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17. Climate Change

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17. Introduction

17.1.1 This chapter presents the assessment of the likely significant effects of the Yorkshire Green Energy Enablement (GREEN) Project referred to as 'the Project' or 'Yorkshire GREEN' throughout the ES with respect to climate change.

17.1.2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations)[1] (Schedule 4, Paragraph 5 (f)) require consideration of two different types of climate change effect and therefore this chapter considers the following:

- Greenhouse gas (GHG) emissions – the effects on the climate of the GHG emissions arising from the operation and construction of the Project, including how the Project would affect the ability of the UK Government to meet its carbon reduction targets.
- Climate Change Resilience (CCR) – the effects of a changing climate on the vulnerability of the Project, including how the design will mitigate the anticipated impacts of climate change. The In-combination Climate Change Impact (ICCI) assessment considers the extent to which climate change exacerbates effects on receptors identified in the other aspect chapters and is provided in **Section 17.11**.

17.1.3 This chapter should be read in conjunction with the Project description provided in **Chapter 3: Description of the Project**, **Volume 5, Document 5.2.3** and with respect to relevant parts of the following chapters:

- **Chapter 8: Biodiversity, Volume 5, Document 5.2.8;**
- **Chapter 9: Hydrology, Volume 5, Document 5.2.9;**
- **Chapter 11: Agriculture and Soils, Volume 5, Document 5.2.11**;
- **Chapter 12: Traffic and Transport, Volume 5, Document 5.2.12;** and
- **Chapter 13: Air Quality, Volume 5, Document 5.2.13**.

17.1.4 This chapter includes:

- the legislation, planning policy and technical guidance that has informed the assessment (**Section 17.2**);
- consultation and engagement that has been undertaken and how comments from consultees relating to climate change have been addressed (**Section 17.3**);
- the methods used for baseline data gathering (**Section 17.4**);
- overall baseline (**Section 17.5**);
- embedded measures relevant to climate change (**Section 17.6**);
- the scope of the assessment for climate change (**Section 17.7**);

[1] UK Government (2017). The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (online). Available at: https://www.legislation.gov.uk/uksi/2017/572/contents/made (Accessed 16 June 2022).

- the methods used for the assessment (**Section 17.8**);
- the assessment of climate change effects (**Section 17.9**);
- the assessment of cumulative effects (**Section 17.10**); and
- a summary of the significance conclusions (**Section 17.11**).

Project overview

17.1.5 The Project is divided into six sections for ease of reference as indicated in **Figure 1.2, Volume 5, Document 5.4.1**. In summary Yorkshire GREEN comprises the following new infrastructure within the Order Limits:

- Section B (North west of York Area):
  - Shipton North and South 400kV cable sealing end compounds (CSECs) and 230m of cabling;
  - the 2.8km YN 400kV overhead line (north of proposed Overton Substation);
  - Overton 400/275kV Substation; and
  - two new sections of 275kV overhead line south of Overton Substation: the XC 275 kV overhead line to the south-west (2.1km) and the SP 275kV overhead line to the south-east (1.5km).
- Section D: Tadcaster Tee West and East 275kV CSECs; and 350m of cabling; and
- Section F: Monk Fryston 400kV Substation (adjacent to the existing substation).

17.1.6 Works to existing infrastructure within the Order Limits would comprise:

- Section A (Osbaldwick Substation): Minor works at Osbaldwick Substation comprising the installation of a new circuit breaker and isolator along with associated cabling, removal and replacement of one gantry and works to one existing pylon. All substation works would be within existing operational land.
- Section B (North-west of York Area): Reconductoring of 2.4km of the 2TW/YR 400kV overhead line and replacement of one pylon. A mixture of decommissioning, replacement and realignment of 5km of the existing XCP 275kV Poppleton to Monk Fryston overhead line between Moor Monkton and Skelton. To the south and south-east of Moor Monkton the existing overhead line would be realigned up to 230m south from the current overhead line and the closest pylon to Moor Monkton (340m south-east) would be permanently removed. A 2.35km section of this existing overhead line permanently removed between the East Coast Mainline (ECML) Railway and Woodhouse Farm to the north of Overton.
- Section C (Moor Monkton to Tadcaster): Works proposed to the existing 275kV Poppleton to Monk Fryston (XC) overhead line comprise replacing existing overhead line conductors, replacement of pylon fittings, strengthening of steelwork and works to pylon foundations.
- Section D (Tadcaster Area): Replacement of one pylon on the Tadcaster Tee to Knaresborough (XD/PHG) 275kV overhead line route.
- Section E (Tadcaster to Monk Fryston). Works proposed to the existing 275kV Poppleton to Monk Fryston (XC) overhead line comprise replacing existing overhead

