long-term social impacts.	Loss of social licence to operate. Community protests.

[4] The likelihood categories are assessed qualitatively based on professional judgement

Risk areas	Negligible	Minor	Moderate	Major	Catastrophic
Financial (for single extreme event or annual average impact)	Less than 2% of turnover	2–10% of turnover	10–25% of turnover	25–50% of turnover	Greater than 50% of turnover
Reputation	Localised, temporary impact on public opinion	Localised, short-term impact on public opinion	Local, long-term impact on public opinion with adverse local media coverage	National, short-term impact on public opinion; negative national media coverage	National, long-term impact with potential to affect the stability of the Government
Cultural heritage and cultural premises	Insignificant impact	Short-term impact. Recovery or repair.	Serious damage with wider impact to tourism industry	Significant damage with national and international impact	Permanent loss with resulting impact on society

Climate Change Risk Assessment – significance of effects

19.4.62 The likelihood and consequence of climate impacts, as defined in Table 19.9 and Table 19.10, are combined to form a risk rating matrix as set out in Table 19.11 below. As a result, the matrix in Table 19.11 provides a measure of the significance of climate change effects assessed on the Project.

Table 19.11 – Significance of climate change effects

Measure of consequence	Likelihood of climate-related impact occurring				
	Rare	Low	Moderate	High	Almost certain
Negligible	Low (not significant)	Low (not significant)	Medium (not significant)	Medium (not significant)	Medium (not significant)
Minor	Low (not significant)	Low (not significant)	Medium (not significant)	High (significant)	Extreme (significant)
Moderate	Low (not significant)	Medium (not significant)	High (significant)	Extreme (significant)	Extreme (significant)
Major	Medium (not significant)	High (significant)	High (significant)	Extreme (significant)	Extreme (significant)
Catastrophic	High (significant)	High (significant)	Extreme (significant)	Extreme (significant)	Extreme (significant)

In-Combination Climate Change Impact Assessment methodology

19.4.63 The ICCI Assessment has considered the ways in which projected climate change will influence the significance of the impact of the Project on receptors in the surrounding environment.

19.4.64 The ICCI Assessment has considered the existing and projected future climate conditions for the geographical location and assessment timeframe. It identifies the extent to which identified receptors in the surrounding environment are potentially vulnerable to (and affected by) these factors. The receptors for the ICCI Assessment are those that will be impacted by the Project as identified in other topic chapters within the ES. These impacts have been assessed in liaison with the technical specialists responsible for preparing the applicable technical chapters as listed in paragraph 19.4.7. The ICCI is presented by theme, rather than on a chapter topic basis, and a theme may consider inputs from more than one technical discipline, for example ecology and landscape.

19.4.65 Climate hazards and the likelihood of their impact on identified receptors is determined using the same approach as set out for the CCRA, using the criteria presented in Table 19.10. Once the likelihood of an impact occurring has been determined, the consequence of the impact on the receptor is determined using the criteria defined in Table 19.12. 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-specific assessment methodology.

Table 19.12 – Consequence criteria for ICCI Assessment

Criteria	Description
High	The climate hazard in-combination with the effect of the Project causes the significance of effect defined by the topic to increase, to increase from negligible, low, or moderate to major.
Moderate	The climate hazard in-combination with the effect of the Project causes the significance of effect defined by the topic to increase from negligible or low, to moderate.
Low	The climate hazard in-combination with the effect of the Project causes the significance of effect defined by the topic to increase from negligible to low.
Negligible	The climate hazard in-combination with the effect of the Project does not alter the significance of the effect defined by the topic.

In-Combination Climate Change Impact Assessment methodology – significance criteria

19.4.66 The significance of potential effects is determined using the matrix in Table 19.13. Where an effect has been identified as significant against the matrix in Table 19.13, these have been classed as a significant ICCI effect. If significant ICCI effects are assessed, then as per the IEMA guidance, (Institute of Environmental Management and Assessment, 2020), consideration of additional mitigation measures and inclusion of allowances for future mitigation measures and monitoring have been assessed.

Table 19.13 – Significance criteria for ICCI Assessment

Level of consequence	Likelihood of climate-related impact occurring				
	Rare	Low	Moderate	High	Almost certain
Negligible	Not significant	Not significant	Not significant	Not significant	Not significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Moderate	Not significant	Not significant	Not significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant

Assumptions and Limitations

Lifecycle GHG Impact Assessment

19.4.67 The assessment has been undertaken based on the description of the Project outlined in **Application Document 6.4 Chapter 4 Description of the Project**.

19.4.68 Decommissioning has been scoped out of the assessment as explained in **Application Document 6.5 Chapter 5 EIA approach and Methodology**. It should be noted the assessment does include carbon implications of the removal of the pylons at the cross-over, but this is classified as 'demolition' not decommissioning.

19.4.69 There are currently no specific GHG emission thresholds that, if exceeded, are considered significant. Assessment of significance of emissions therefore cannot be judged objectively.

19.4.70 To address this, the assessment has used a combination of approaches as determined using the IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022). The magnitude of GHG emissions is put into context using national carbon budgets. In addition to this, the significance of emissions has been assessed based on '*whether the Proposed Development contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*' (Institute of Environmental Management and Assessment, 2022).

19.4.71 Where detailed information is not available regarding energy use, types and quantities of materials used, or the carbon of key features of the assets, assumptions are made based on industry approximations, professional best practice, and estimates provided by National Grid.

19.4.72 Key assumptions applied in the Lifecycle GHG Impact Assessment are presented in Table 19.14. The lifecycle modules are labelled in accordance with PAS 2080 guidelines (British Standards Institution, 2023). Key sources of assumptions include RICS Whole Life Carbon Assessment for the Built Environment, 2nd Edition guidelines (Royal Institution of Chartered Surveyors, 2024) and National Grid's internal carbon factor and conversion factor database.

Table 19.14 – Key assumptions applied in Lifecycle GHG Impact Assessment

PAS 2080 guidelines lifecycle module		Emission source	Key assumptions
A: Before Use Stage	A0 Pre-construction Stage	Preliminary studies/works such as strategy development, design efforts, and EIA.	Assumed to be minimal and therefore not a material contributor to the overall footprint.
	A1–A3 Product Stage	A1-A3 Raw materials supply and manufacture	Estimated material quantities for cables, electrical equipment, steel, concrete, etc., were obtained from a Request For Information (RFI) and follow up discussions with the Project design team. Emission factors were obtained from the University of Bath's ICE (University of Bath, 2024). Where appropriate ICE factors were not available, for example for earthing rods, conversion factors from National Grid's internal carbon database were used. Material quantities were uplifted by respective wastage rates for each material type, based on wastage rate assumptions from the RICS Whole Life Carbon Assessment for the Built Environment, 2nd Edition guidelines (RICS WLCA guidance) (Royal Institution of Chartered Surveyors, 2024) including: • Glass: 1%; • Steel frame (beams, columns, braces): 1%; • Aggregate: 10%; • Asphalt: 6%; • Concrete in situ: 5%; • Concrete precast: 1%; and • Other: 5% (this was used where an element did not clearly sit within a waste rate material type as a conservative estimate).
		A4 Material transport	Emission factors from the Department for Energy Security & Net Zero (Department for Energy Security & Net Zero, 2025) and the RICS default

PAS 2080 guidelines lifecycle module	Emission source	Key assumptions
A4–A5 Construction Process Stage		transport scenarios for UK projects were used (Royal Institution of Chartered Surveyors, 2024): • Locally manufactured (ready-mix concrete): 20 km by road; • Locally manufactured (general), e.g. aggregate, earth, asphalt: 50 km by road; • Regionally manufactured, e.g. plasterboard, blockwork, insulation, carpet, glass: 80 km by road; • Nationally manufactured, e.g. structural timber, structural steelwork, reinforcement, precast concrete: 120 km by road; • European manufactured, e.g. cross-laminated timber (CLT), facade modules: 1,500 km by road and 100 km by sea; • Globally manufactured, e.g. specialist stone cladding: 500 km by road and 10,000 km by sea; • All materials (except concrete) – Rigid heavy goods vehicle (HGV), All Rigids, tonne-km, including well to tank (WTT) (aligned with One Click LCA software[5], which assumes an empty return journey is 43% of a loaded journey (One CLick LCA, 2026)); • Concrete – Rigid HGV, All Rigids, tonne-km, including WTT (aligned with RICS, assumes a 100% empty return journey – 0% laden) (Royal Institution of Chartered Surveyors, 2024); and • All materials – Cargo ship, General Cargo, average, including WTT.
	A5.1 Pre-construction demolition	Following the IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022), within the Lifecycle GHG Impact Assessment, pre-construction demolition includes activities such as vegetation removal and/or management to facilitate the construction of temporary compounds and accesses, and cable installation; alongside the limited removal/dismantling of existing pylons. It is noted that there is no ‘demolition’ in its

[5] One Click LCA is an industry standard software used for the calculation of whole life carbon and utilising international standards and methods to ensure compliance.