line conductors, replacement of pylon fittings, strengthening of steelwork and works to pylon foundations.

- Section F (Monk Fryston Area): Reconfiguration of the existing XC Poppleton to Monk Fryston overhead line at its southern end to connect into the new substation at Monk Fryston; Reconfiguration and the Monk Fryston to Eggborough 400kV 4YS overhead line to connected into the new substation at Monk Fryston.

17.1.7 Please refer to **Chapter 3: Description of the Project, Volume 5. Document 5.2.3** for more information on the different components of the Project.

Limitations and assumptions

17.1.8 Assumptions have been made to characterise the likely activities associated with the Project and therefore enable GHG emissions to be determined. These assumptions ensure a proportionate assessment has been carried out. The assumptions made in the assessment are stated within **Section 17.8**.

17.1.9 A list of materials associated with the construction of the Project has been developed to inform the GHG assessment. The list of materials has specifically informed the embodied carbon assessment of the GHG assessment. This list of materials was developed through discussions with project engineers and based upon the Project description reported in **Chapter 3: Description of the Project**, **Volume 5, Document 5.2.3** and upon professional judgement. Climate change, by its very nature, is associated with a range of assumptions and limitations. For example, there is uncertainty in climate models and regarding how global climatic trends will be reflected at the regional scale. The future baseline for the CCR assessment represents projections under one future scenario and cannot be treated as a prediction. Data for the 10%, 50% and 90% probability levels for the high emissions scenario have been used in the assessment to highlight uncertainty and ensure a conservative assessment of risk. Leading climate change data from the UK Climate Projections 2018 (UKCP18) programme has been used to explore trends and magnitude of change at the regional scale. UKCP18 is the result of over seven years' work by the Met Office's Hadley Centre Climate Programme[2] and over 30 years of work from other contributing organisations. UKCP18 provides the most up-to-date assessment of how the climate of the UK may change over the 21st century.

17.2 Relevant legislation, planning policy and technical guidance

17.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to climate change. Further information on policies relevant to the Project is provided in **Chapter 5: Legislation and policy overview, Volume 5, Document 5.2.5**.

Legislation

17.2.2 The UK Emission Trading Scheme (ETS) replaced the UK's participation in the EU ETS on 1 January 2021. The UK ETS is a market-based mechanism of emissions trading to

[2] The Met Office's Hadley Centre Climate Programme is supported by the Department of Business, Energy and Industrial Strategy (BEIS) and the Department for Environment, Food and Rural Affairs (Defra).

control pollution though the provision of economic incentives for reducing the emissions of pollutants.

17.2.3 A summary of the legislation relevant to the GHG assessment is given in **Table 17.1** and to the CCR assessment is given in **Table 17.3**.

Table 17.1 – Legislation relevant to the GHG assessment

Legislation	Legislative context
Climate Change Act 2008[3] *(including The Climate Change Act 2008 (2050 Target Amendment) Order 2019*[4]*)*	This Act, as amended in 2019, commits the UK to reduce its net GHG emissions by at least 100% below 1990 levels by 2050 (the 'UK carbon target', often referred to as 'net zero') and requires the Government to establish 5-year carbon budgets. The Act also established an independent expert body, the Committee on Climate Change, to advise the Government on the level of those emissions targets and report on progress made to reduce emissions. The Act sets out reporting requirements in the form of Adaptation Reports, a mechanism for gathering and presenting evidence to help understand climate change risks to the UK.
The Carbon Budgets Order 2009[5]	This legislation implements the carbon budgets set out in the Climate Change Act 2008[3]. The budgets require the UK to continually reduce emissions in line with the carbon reduction commitments established under the Act. The fourth, fifth and sixth carbon budgets are derived from The Carbon Budgets Order 2011[6], The Carbon Budgets Order 2016[7] and the Carbon Budgets Order 2021[8]. The carbon budgets are shown in .
Energy Act 2016[9]	The Energy Act 2016 is a UK Act of Parliament relating to UK enterprise law and energy in the UK. It covers three main areas, established the new Oil and Gas Authority (OGA), sets out the formal powers of the OGA and sets out the closure of Renewables Obligation for onshore wind in England, Wales and Scotland.