PAS 2080 guidelines lifecycle module	Emission source	Key assumptions
		more traditional sense, owing to the Project's commitment to avoiding the loss of buildings. Therefore, an estimate on the RICS demolition benchmark (35 $kgCO_2e/m^2$) is used, assuming that, per m² of works, only 50% of the construction compound and access track land-take would require demolition. This is considered to be conservative because the benchmark reflects building projects, whereas most of the greenfield area for the Project is not expected to require demolition.
	A5.2 Construction activities	It is assumed that 10% of the site compound area comprises portacabins, applying the RICS benchmark of 40 $kgCO_2e/m^2$ to estimate the associated energy use. For key temporary hired equipment, such as scaffolding or steel plates, emissions were proportioned in line with the average lifespan of the equipment. For example, if the average lifespan of scaffolding components is ten years and it is being used on a construction site for 3.5 years, then the fraction of embodied impacts that can be attributed to that project would be 35% of the total embodied carbon. For the modular steel bridges, a worst-case approach was taken in which these were treated as new steel structures whose entire emissions are attributable to the Project.
	A5.3 Waste	The RICS WLCA guidance wastage rates and assumptions as applied for the A1–A3 Product Stage were applied for end-of-life scenarios. These are the same as applied for the A1–A3 Product Stage and are taken from Table 23 in the RICS WLCA guidance (Royal Institution of Chartered Surveyors, 2024): • Glass: 1%; • Steel frame (beams, columns, braces): 1%; • Aggregate: 10%; • Asphalt: 6%; • Concrete in situ: 5%; • Concrete precast: 1%; and

PAS 2080 guidelines lifecycle module	Emission source	Key assumptions
		• Other: 5% (this was used where an element did not clearly sit within a waste rate as a conservative estimate).
	A5.4 Worker transport	Emissions from transportation of workers to the work site (i.e., commuting) was calculated using Project-defined worker transport numbers (**Application Document 6.14 Chapter 14 Traffic and Transport**) and based on an estimated commute distance of 30 km. Unless otherwise indicated, it was assumed workers commute via car with an occupancy rate of one person per vehicle.
B: Use Stage	B2–B4: Maintenance, repair, replacement,	Emissions from maintenance and repair activities have been assumed in line the RICS WLCA guidance (Royal Institution of Chartered Surveyors, 2024) including: • B2 Maintenance: 1% of modules A1–A5; • B3 Repair: Equivalent to 25% of B2 maintenance impacts for the relevant items; and • B4 Replacement: Lifecycles were informed by the design team, and transport scenarios were assumed in line with the assumptions applied in A4.
	B6: Operational energy use	At this stage, data on other operational energy sources, such as lighting and CCTV, are not available. However, their impact is expected to be negligible compared to B8 transmission and distribution losses, given the scale (400 kV) and length of the infrastructure GHG emissions from refrigerant leakage have not been accounted for due to a lack of available data at this stage in the design. However, it is assumed that no sulphur hexafluoride (SF_6) equipment will be used in the Project, in accordance with National Grid policy. The global warming potential (GWP) of alternatives to SF_6 such as Perfluoroisobutyronitrile (C_4-FN) mixtures or Green Gas for Grid (G^3) is more than 99% lower than that of SF_6. Having applied this reduced GWP to SF_6 leakage emissions calculated for similar transmission projects, it is considered that any refrigerant leakage emissions associated with the Project will not be material in the context of the overall footprint, and as such will not affect the outcome of this assessment.
	B8: Users' utilisation	Transmission losses were conservatively estimated at 3%, uplifting to account for increased losses of an overhead line system (The Institution of Engineering and

PAS 2080 guidelines lifecycle module		Emission source	Key assumptions
			Technology, 2025). It is assumed that the proposed overhead line is designed for 70% load factor. Department for Energy Security & Net Zero emission factors are used which account for anticipated grid decarbonisation over the 80-year reference period (Department for Energy Security & Net Zero, 2023).
C: End of Life Stage	C1–C4: Deconstruction, transport, waste processing for recovery and disposal	End of Life Stage	As set out in **Application Document 6.4 Chapter 4 Description of the Project**, decommissioning of the Project has been scoped out of the assessment owing to the Project's design life (80 years), and expected alterations to the regulatory framework, good industry practices, and the future baseline in that period. The end-of-life stage is therefore not considered.

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

19.4.73 Climate change projections, by their very nature, are associated with a range of assumptions and limitations. There are inherent uncertainties associated with climate projections. Climate projections are not predictions of the future but are rather projections based on the best available data and science.

19.4.74 To account for this uncertainty, a 'high' emissions scenario (RCP8.5) (Met Office, 2018) has been used in this assessment, which is consistent with the precautionary principle.

19.5 Basis of Assessment

19.5.1 This section sets out the assumptions that have been applied in respect of design flexibility maintained within the Project.

19.5.2 Details of the available flexibility and assessment scenarios are presented in **Application Document 6.5 Chapter 5 EIA Approach and Methodology**.

Flexibility Assumptions

19.5.3 The climate change assessment has been undertaken based on the description of the Project provided in **Application Document 6.4 Chapter 4 Description of the Project**. To take account of the flexibility allowed in the Project, consideration has been given to the potential for effects to be of greater or different significance, should any of the permanent or temporary infrastructure elements be moved within the Limits of Deviation LoD (horizontal, vertical or longitudinal), or Order Limits.

19.5.4 The assumptions made regarding the use of flexibility for the assessment are set out in Table 19.15.

Table 19.15 – Flexibility assumptions

Element of flexibility	How has this been considered within the assessment
Horizontal LoD	Any changes to the elements of flexibility could result in a change in emissions due to the potential change in how the element is constructed, operated, and maintained. The risk uncertainty has been factored in by aligning with the RICS Whole Life Carbon Assessment for the Built Environment, 2nd Edition guidelines (Royal Institution of Chartered Surveyors, 2024), which sets out percentile uplifts dependent on the confidence within the material data received, the emission factors used and the design stage maturity. In addition, the CCRA and ICCI have adopted a worst-case RCP8.5 scenario to estimate future climate impacts on the Project. This provides a worst-case assessment of climate-related risks and offers flexibility should aspects of the Project change during design development.
Vertical LoD	
Longitudinal LoD	
Pylon footprint	
Foundation types	
Order Limits – temporary construction works	
Watercourse crossings	
Modifications to third party assets – construction methodology	

Optionality

19.5.5 As set out in Application Document 6.4 Chapter 4 Description of the Project and shown on Application Document 6.4.F3 Figure 4.3 Temporary Construction Works optionality has been included at the following five locations:

- Two alternative options for temporary construction access between Pennyhill Cottages (Main Street) Primary Access Route (PAR 34) and proposed pylon 4AF82 and satellite construction compound S-3:
  - Bellmouths BM-040/41, associated construction access track and watercourse crossings C-169 and BC-11; or
  - Bellmouths BM-040A/41A, associated construction access track and watercourse crossings C-220A, C-169A and BC-11A.
- Two alternative options for temporary construction access tracks to proposed pylon 4AF88:
  - Watercourse crossing BC-36 and BC-37; or
  - Watercourse crossing B-06A.
- Two alternative options for the construction access track between proposed pylons 4AF130 and 4AF131:
  - Watercourse crossing BC-29; or
  - Watercourse crossings BC-29A and BC-29B.
- Two alternative options for taking access off High Melwood (PAR 63) and the associated construction access track:
  - Bellmouth BM-078; or
  - Bellmouth BM-110.
- Two alternative power supply connections to the proposed main construction compound (M1) as shown on Application Document 6.4.F4 Figure 4.4 Third Party Works.
  - NPG-09A from the west – there is currently uncertainty whether capacity of the network would be sufficient for this connection; or
  - NPG-09B from the east.

19.5.6 Where differences in effects between options have been identified, these are set out within section 19.9., with clear reference to the nature, extent, and significance of any resulting climate change effects.

Sensitivity Test

19.5.7 Under the terms of the DCO, construction could commence any year up to five years from the granting of the DCO which is assumed to be 2028. Consideration has therefore been given to whether the effects reported would be different if the works were to commence in any year up to year five, following the granting of the DCO. Where there is a difference, this is reported in section 19.9 of this chapter.