[3] UK Government (2008). Climate Change Act 2008 (online). Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents (Accessed 07 June 2021).
[4] UK Government (2019). The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (online). Available at: https://www.legislation.gov.uk/uksi/2019/1056/contents/made (Accessed 07 June 2021).
[5] UK Government (2009). The Carbon Budgets Order 2009 (online). Available at: https://www.legislation.gov.uk/uksi/2009/1259/contents/made (Accessed 18 August 2022).
[6] UK Government (2011). The Carbon Budget Order 2011 (online). Available at: https://www.legislation.gov.uk/uksi/2011/1603/contents/made (Accessed 18 August 2022).
[7] UK Government (2016). The Carbon Budget Order 2016 (online). Available at: https://www.legislation.gov.uk/uksi/2016/785/contents/made (Accessed 18 August 2022).
[8] UK Government (2021). The Carbon Budget Order 2021 (online). Available at: https://www.legislation.gov.uk/uksi/2021/750/contents/made (Accessed 18 August 2022).
[9] UK Government (2016). The Energy Act 2016. (Online). Available at: https://www.legislation.gov.uk/ukpga/2016/20/contents/enacted

Legislation	Legislative context
Environment Act 2021[10]	An Act to make provision about targets, plans and policies for improving the natural environment, including waste management and resource efficiency (Part 3). The Act aims to help the Government achieve the net zero carbon emissions target. It establishes a new public body, the Office for Environmental Protection which will act as an independent, domestic watchdog. All climate change legislation (including carbon budgets) is within the enforcement remit of the body, ensuring that there is no governance gap in relation to climate change legislation.

17.2.4 All carbon budgets that have been legislated, or are under draft legislation, have been considered in the GHG assessment. The timescale of these budgets covers the construction period and some of the operational period only since the carbon budgets extend only to 2050. The total UK budgets, expressed in the form of million tonnes of carbon dioxide equivalent (million tCO_2e), are detailed in **Table 17.2**.

Table 17.2 - UK Carbon budgets

Budget	Carbon budget level (million tCO_2e)	Reduction below 1990 levels	Legal status
4th Carbon Budget (2023 to 2027)	1,950	51% by 2025	Statute
5th Carbon Budget (2028 to 2032)	1,725	57% by 2030	Statute
6th Carbon Budget (2033 -2037)	965	78% by 2035	Statute
Net Zero Target	0	100% by 2050	Statute

Table 17.3 - Legislation relevant to the CCR assessment

Legislation	Legislative context
Climate Change Act 2008[3]	The Act sets out the reporting requirements of the UK Government to produce a UK Climate Change Risk Assessment (CCRA), published every five years, which is the mechanism for gathering and presenting evidence to help understand climate change risks to the UK. The Third CCRA was published by the UK Government in January 2022[11] and draws from the latest

[10] UK Government (2021). Environment Act 2021. (online). Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted (Accessed 18 July 2022).
[11] HM Government (2022). UK Climate Change Risk Assessment 2022 (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf (Accessed 13 June 2022).

Legislation	Legislative context
	evidence prepared by the Adaptation Committee presented in the Independent Assessment of UK Climate Risk 2021[12].
The Environment Act 2021[10]	The Environment Act (passed in November 2021) translates aspects of the government's "A Green Future: Our 25 Year Plan to Improve the Environment"[13] into legislation. This Plan includes how the UK Government will tackle the effects of climate change, by ensuring all policies, programmes and investment decisions take into account the possible extent of climate change this century.

Planning policy

17.2.5 A summary of the relevant national and local planning policy for the GHG assessment is given in **Table 17.4** and for the CCR assessment is given in **Table 17.5**. In September 2021, the Department of Business, Energy and Industrial Strategy (BEIS) consulted upon a review of energy National Policy Statements (NPS) with consultation closing on 29 November 2021. The energy NPS' were reviewed to reflect the policies and broader strategic approach set out in the Energy white paper: Powering our net zero future published by BEIS in December 2020[14] and ensure a planning framework was in place to support the infrastructure requirement for the transition to net zero. There are no substantive changes with regard to the CCR within those draft Energy National Policy Statements which are considered to be relevant to the Project.

Table 17.4 – Planning policy relevant to the GHG assessment

Policy	Policy context
International policy	
The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement[15]	The UNFCCC is the major international body responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, the aims of which are stated as: "This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: (a) Holding the increase in the global

[12] Betts, R.A. and Brown, K, (2021). Introduction. In: The Third UK Climate Change Risk Assessment Technical Report (Betts, R.A., Haward, A.B. and Pearson, K.V. (eds.)). Prepared for the Climate Change Committee, London..
[13] HM Government (2021). A Green Future: Our 25 Year Plan to Improve the Environment (Online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf (Accessed 13 June 2022).
[14] Department for Business, Energy and Industrial Strategy (2020). The Energy White Paper: Powering our Net Zero Strategy. (Online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf (Accessed 13 June 2022).
[15] UNFCCC (2015). Paris Agreement. (online). (Accessed 13 June 2022).

Policy	Policy context
	average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change" (Article 2). The agreement sets targets for countries' GHG emissions, but these are not legally binding or enforceable. In December 2020, the UK submitted its first Nationally Determined Contribution (NDC) to the UNFCCC, committing to "at least a 68%" reduction in GHG emissions below 1990 levels (1995 levels for F-gases) by 2030, aligned with the UK's 2050 net-zero GHG emissions target.
UNFCCC Kyoto Protocol[16]	The Kyoto Protocol was adopted in December 1997 and there are currently 192 Parties to the Kyoto Protocol. It commits industrialised countries and economies to transition to limit and reduce GHG emissions in accordance with agreed individual targets. These have been strengthened in more recent international agreements culminating in the Paris Agreement (UNFCCC, 2015), as described above. The Kyoto Protocol contains a list of seven GHG to be reported, which remains relevant in the Paris Agreement, namely: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). In this GHG assessment, these seven GHG are collective considered "GHG emissions" and reported as carbon dioxide equivalent (CO_2e) GHG emissions.
UNFCCC Glasgow Climate Pact[17]	The recent Conference of the Parties (COP 26) held in Glasgow in November 2021, resulted in almost 200 countries agreeing on: the acceleration of action on climate change this decade to reduce emissions (mitigation); helping those already impacted by climate change (adaption); enabling countries to deliver on their climate goals (finance); and working together to deliver even greater action (collaboration). This agreement is in the form of the Glasgow Climate Pact which reaffirms the long-term goal to limit global warming to 1.5°C above pre-industrial levels and resolves to pursue efforts to achieve this, recognising that limiting global warming to 1.5°C "requires rapid, deep and sustained reductions in global greenhouse gas emissions, including reducing global CO2 emissions by 45% by 2030 relative to the 2010 level and to net zero around mid-century, as well as deep reductions in other greenhouse gases".
National Policy Statements	

[16] UNFCCC (1998). Kyoto Protocol. (online). (Accessed 13 June 2022).
[17] UNFCCC (2021). Glasgow Climate Pact. (online). (Accessed 13 June 2022).