19.6 Baseline Conditions

19.6.1 This section describes the existing and future baseline climate change environment in the study area.

Existing Baseline

19.6.2 As discussed in section 19.4, the receptor associated with the Lifecycle GHG Impact Assessment is the global climate, and the receptor associated with the CCRA is the Project itself (during construction, operation and maintenance) and workers (e.g. construction and maintenance workers). Value/importance levels of each receptor consistent with the terminology used in **Application Document 6.5 Chapter 5 EIA Approach and Methodology** are not applicable to the baseline conditions of the climate change assessment. Rather, these receptors are contextualised in the baseline conditions described below.

Lifecycle Greenhouse Gas Impact Assessment

19.6.3 The current and future baseline for the Lifecycle GHG Impact Assessment is a 'business as usual' scenario where the Project is not constructed and operated.

19.6.4 Land within the Order Limits is partly occupied by the existing 400 kV overhead lines, with the surrounding area comprising predominantly arable land. Additionally, there are a number of designated ecological sites present within or close to the Orders Limits, as identified in **Application Document 6.8 Chapter 8 Ecology** and **Application Document 6.8.A2 Appendix 8.2 Designated Sites Information**. The Project is also located close to existing infrastructure including former coal-fired power stations at West Burton and Cottam, Keadby Power Station, and Keadby Windfarm, among other power-related infrastructure as identified in **Application Document 6.4 Chapter 4 Description of the Project**.

19.6.5 Current land use within the Order Limits has minor levels of associated GHG emissions, as the land use is largely agricultural. Baseline agricultural GHG emissions are dependent on the soil and vegetation types that are present, as well as the fuel used for the operation of agricultural vehicles and machinery.

19.6.6 Baseline emissions are anticipated to be immaterial without the Project, and the existing site within the Order Limits is considered to emit zero emissions.

19.6.7 As it is not possible to accurately calculate a GHG baseline, in line with IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022), the baseline is assumed to be zero as per the rationale in section 19.4. This approach represents a worst-case scenario as all GHG emissions associated with the Project are in addition to the baseline.

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

19.6.8 The current baseline for the CCRA and ICCI Assessment are based on historical climate data from the nearest three weather stations to the Project obtained from the Met Office website (Met Office, 2023), as set out in section 19.4. Given the geographical extent of the Project, this assessment undertakes an average of the latest historical climate data (1991–2020) across three points of the Project (representing the climate monitoring stations closest to the Project's connection

points in East Yorkshire and Lincolnshire, and an additional location in proximity to the Project). The selected stations are Hull (Kingston upon Hull) Station, Scampton (Lincolnshire), and Cranwell (Lincolnshire), which are further described in paragraph 19.4.16. The average historical climate data for these three locations is presented in Table 19.16.

Table 19.16 – Baseline climate data

	Hull Station (East Riding of Yorkshire) (Route Section A)	Scampton (Lincolnshire) (Route Section E)	Cranwell (Lincolnshire) (Route Section F)	Average
Climate variable	**Baseline (1991–2020)**			
Mean annual maximum daily temperature (°C)	14.45	13.84	14.06	14.12
Mean Summer maximum daily temperature (°C)	21.13	20.71	21.08	20.97
Mean Winter maximum daily temperature (°C)	8.07	7.21	7.34	7.54
Highest maximum daily temperature for baseline period (°C)	22.02 (July)	21.62 (July)	22.07 (July)	21.90
Maximum daily temperature for baseline period (°C)	7.74 (Jan)	6.86 (Jan)	6.98 (Jan)	7.19
Mean annual rainfall (mm)	693.45	619.40	612.61	641.82
Mean Summer rainfall (mm)	65.19	60.38	21.08	48.88
Mean Winter rainfall (mm)	54.13	47.02	49.35	50.17
Wettest month on average (mm)	68.29 (November)	58.79 (July)	62.37 (October)	63.15
Driest month on average (mm)	43.30 March	35.87 March	36.33 March	38.50
Mean monthly wind speed at 10 m (knots)	8.92	9.72	10.28	9.64

Table presents average values calculated from historical climate data 1991–2020 (Met Office, 2023)

Future Baseline

19.6.9 As detailed in **Application Document 6.5 Chapter 5 EIA Approach and Methodology**, a review has been undertaken to determine whether the existing baseline conditions might change between the time of undertaking the assessment and the future years in which the Project is planned to be constructed and become operational.

19.6.10 The future baseline for the CCRA and ICCI Assessment is based on UKCP18 (Met Office, 2018) which has been developed by the UK Climate Impacts Programme (UKCIP) to provide projections for future climate scenarios and trends. This projection data provides probabilistic indications of how global climate change is likely to affect areas of the UK using pre-defined climate variables and time periods.

19.6.11 Projected temperature and precipitation variables presented in UKCP18 probabilistic projections have been analysed by taking an average of the data from the three 25 km^2 grid squares within which the Project would be located equivalent to that taken for the baseline assessment in Table 19.16. These figures are expressed as temperature/precipitation anomalies in relation to the 1981 to 2000 baseline.

19.6.12 UKCP18 uses a wide range of possible scenarios, classified as RCPs, to inform differing future emission trends. These RCPs are defined in UKCP18 Guidance: Representative as Concentration Pathways as '… *RCPs specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels* (Met Office, 2018). RCP8.5 has been used for the purposes of this assessment as a worst-case scenario, as this predicts a high-emissions or 'business-as-usual' scenario as explained in section 19.4.

19.6.13 UKCP18 provides probabilistic projections for pre-defined 30-year time periods (such as 2020s (2010–2039), 2050s (2040–2069), and 2080s (2070–2099)) at annual and seasonal levels for changes to mean climatic conditions over land areas. For the purpose of the Project, UKCP18 projections to assess climate variables have been obtained and analysed for the Order Limits.

19.6.14 The RCP8.5 pathway is defined by UKCP18 as a scenario whereby GHG emissions continue to grow unmitigated, leading to a best-estimate global average temperature rise of 4.3°C by 2100 compared to the pre-industrial period, (Met Office, 2023).

19.6.15 UKCP18 allows for future climate projections across a range of probability levels to be assessed, ranging from 10 per cent probability to 90 per cent probability:

- 10 per cent probability level – this represents a lower-end projection, with a 90 per cent likelihood that actual change will exceed this value.
- 50 per cent probability level – this is known as the central estimate, with an even chance of it occurring and not occurring.
- 90 per cent probability level – this represents a high-end projection, with only a 10 per cent likelihood that actual change will exceed this value.

19.6.16 Climate variables impacting the construction, operation and maintenance phases of the Project have been assessed in Table 19.17 against RCP8.5 2010–2039, 2040-2069 and 2070–2099 projection data.

Table 19.17 – Projected changes in temperature and precipitation variables, 50% probability (10% and 90% probability level in parenthesis)

Climate variable	Time period				Projected trend	Climate projection source
	Baseline (1981-2000)	2010-2039	2040-2069	2070-2099		
Mean annual air temperature anomaly at 1.5 m (°C)	14.155	+0.77 (+0.32 to +1.23)	+1.86 (+0.97 to +2.79)	+3.57 (+2.09 to +5.14)	↑	UKCP RCP8.5
Mean Summer air temperature anomaly at 1.5 m (°C)	20.92	+0.94 (+0.31 to +1.56)	+2.29 (+1.01 to +3.56)	+4.52 (+2.32 to +6.79)	↑	UKCP RCP8.5
Mean Winter air temperature anomaly at 1.5 m (°C)	7.685	+0.67 (+0.038 to +1.34)	+1.63 (+0.49 to +2.84)	+2.99 (+1.19 to +4.97)	↑	UKCP RCP8.5
Maximum Summer air temperature anomaly at 1.5 m (°C)	21.82 (July)	+1.23 (+1.16 to +1.41)	+2.15 (+2.11 to +2.36)	+2.83 (+2.82 to +3.55)	↑	UKCP RCP8.5
Lowest maximum Winter air temperature anomaly at 1.5 m (°C)	7.36 (Jan)	+0.45 (+0.38 to +0.67)	+1.09 (+1.08 to +1.81)	+1.51 (+1.18 to +3.54)	↑	UKCP RCP8.5
Annual precipitation rate anomaly (mm)	654.13	-4.45 (-5.87 to -3.58)	-6.29 (-7.52 to -2.41)	-8.09 (-12.04 to -0.60)	↓	UKCP RCP8.5
Summer precipitation rate anomaly (mm)	62.415	-1.77 (-10.23 to 1.68)	-18.45 (-25.06 to -15.76)	-8.65 (-11.34 to -3.72)	↓	UKCP RCP8.5
Winter precipitation rate anomaly (mm)	50.035	-0.14 (-10.20 to +2.54)	+9.98 (+3.12 to +23.88)	+15.77 (+5.33 to +40.93)	↑	UKCP RCP8.5

Climate variable	Time period		Projected trend	Climate projection source
Number of heat waves		ThinkHazard! (Global Facility for Disaster Reduction and Recovery, 2025) has classified the projections of extreme heat in the region of Humberside and Lincolnshire as very low to low, according to currently available information. A very low rating means that there is less than a 5% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years, and a low rating means there is between a 5% and 25% chance.	↑	ThinkHazard!
Wildfires		In the northern region of the Order Limits towards Humberside, ThinkHazard! (Global Facility for Disaster Reduction and Recovery, 2025) has classified the wildfire hazard as medium, according to currently available information. This means that there is between a 10% and 50% chance of experiencing weather that could support a hazardous wildfire that may pose risk to life and property loss in any given year. However, towards the south of the Order Limits, ThinkHazard! has classified the wildfire hazard as high, according to currently available information. This means that there is greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. It should be noted that the ThinkHazard! wildfire risk classification has not been used directly in this assessment. A qualitative review of wildfire hazard, and vulnerability across the wider Project was undertaken based on professional judgement, which concluded that, despite the presence of wildfire hazards within the surrounding area, the likelihood of the Project being materially affected by a wildfire event is moderate.	↑	ThinkHazard!
Drought		ThinkHazard! (Global Facility for Disaster Reduction and Recovery, 2025) has classified the occurrence of drought in Humberside and Lincolnshire as low, according to currently available information. This means that there is a 1% chance drought will occur in the coming ten years.	↑	ThinkHazard!

19.7 Potential Effects

19.7.1 Based on the assessment scope (see section 19.3), the following sections describe how construction (C) operation (O) and maintenance (M) activities are likely to affect climate change. This takes account of the embedded mitigation measures which are defined in **Application Document 7.3 Register of Environmental Actions and Commitments**. This section first lists the effects and impact pathways that could result from each phase of the Project on the receptors identified in section 19.6.

Greenhouse Gas Emissions

Construction

19.7.2 Construction the Project may increase GHG emissions through construction activities (direct emissions) and emissions embedded within the construction materials due to the energy used for their production, as well as emissions arising from the transportation of materials, waste, and construction workers (indirect emissions).

Operation

19.7.3 In operation, the Project will allow more renewable and low carbon electricity to be transmitted on the UK national electricity grid. As set out in section 19.4, these potential benefits of the Project associated with the UK's transition to net zero are discussed indicatively but are not formally assessed.

Climate Change Risk Assessment and ICCI Assessment

19.7.4 Changes in the climate may affect the Project and associated receptors such as the workforce, through exposure to dangerous working conditions, and physical structures, plant, and equipment as a result of damage due to climate change. The combined impact of climate change and the Project may also lead to effects on surrounding sensitive receptors, such as soil resources. The effects may include, but are not limited to:

- Increases in extreme weather events which may result in dangerous working environments and asset damage;
- Increases in Winter precipitation which may lead to increased flood risks; and
- A decrease in Summer rainfall, coupled with an increased risk of drought, which may lead to drier soil conditions and reduced vegetation cover, resulting in reduced air quality.

19.8 Mitigation

Embedded Measures

19.8.1 Environmental appraisal has been an integral part of the Project design from the outset, which has meant that the Project has been able to avoid environmentally sensitive features as far as reasonably practicable. National Grid has also embedded measures into the design of the Project to avoid or reduce significant effects that may otherwise be experienced during construction and operation (and maintenance) of the Project.

19.8.2 Embedded measures are those that are intrinsic to and built into the design of the Project; these are presented in **Application Document 7.3 Register of Environmental Actions and Commitments**. Embedded measures of relevance to the climate change assessment are:

- CC04: Electrical equipment will be specified with high temperature range tolerances which consider climate change projections, UKCP18 (Met Office, 2018), for the design life of the Project.
- DE1: The Project will be delivered and operated in compliance with all relevant legislation, consents and permits.
- DE11: The Project will be designed to comply with design safety standards including National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) and the suite of National Grid policies and processes which contain details on design standards required to be met when designing, constructing, and operating its projects.
- DE18: Temporary infrastructure such as construction compounds, lay down areas (as well as areas where impermeable material will be installed or where heavy equipment would be used) and construction access tracks would be drained using sustainable drainage systems (SuDS) techniques that are suitable for local ground conditions and topography and which are designed to accommodate a 1 in 10-year (10% Annual Exceedance Probability) event, plus a 40% allowance for climate change resilience. These areas will be reinstated after completion of the temporary works, as agreed with the landowner.
- DE21: The Project will explore the use of and utilise temporary materials from other construction projects where economically feasible and appropriate to do so.
- GG01: The final versions of the outline environmental management plans will be submitted for approval in accordance with Requirement 4 (construction management plans) of **Application Document 3.1 Draft Development Consent Order** prior to commencement of development and will reflect the final construction methodologies produced by the Main Works Contractor(s). The following will be produced prior to construction:
  - Code of Construction Practice (CoCP);
  - Construction Traffic Management Plan (CTMP);
  - Soil Management Plan;
  - Public Right of Way Management Plan;
  - Noise and Vibration Management Plan;
  - Landscape and Ecology Management Plan;
  - Archaeological Written Scheme of Investigation; and
  - Cultural Heritage Management Plan.
  - Framework Construction Surface Water Management Plan (CSWMP).
- All construction works will be undertaken in general accordance with these plans and all referenced subordinate plans.

Control and Management Measures

19.8.3 Control and management measures comprise management activities and techniques that will be implemented during construction and reinstatement to limit effects, through adherence to good site practices and ensuring legal compliance.

19.8.4 Measures relevant to the control and management of impacts during construction have been included within **Application Document 7.2 Outline Code of Construction Practice**, **Application Document 7.5 Outline Soil Management Plan, Application Document 7.4 Construction Traffic Management Plan, Application Document 7.8 Landscape and Ecology Management Plan**, and **Application Document 7.13 Flood Risk Assessment,** Appendix B Framework Construction Surface Water Management Plan which are secured by Requirement 4 of **Application Document 3.1 Draft Development Consent Order** and **Application Document 7.3 Register of Environmental Actions and Commitments** secured by Requirement 5 of **Application Document 3.1 Draft Development Consent Order**. These outline management plans and the following measures in **Application Document 7.3 Register of Environmental Actions and Commitments** have been taken into account in assessing the climate change effects of the Project

- CC01: Sustainable, low-carbon materials will be specified and prioritised wherever practicable, supported by material selection processes aimed at minimising embodied carbon across the Project lifecycle.
- CC02: Materials will be sourced from local suppliers, where reasonably practicable, to minimise transportation distances and associated greenhouse gas emissions.
- CC03: The design and maintenance of pylons will incorporate protective treatments (e.g. galvanisation and specialist coatings) and scheduled inspection regimes to maximise operational lifespan. Ongoing maintenance, including repainting and targeted repairs, will minimise the need for full component replacement.
- GG02: The Mains Works Contractor(s) will undertake site inspections to check conformance to the measures set out within each of the management plans and their subordinate plans as set out within GG01.
- GG03: A number of roles and their respective responsibilities are listed within **Application Document 7.2 Outline Code of Construction Practice**. Suitability qualified personnel will be appointed to undertake these roles for the duration of the construction phase.
- GG04: Construction workers will undergo training to increase their awareness of environmental issues as applicable to their role on the Project as set out within **Application Document 7.2 Outline Code of Construction Practice**.
- GG10: As far as reasonably practicable and safe to do so, any activity carried out or equipment located within a construction compound that may produce dust, noise, vibration and lighting emissions, will be located away from sensitive receptors such as residential properties or designated ecological sites.
- GG12: Vehicles and vessels will be correctly maintained and operated in accordance with manufacturer's recommendations and in a responsible manner. The operators of plant and vehicles will be required to switch off their engines

when not in use and when it is safe to do so. Electric or other low carbon plant and equipment will be used where available and where practicable.

- GG17: Potential hazardous materials used during construction will be safely and securely stored including use of secondary containment where appropriate.
- GG19: Runoff across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There will be no intentional discharge of site runoff to ditches, watercourses, drains (including highway drainage systems), or sewers without appropriate treatment and agreement of the appropriate authority. All practicable steps will be put in place to prevent pollution of watercourses. In the case of an emergency, protocols will be followed as per a Emergency Response Plan to be produced by the Mains Work Contractor(s) in accordance with GG25 below.
- GG21: Earthworks and stockpiled soil will be protected by covering, seeding or using water suppression.
- GG22: Bonfires and the burning of waste material will be prohibited.
- GG24: A Site Waste Management Plan (SWMP) will be developed prior to construction. The SWMP will include but not be limited to:
  - Waste forecasts;
  - How waste will be reduced, re-used, managed and disposed of in accordance with the waste hierarchy;
  - Identification of recovery routes; and
  - Actual waste figures once work has begun.
  - Consideration will be given to the guidance in The Definition of Waste: Development Industry Code of Practice (DoWCoP) (CL:AIRE, 2011). Dedicated waste management areas will be designed to sufficiently accommodate the types and volumes of waste produced and to reduce the environmental risk of storing waste on-site (covered, secured and away from drainage).
- GG25: An Emergency Response Plan will be developed by the Mains Work Contractor(s) for the construction phase which will outline procedures to be implemented and to be followed in case of unplanned events, including but not limited to site flooding and pollution incidents.
- GG30: The construction work area will be reinstated to pre-existing conditions as far as reasonably practical in line with a Soil Management Plan and the Department for Environment, Food and Rural Affairs (Defra) Code of Construction Practice for the Sustainable Use of Soils on Construction Sites (Department for Environment Food and Rural Affairs, 2009). This will include a commitment to develop and comply with the measures set out within an Aftercare Management Plan (including the aftercare period) prior to the completion of construction.
- AQ02: Dust Management. The Mains Works Contractor(s) will develop and comply with a Dust Management Plan (DMP), which may include measures to control other air emissions, and be implemented prior to construction.
- AQ04: Monitoring. Daily on-site and off-site inspections will be undertaken, where receptors (including roads) are nearby, to monitor dust, record inspection results.

The information collected from these inspections will be compiled within a log, which will be made available to the local authority on request. This will include regular dust soiling checks of surfaces such as street furniture, cars, and windowsills within 100 m of the site boundary, with cleaning to be provided if necessary. The inspection log will be made available to the local authority on request. There will be an increase in frequency of site inspections by the person accountable for air quality and dust issues on-site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations will be discussed with the local authority, if required. Where possible, baseline monitoring will commence at least three months before work commences on-site or, if it is a large site, before work on a phase commences

- AQ05: Preparing and Maintaining the Site. Solid screens or barriers will be erected around dusty activities, where required, that are at least as high as any stockpiles on-site. Specific activities will be fully enclosed where there is a high potential for dust production and the activity is ongoing for an extensive period. Runoff of water or mud will be avoided where possible. Site fencing, barriers and scaffolding will be kept clean using wet methods. Materials that have the potential to produce dust from site will be removed as soon as possible, unless being re-used on-site. If they are being re-used on-site, they will be covered as described below. Stockpiles will be covered, seeded or fenced to prevent wind whipping (where needed and depending on duration).
- AQ06: Operating vehicle/machinery and sustainable travel. A maximum speed limit will be imposed on construction access tracks and work areas. For longer length of construction access tracks, these speeds may be increased with suitable additional control measures provided, subject to the approval of the undertaker and with the agreement of the local authority, where appropriate. A Construction Logistics Plan will be produced and complied with to manage the sustainable delivery of goods and materials.
- AQ07: Operations. Suitable dust suppression techniques, such as water sprays or local extraction, will be fitted to or used in conjunction with, cutting, grinding or sawing equipment. There will be an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. Enclosed chutes and conveyors and covered skips will be used, where reasonably practicable. Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment will be minimised and fine water sprays will be used on such equipment wherever appropriate. It will be ensured that equipment will be readily available on-site to clean any dry spillages, and spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods.
- AQ08: Earthworks. Earthworks and exposed areas/ soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable, where appropriate and using appropriate seed mix for what habitat the top soil was from. Hessian, mulches or trackifiers[6] will be used where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

[6] A hydraulically applied or mechanically mixed agent used to bind soil particles and mulch, preventing wind and water erosion during construction, landscaping, and land reclamation

- AQ09: Construction. Scabbling (roughening of concrete surfaces) will be avoided if possible. Sand and other aggregates will be stored in bunded areas and will not be allowed to dry out, unless this is required for a particular process, in which case appropriate additional control measures will be in place. Fine powder materials will be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. For smaller supplies of fine powder materials, bags will be sealed after use and stored appropriately to prevent dust.
- AQ10: Trackout. Vehicles carrying materials entering and leaving sites will be covered to prevent escape of materials during transport. On-site construction access tracks will be inspected for integrity and any necessary repairs to the surface will be instigated as soon as reasonably practicable. Hard surfaced haul routes will be installed where possible and regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers, and regularly cleaned. An adequate area of hard surfaced road will be provided between the wheel wash facility and the site exit, wherever site size and layout permits. Access gates will be located at least 10 m from receptors where possible.
- AQ11: Throughout the construction phase, Stage IV Non-Road-Mobile-Machinery (NRMM) will be used as a minimum and Stage V will be used where possible. Additionally, use electric or other low carbon plant and equipment where practicable.
- AQ12: The use of diesel or petrol powered generators will be avoided, and mains electricity or battery powered equipment will be used, where practicable.
- Where diesel generators are used, ensure the generators adhere to Stage V emissions standards and seek alternatives where possible, such as batteries or alternative fuel. Ensure they are placed as far from receptors as possible and that testing, if applicable, is kept to a minimum. Consideration will be given to increasing the release height of emissions for sufficient dispersion, and relevant abatement technology, if required.
- AQ13: Construction vehicles will conform to relevant applicable standards for the vehicle type as follows:
  - Euro 4 (NOx) for petrol cars, vans and minibuses;
  - Euro 6 (NOx and PM) for diesel cars, vans and minibuses; and
  - Euro VI (NOx and PM) for lorries, buses, coaches and heavy goods vehicles (excluding specialist abnormal indivisible loads).
- AQ14: Where maintenance activities are required during the operational phase that have the potential to generate dust or emissions, proportionate dust and emissions management measures consistent with those committed to for the construction phase shall be implemented, to minimise any effects on air quality.
- W05: Where new or additional surfacing is required on any construction access tracks and compound areas, these will be permeable surfaces where ground conditions allow. The Project will incorporate appropriate surface water drainage measures into the final design for any access tracks so that they do not lead to a significant increase in flood risk. Construction access tracks will be removed at the end of the construction phase, and the ground surface will be reinstated to pre-Project levels.

- W06: The contractor(s) will subscribe to the Environment Agency's flood warning e-service, which provides advance notification of potential local flooding events, and subscribe to the Met Office's Weather Warnings email alerts system and any other relevant flood warning information. The Main Works Contractor(s) will implement and comply with a Flood Warning and Evacuation Plan based upon Appendix A Outline Flood Warning and Evacuation Plan within **Application Document 7.2 Outline Code of Construction Practice**, which will include appropriate evacuation procedures should a flood occur or be forecast.
- W11: Where construction activities take place in Flood Zone 3, temporary construction compounds, laydown areas and other work sites will be laid out in accordance with the sequential approach and incorporate flood resilience measures where necessary. Land raising for construction of temporary access routes would be avoided and materials storage areas would be located outside of fluvial floodplains, where practicable. Where this cannot be avoided, access routes and material stores would be designed and placed to avoid forming barriers to floodplain flows.
- W13: Where construction access tracks cross watercourses and key overland flow routes, the construction access track will include flood mitigation/drainage to allow for the flow of water during flood events up to and including the 1 per cent Annual Exceedance Probability event (i.e., ducting). The design of the construction access tracks themselves will include some resilience to flooding, for example incorporating suitable geo-textiles to stabilise the road surfacing. Suitable materials would be used to surface the haul roads. In some cases, bespoke construction methodologies may be used based on site constraints and ground conditions.
- W18: For events up to and including the 1 per cent Annual Exceedance Probability flood event plus climate change, where pylons would be located in Flood Zone 3 associated with fluvial floodplains, compensatory storage within the Order Limits will be provided for loss of floodplain storage (as shown on **Application Document 6.4.F1 Environmental Statement Figure 4.1 Proposed Project Design**).
- W20: The Mains Works Contractor(s) will develop and comply with a Construction Surface Water Management Plan (CSWMP) in accordance with **Application Document 7.13 Flood Risk Assessment** Appendix B Framework Construction Surface Water Management Plan. This will set out measures to manage surface water runoff during construction.
- LV01: The Main Works Contractor(s) will retain vegetation where practicable. Where vegetation is lost and trees cannot be replaced in situ due to the restrictions associated with operational safety, replacement vegetation will be planted as close by as practicable and will complement the landscape character and be sympathetic to the local habitat type in order to provide a high biodiversity value.
- LV03: A five-year aftercare period will be established for all reinstatement and mitigation planting.
- S01: Training will be provided to construction workers on the management of emissions (dust, noise, vibration, etc) in line with measures and methods defined in the Final CoCP.

- GH01: Intrusive ground investigations and assessment will be undertaken prior to construction, including the measurement and monitoring of groundwater levels, geotechnical and geoenvironmental sampling and testing as appropriate. The information will inform geoenvironmental assessment, where required, and appropriate geotechnical design in relation to the site/structure specific ground conditions, identified by the intrusive ground investigation including ground instability/adverse ground conditions/ground gas etc. Therefore, any risks from these hazards would be considered within the engineering design of the new infrastructure in accordance with good practice.
- GH02: Where specific sites within the Order Limits have been assessed in the ES as presenting a Moderate or above risk to sensitive receptors, these sites will be individually investigated and assessed in accordance with Land Contamination Risk Management (LCRM) prior to construction. This will inform the assessment of the risks to receptors, and good practice measures and working methods to control those risks will be developed. The results will be discussed, and the nature and scope of any mitigation or remediation will be agreed with the Environment Agency and LPA (as appropriate). Where sites have been identified within the Order Limits as having a moderate (or above) potential for generating contamination (and not also a moderate or above risk to receptors, for example due to limited or no interaction with the Project), these sites will be reviewed against the final detailed design. Where the final detailed design and proposed construction activities do not interact with these sites, no further assessment will be required. However, where there is potential for any interaction of the final design or proposed construction activities with these sites, each site will be individually investigated and assessed to determine any mitigation or remediation measures required. The nature and scope of any mitigation or remediation will be agreed with the Environment Agency and local authority (as appropriate). If a site to be investigated is identified as a historical landfill, then prior discussions will be held with the Environment Agency to determine any assessments required to be undertaken before any intrusive ground investigations commence.
- GH03: A protocol for dealing with any unexpected contamination will be developed and complied with by the Main Works Contractor(s). The protocol will include, as a minimum:
  - Details of a watching brief and toolbox talks to be implemented throughout the construction phase;
  - Details regarding how any affected area will be delineated, protected, investigated and assessed;
  - The qualifications and competencies of the person appointed to oversee the works;
  - The preparation of a method statement for how the contamination will be dealt with or remediated (as appropriate);
  - An escalation policy describing when and how any notifications and approvals will be agreed with the local planning authority; and
  - Details of verification procedures for any mitigation or remediation works demonstrating compliance with the method statement.
- AS01: Where land is being returned to agricultural use, the appropriate soil conditions (for example through the replacement of stripped layers and the

removal of any compaction) will be recreated. This will be achieved to a depth of 1.2 m (or the maximum natural soil depth if this is shallower).

- AS04: Consultation with affected landowners will be carried out to investigate the current extent of land drainage. A scheme of pre-construction land drainage will be designed with the intent of maintaining the efficiency of the existing land drainage system and to assist in maintaining the integrity of the working area during construction. The Project may include a system of 'cut-off' drains which feed into a new header drain and the Project will also take into account surface water runoff measures. The Main Works Contractor(s) will ensure any land drains within the Order Limits, affected as a result of the Project are reinstated to their former functional condition, where agreed with the landowner. Any installed pre-construction land drainage to replace existing land drains affected by permanent infrastructure, as well as any drainage improvements resulting from the Project, would be retained.
- AS09: Appropriate technology/material will be installed in areas where heavy equipment, such as cranes and piling rigs, are to be used to provide stable working areas and reduce disturbance to the ground.

19.8.5 In addition, various plans are to be produced prior to construction, the outline version of which are submitted with the application: **Application Document 7.4 Outline Construction Traffic Management Plan**, **Application Document 7.5 Outline Soil Management Plan**, and **Application Document 7.8 Outline Landscape and Ecology Management Plan and Application Document 7.13 Flood Risk Assessment,** Appendix B Framework Construction Surface Water Management Plan. Mitigation measures provided through these plans are also of relevance to climate change.

19.8.6 Furthermore, the assessments presented for climate change also draw upon and are supported by the topic chapters listed in paragraph 19.3.5. Therefore, commitments in **Application Document 7.3 Register of Environmental Actions and Commitments** relevant to those topics, as listed in the corresponding section of the topic chapters, may also be of relevance.

Additional Measures

19.8.7 Additional mitigation comprises measures over and above any embedded and control and management mitigation measures, for which the assessment within this ES has identified a requirement to further reduce significant environmental effects.

19.8.8 The following additional measures in **Application Document 7.3 Register of Environmental Actions and Commitments** have been taken into account in assessing the climate change effects of the Project.

- LV04: Planting and seeding operations will be undertaken during an appropriate planting/seeding season, and where planting is in locations not affected by other construction activities, planting will be undertaken at the earliest opportunity.

Other Considerations

19.8.9 In addition to the mitigation measures set out above **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy** sets out a range of further measures that are being considered on the Project in relation to GHG emissions. These have not been taken into account in the residual effects assessment

presented in section 19.9, as these are potential opportunities for GHG reduction only and are not committed to through the DCO.

19.9 Residual Effects Assessment

Lifecycle Greenhouse Gas Impact Assessment

19.9.1 This section presents the assessment of impacts and likely significant effects for the Lifecycle GHG Impact Assessment. A more detailed breakdown of GHG emissions is provided in **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**. The GHG Reduction Strategy also provides more detail on the GHG management process and GHG reduction opportunities.

Construction

19.9.2 For the purpose of the climate change assessment, the construction phase of the Project is assumed to be from Q2 2028 to Q3 2031.

19.9.3 The GHG emissions associated with the construction phase of the Project have been calculated subject to the methodology, assumptions, and limitations detailed in section 19.4. The results are provided in Table 19.18 in accordance with PAS 2080 guidelines (British Standards Institution, 2023).

Table 19.18 – Construction phase GHG emissions

PAS 2080 guidelines lifecycle module		Emission source	GHG emissions (tCO_2e)
A: Before Use Stage	A1–A3 Product Stage	A1–A3 Raw materials supply and manufacture	98,379.7
	A4–A5 Construction Process Stage	A4 Material transport	23,413.1
		A5.1 Pre-construction demolition	12,612.3
		A5.2 Construction activities	830.5
		A5.3 Waste	131.8
		A5.4 Worker transport	8,169.8
		Total tCO_2e over construction phase	**143,537.2**

19.9.4 Table 19.18 shows that the total GHG emissions associated with the Project in the construction phase are 143,537.2 tCO_2e (0.144 $MtCO_2e$). The majority of construction phase GHG emissions are attributed to embodied emissions in raw materials. The main contributor to embodied carbon would be the infrastructure associated with the Project. Other emission sources include material transport, construction activities, worker transport, waste, and pre-construction demolition (for example dismantling of existing pylons and vegetation removal).

19.9.5 A more detailed breakdown of emissions is provided in **Application Document 6.19.A4 Appendix 19.4 Greenhouse Gas Reduction Strategy**.

19.9.6 To contextualise this impact, these construction emissions (as $MtCO_2e$) have been compared to the UK carbon budget (HM Government, 2016) which coincides with the construction phase as presented in Table 19.19.

Table 19.19 – Comparison of construction phase GHG emissions with UK carbon budgets

UK carbon budget period	UK carbon budget ($MtCO_2e$)	Construction emissions ($MtCO_2e$)	Percentage contribution of potential construction emissions to the UK carbon budget
Fifth (2028-2032)	1,725	0.144	0.01%

Operation (and maintenance)

19.9.7 For the purposes of the climate change assessment, the operational phase of the Project is assumed to begin in Q4 2031. A reference operational period of 80 years is assumed, in accordance with asset lifespans.

19.9.8 The GHG emissions associated with the operational phase of the Project have been calculated subject to the methodology, assumptions, and limitations detailed in section 19.4. The results are provided in Table 19.20. The lifecycle modules are labelled in accordance with PAS 2080 guidelines (British Standards Institution, 2023).

Table 19.20 – Operational phase GHG emissions

PAS 2080 guidelines lifecycle module	Emission source	GHG emissions (tCO_2e)
B: Use Stage	B2–B4 Maintenance, Repair, and Replacement	40,361.7
	B8 Users' utilisation of infrastructure	271,861.1
	Total tCO_2e over operational phase	**312,222.8**

19.9.9 Table 19.20 shows that the total GHG emissions associated with the Project in the operational phase are 312,222.8 tCO_2e (0.312 $MtCO_2e$). The majority of operational phase GHG emissions are attributed to transmission losses, accounting for 87 per cent of operational phase emissions. This is followed by GHG emissions associated with maintenance, repair and replacement, which account for 13 per cent of operational phase emissions.

19.9.10 To contextualise this impact, these operational emissions have compared to the respective UK carbon budgets (HM Government, 2016) (HM Government, 2021) and the CCC's Balanced Net Zero Pathway (Climate Change Committee, 2025) (from the Seventh Carbon Budget period and beyond) which coincide with the operational phase up to 2050, as presented in Table 19.21. For the sake of this comparison, the operational emissions are assumed to be distributed evenly across the years of the operational phase.

Table 19.21 – Comparison of operational phase GHG emissions with UK carbon budgets and the CCC's Balanced Net Zero Pathway[7]

UK carbon budget period	UK carbon budget ($MtCO_2e$)	Potential operational and maintenance emissions ($MtCO_2e$)	Percentage contribution of potential operational and maintenance emissions to the overall UK carbon budget (%)
Fifth (2028-2032)	1,725	0.0049	0.0003%
Sixth (2033-2037)	965	0.0195	0.0020%
Seventh (2038-2042)	533	0.0195	0.0037%
Eighth (2043-2047)	220	0.0195	0.0089%
Ninth (2048-2050)	23	0.0117	0.0512%

19.9.11 For additional contextualisation, the operational emissions are also compared against the CCC's Balanced Net Zero Pathway (Climate Change Committee, 2025) for the sector specific electricity generation budgets in Table 19.22.

Table 19.22 – Sector specific electricity generation CCC Balanced Net Zero Pathway[8]

UK electricity generation sector carbon budget period	UK electricity generation sector carbon budget (MtCO2e)	Potential operational and maintenance emissions ($MtCO_2e$)	Percentage contribution of potential operational and maintenance emissions to the UK sectoral carbon budget (%)
Fifth (2028-2032)	68	0.0049	0.0072%
Sixth (2033-2037)	29	0.0195	0.0669%
Seventh (2038-2042)	22	0.0195	0.0891%
Eighth (2043-2047)	10	0.0195	0.1917%
Ninth (2048-2050)	3.5	0.0117	0.3363%

Overall GHG impact and significance

19.9.12 To contextualise the emissions from construction, operation, and maintenance, these emissions have been compared to the respective UK carbon budgets (HM Government, 2016), (HM Government, 2021) and CCC's Balanced Net Zero Pathway (Climate Change Committee, 2025) (from the seventh carbon budget period and beyond) which coincide with the operational phase up to 2050, as presented in

[7] Values have been rounded to three decimal places, so minor differences may occur.

[8] Values have been rounded to three decimal places, so minor differences may occur.

Table 19.23. For the sake of this comparison, the operational emissions are assumed to be distributed evenly across the years of the operational phase.

Table 19.23 – Comparison of construction and operational phase GHG emissions with UK carbon budgets and the CCC Balanced Net Zero Pathway

UK carbon budget period	UK carbon budget ($MtCO_2e$)	Potential construction and operational and maintenance emissions ($MtCO_2e$)	Percentage contribution of potential construction, operational and maintenance emissions to the overall UK carbon budget (%)
Fifth (2028-2032)	1,725	0.1484	0.0086%
Sixth (2033-2037)	965	0.0195	0.0020%
Seventh (2038-2042)	533	0.0195	0.0037%
Eighth (2043-2047)	220	0.0195	0.0089%
Ninth (2048-2050)	23	0.0117	0.0512%

19.9.13 The overall significance of GHG emissions in the context of the UK carbon budgets and the national policy environment is assessed below.

19.9.14 As identified earlier in this assessment, the overall estimated GHG emissions of the Project contribute to less than 0.1 per cent of each respective UK carbon budget as shown in Table 19.19, Table 19.21, and Table 19.23. Additionally, estimated GHG emissions of the Project contribute to less than 0.34 per cent of each respective sectoral carbon budget (Table 19.22).

19.9.15 Although the construction and operation of the Project would directly result in increased GHG emissions, to provide context, consideration also needs to be given to its role in wider UK policy to decarbonise the electricity grid. Over its lifetime, the Project would provide a key contribution to the UK fulfilling its net zero policy and transition away from fossil fuels. By reinforcing the electricity transmission network, the Project would facilitate the connection of new renewable and low-carbon energy generation and transmission. Without projects such as this, which facilitate the connection of low-carbon energy generation projects to the network, GHG intensity would not decrease as projected, thereby adversely affecting the UK's ability to meet its carbon reduction targets. This statement is consistent with the position taken in paragraph 150 of the Supreme Court judgment in the case of Finch, on behalf of the Weald Action Group (Appellant) v Surrey County Council and others (Respondents) (Supreme Court of the United Kingdom, 2024).

19.9.16 In this, there is a need for the relevant planning authority to consider the beneficial indirect effects of a project on the climate, as well as adverse effects, as a material planning consideration: '*Just as beneficial indirect effects of a project on climate - for example, the "green" energy that would be generated by a project to develop a wind farm or solar farm - are clearly a relevant matter for the planning authority to consider, so corresponding adverse effects are also a material planning consideration*' (paragraph 150).

19.9.17 There would be emissions associated with construction and operation of the Project. However, it is anticipated that the potential benefits from the Project of improving efficiency and enabling greater renewable energy connections would far outweigh the associated emissions.

19.9.18 In accordance with the IEMA GHG assessment guidance (Institute of Environmental Management and Assessment, 2022) (see section 19.4), the effect of GHG emissions associated with the Project is deemed to be **minor adverse** and therefore **not significant**. This is because 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. In addition, the Project would support the ambitions for UK policy to decarbonise the electricity grid and transition to net zero by 2050 (HM Government, 2019).

Climate Change Risk Assessment

19.9.19 The potential climate hazards across the construction, operation and maintenance phases of the Project have been recorded in **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**, with the results summarised below. The assessment measures the risks on the basis of the likelihood, consequence and significance of effects to the Project.

Construction

19.9.20 The construction phase climate hazards assessed in the CCRA are presented in Table 1.1 of **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**.

19.9.21 For the construction phase of the Project, the CCRA predominantly covers workforce exposure to dangerous working conditions and damage to physical structures as a result of climate change.

19.9.22 Major climatic variables contributing to these climate hazards include, but are not limited to, more frequent extreme weather conditions (e.g., flooding and heatwaves) and higher temperatures due to climate change.

19.9.23 During the construction phase, under the RCP8.5 scenario, there is likely to be an increase in daily temperatures. Furthermore, under the RCP8.5 scenario, it is likely that Summer rainfall will decrease and lead to a higher risk of drought. Meanwhile, Winter rainfall is likely to increase, which could increase the risk of flooding.

19.9.24 With the inclusion of the climate change embedded mitigation measures highlighted in section 19.8 and **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**, and detailed in **Application Document 7.3 Register of Environmental Actions and Commitments**, all climate hazards during the construction phase have been assessed to be **low** to **medium** and therefore **not significant**.

Operation and maintenance

19.9.25 The climate hazards assessed in the CCRA for the operational and maintenance phase of the Project are presented in Table 1.2 of **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment** and are summarised below:

- Higher temperatures can reduce the performance and capacity of transmission assets, including conductors, transformers, switchgear and other electrical equipment, increasing the risk of faults, overheating, outages and loss of supply.
- Elevated temperatures can cause thermal expansion and sagging of overhead line conductors, potentially exceeding design limits and affecting network reliability.
- Hotter, drier conditions may degrade soils and foundations through drought and reduced soil quality, increasing the risk of structural instability and asset damage.
- More frequent and intense storms can cause physical damage to transmission infrastructure, including overhead lines and associated assets, resulting in faults, outages and increased repair requirements.
- Stronger winds can damage infrastructure, including pylons and overhead lines, leading to power supply disruptions, safety risks, increased maintenance costs and difficulties accessing assets for repairs.
- Drought conditions can also cause shrink-swell effects in clay-rich soils, potentially affecting foundations and asset stability.

19.9.26 With the inclusion of the climate change embedded mitigation measures highlighted in section 19.8 and **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**, and detailed in **Application Document 7.3 Register of Environmental Actions and Commitments**, all climate hazards during the operational and maintenance phase have been assessed to be **low** to **medium** and **not significant**.

In-Combination Climate Change Impact Assessment

19.9.27 Potential ICCIs, including their likelihood, consequence, and significance, are detailed in **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**.

Construction

19.9.28 Potential ICCIs during the construction phase of the Project, took into account embedded mitigation and are fully recorded in Table 1.1 of **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**.

19.9.29 With the inclusion of embedded mitigation, the impacts are assessed as **not significant**. The main identified ICCIs during construction are summarised below:

- A projected decrease in annual precipitation, coupled with an increased risk of drought, may lead to drier soil conditions and reduced vegetation cover. This, in turn, could increase the potential for dust generation and soil erosion, particularly during construction activities, with associated impacts on local air quality.
- Increased Winter precipitation and a higher frequency and intensity of extreme weather events, including heavy rainfall, are projected as a result of climate change. These conditions may lead to:
  - enhanced soil erosion, as saturated or exposed soils are more vulnerable to being mobilised;

- increased groundwater levels and mixing of groundwater with potential existing contamination if present;
- Increased flood risk and peak discharge rates exceeding the capacity of the attenuation treatment train.

19.9.30 Following consultation with technical disciplines, potential ICCIs were identified for the following themes, all of which were assessed as **not significant**: Air Quality, Ecology and Landscape, Health and Wellbeing, Agriculture and Soils, Visual amenity, and Water Environment.

19.9.31 Following consultation with other disciplines, no ICCIs were identified for the following themes Ornithology, Cultural Heritage, Geology and Hydrogeology, Noise and Vibration, Socio-economic, and Traffic and Transport.

Operation and maintenance

19.9.32 Potential ICCIs during the operational and maintenance phase of the Project, took into account embedded mitigation and are fully recorded in Table 1.2 of **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**.

19.9.33 No significant effects were identified. The main identified ICCIs during operation and maintenance are summarised below:

- Reduced precipitation may lead to drier soil conditions, resulting in a loss of soil cohesion and vegetation cover. This can increase the susceptibility of soils to erosion, particularly during periods of wind or intense rainfall events.
- Increased flow rates may alter sediment dynamics within the channel, leading to enhanced erosion, sediment transport, and potential deposition downstream.
- Soils may be vulnerable to structural damage if trafficked or handled when excessively wet, leading to compaction and degradation of soil structure. This can reduce infiltration capacity, increase surface water runoff, and elevate the risk of localised flooding and soil erosion.

19.9.34 Following consultation with technical disciplines, potential ICCIs were identified for the following themes, all of which were assessed as **not significant**: Agriculture and Soils, and Water Environment.

19.9.35 Following consultation with technical disciplines, no ICCIs were identified for the following themes: Air Quality, Ecology, Cultural Heritage, Landscape, Geology and Hydrogeology, Noise and Vibration, Health and Wellbeing, Visual amenity, and Traffic and Transport.

Assessment Summaries

19.9.36 Table 19.24, Table 19.25 and Table 19.26 summarise the residual effects of the Project on climate change receptors.

Table 19.24 – Summary of residual climate change effects (Lifecycle GHG Impact Assessment)

Receptor	Sensitivity	Description of impact	Mitigation[9]	Likely significant effect	Residual effect and significance
Construction lifecycle stage					
Global climate	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 five-year carbon budgets.	The total GHG emissions associated with the Project in the construction phase are 143,537.2 tCO_2e (0.144 MtCO2e). The majority of construction phase GHG emissions are attributed to embodied emissions in raw materials. The main contributor to embodied carbon would be the infrastructure associated with the Project. Other emission sources include material transport, construction activities, worker transport, waste, and pre-construction demolition (for example dismantling of existing pylons and vegetation removal).	As set out in section 19.8: CC01, CC02, CC03, CC04, DE1, DE11, DE18, DE21, GG01, GG02, GG03, GG04, GG12, GG22, GG24, GG25, GG30, AQ06, AQ05, AQ06, AQ10, AQ11, AQ12, AQ13, W05, W06, W11, W13, W18, W20, VV01, LV03, LV04, GH01, GH03, AS01, AS04, AS08, and S01.	The Project has committed to implementing a range of best practice mitigation measures to minimise GHG emissions wherever practicable. These measures include specifying and prioritising sustainable, low-carbon materials, sourcing materials from local suppliers where reasonably practicable to reduce transportation distances and associated emissions, and utilising electric or other low-carbon plant and equipment wherever available and practicable. Hence, having regard to the embedded mitigation measures incorporated into the Project design and construction approach, the Project's contribution to GHG emissions has been minimised as far as reasonably practicable. In accordance with the IEMA GHG assessment guidance (Institute of	**Minor adverse** (**not significant**)

[9] Four-digit codes represent the commitment identifier code in **Application Document 7.3 Register of Environmental Actions and Commitments**.

Receptor	Sensitivity	Description of impact	Mitigation[9]	Likely significant effect	Residual effect and significance
				Environmental Management and Assessment, 2022) (see section 19.4), the residual effect of GHG emissions associated with the Project is therefore assessed as minor adverse and **not significant**. This is because the Project's GHG emissions are consistent with applicable national and local climate policy requirements, and align with current good practice design standards.	
Operation (and maintenance) lifecycle stage					
Global climate	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 five-year carbon budgets.	The total GHG emissions associated with the Project in the operational phase are 312,222.8 tCO_2e (0.312 $MtCO_2e$). The majority of operational phase GHG emissions are attributed to transmission losses, accounting for 87% of operational phase emissions. This is followed by GHG emissions associated with maintenance, repair, and replacement, which account for 13% of operational phase emissions.	As set out in section 19.8: CC01, CC02, CC03, CC04, DE1, DE11, DE18, DE21, GG01, GG02, GG03, GG04, GG12, GG22, GG24, GG25, GG30, AQ06, AQ05, AQ06, AQ10, AQ11, AQ12, AQ13, AQ14, W05, W06, W11, W13, W18,	While the Project would result in GHG emissions during operation, it would also play an important role in facilitating the decarbonisation of the UK electricity system by enabling the connection and transmission of renewable and low-carbon energy. The Project is consistent with applicable climate policy requirements and good practice for infrastructure development, and is in line with measures necessary to achieve the UK's trajectory towards net zero. Accordingly, the residual effect is	**Minor adverse** (**not significant**)

Receptor	Sensitivity	Description of impact	Mitigation[9]	Likely significant effect	Residual effect and significance
			W20, VV01, LV03, LV04, GH01, GH03, AS01, AS04, AS08, and S01	assessed as minor adverse and **not significant**.	

Table 19.25 – Summary of residual climate change effects (CCRA)

Receptor	Description of impact	Mitigation[10]	Likely significant effects	Residual effect and significance
The receptor for the CCRA is the Project itself (during construction and operation) and its workers (e.g., construction and maintenance workers)	The increase of extreme weather events and climate hazards in the UK could lead to detrimental impacts on the Project.	As set out in section 19.8 and **Application Document 6.19.A2 Appendix 19.2 Climate Change Risk Assessment**. Measures DE1, DE11, GG01, GG02, GG04, GG10, GG17, GG19, GG21, GG22, GG23, GG25, W06, W11, W20, LV01, LV03, CC04, AQ02, AQ04, AQ05, AQ06, AQ07, AQ08, AQ09, S01 and GH01 in **Application Document 7.3 Register of Environmental Actions and Commitments**. In addition, the following plans mainly informed the CCRA including **Application Document 7.4 Outline Construction Traffic Management Plan**, **Application Document 7.5 Outline Soil Management Plan**, and **Application Document 7.8 Outline Landscape and Ecology Management Plan**.	With the inclusion of the climate change embedded mitigation measures, all climate hazards during the construction, and operational and maintenance phases of the Project have been assessed as low to medium and **not significant**.	**Low** to **moderate** (**not significant**)

[10] Four-digit codes represent the commitment identifier code in **Application Document 7.3 Register of Environmental Actions and Commitments**.

Table 19.26 – Summary of residual climate change effects (ICCI)

Receptor	Mitigation[11]	Likely significant effects	Residual effect and significance
For the ICCI Assessment, the receptors are those identified by the environmental topic leads for the Project as set out in **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**.	Mitigation measures for identified ICCIs are detailed in Table 1.1 and Table 1.2 of **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**. Measures DE1, DE18, GG01, GG02, GG04, GG10, GG19, GG21, GG25, GG30, W20, LV03, LV04, AQ02, AQ04, AQ05, AQ06, AQ07, AQ08, AQ09, AQ10, AQ14, S01, GH01, GH02, GH03, AS01, AS04, and AS09.	Potential ICCIs during the construction, operational and maintenance phases of the Project were assessed, taking into account the relevant embedded mitigation measures, as detailed in **Application Document 6.19.A3 Appendix 19.3 In-Combination Climate Change Impact Assessment**. While a number of potential ICCIs were identified across environmental themes, all were assessed to be **not significant**.	**Not significant**

[11] Four-digit codes represent the commitment identifier code in **Application Document 7.3 Register of Environmental Actions and Commitments**.

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National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com