Policy	Policy context
Overarching National Policy Statement (NPS) for Energy (EN-1)[18]	EN-1 sets out general assessment principles for applications relating to energy infrastructure. This includes that the Secretary of State should take into account the potential benefits of a project including meeting needs for energy infrastructure and job creation and long term or wider benefits. The Energy NPS aims to "*speed up the transition to a low carbon economy and thus help to realise the UK climate change commitments sooner than continuation under current planning system*" (Paragraph 1.7.2). Note the "*current planning system*" as described in the Energy NPS has since been updated with more ambitious carbon reduction targets. Paragraph 4.8.6 within the EN-1 notes that the Environmental Statement (ES) should consider the impacts of climate change when planning the location, design, build and operation of new energy infrastructure. An assessment of the impacts of climate change is included in **Section 17.9**.
Draft NPS for Energy (EN-1)[19]	The draft NPS for energy (EN-1) contains section 5.3: Greenhouse Gas Emissions, which is not present in the current Overarching NPS for Energy (EN-1)[18]. The current Overarching NPS for Energy (EN-1)[18] reports that "*The Infrastructure Planning Commission (IPC) does not, therefore need to assess individual applications in terms of carbon emissions against carbon budgets"* (Paragraph 5.2.2). Paragraph 5.3.4 within the draft NPS EN-1 reports that "*All proposals for energy infrastructure projects should include a carbon assessment as part of their ES"* This is addressed in **Section 17.9**

[18] Department for Business, Energy and Industrial Strategy (2011). Overarching National Policy Statement for Energy (EN-1) (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf (Accessed 13 October 2021).

[19] Department for Business, Energy and Industrial Strategy (2021). Draft Overarching National Policy Statement for Energy (EN-1) (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf (Accessed July 2022)

Policy	Policy context
NPS for Electricity Networks Infrastructure (EN-5)[20]	EN-5 is directly relevant to the consideration of the Project as a grid reinforcement project. Climate change objectives are reported to come into consideration during the IPC's assessment of electricity networks infrastructure projects, if the IPC decides it needs to probe further (Paragraph 2.3.4).
Draft NPS for Electricity Networks Infrastructure (EN-5)[21]	One of the key differences between the Draft EN-5 and EN-5 is the focus on achievement of Net Zero emissions. Section 2.14 focusses on Sulphur Hexafluoride (SF_6). Paragraph 2.14.2 reports that "*The continued use of SF_6 is acceptable, provided that emissions monitoring and control measures compliant with the F-gas Regulation and/or its successors are in place".*
National planning policy	
National Planning Policy Framework (NPPF)[22]	The 2021 revision of the NPPF, paragraph 152 states: "*The planning system should support the transition to a low carbon future in a changing climate… shape places in ways that contribute to radical reductions in greenhouse gas emissions… and support renewable and low carbon energy and associated infrastructure*". It also requires in paragraph 154 that new development should be planned for in ways that "*can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards*". Furthermore, it is stated in paragraph 157, that local planning authorities should expect new development to:

[20] Department for Business, Energy and Industrial Strategy (2011). National Policy Statement for Electricity Networks Infrastructure (EN-5) (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37050/1942-national-policy-statement-electricity-networks.pdf (Accessed 13 October 2021).
[21] Department for Business, Energy and Industrial Strategy (2021). Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015238/en-5-draft-for-consultation.pdf (Accessed 13 October 2021).
[22] Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed 13 October 2021).

Policy	Policy context
	"*comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.*" This has been addressed in **Section 17.6.**
Clean Growth Strategy[23]	This report, prepared by BEIS, provides the strategy for the UK's future clean growth to allow carbon budgets to be met and support economic growth. It sets out policies and targets out to 2050 for reducing GHG emissions across a number of sectors. Whilst not in itself planning policy it is a material consideration.
The UK's Nationally Determined Contribution under the Paris Agreement[24]	In December 2020, the UK submitted its first NDC under the Paris Agreement to the UNFCCC, committing to "at least a 68%" reduction in economy-wide GHG emissions below 1990 levels (1995 levels for F-gases) by 2030, aligned with the UK's 2050 net-zero GHG emissions target.
The Ten Point Plan for a Green Industrial Revolution[25]	This plan sets out the UK Government's approach to "build back better" following the impacts of the COVID-19 pandemic. It includes details of how the Government intend to accelerate the path to net zero. Point 2 focuses on 'driving the growth of low carbon hydrogen' and the UK Government's plans to develop low carbon hydrogen production capacity.
Net Zero Strategy: Build Back Greener[26]	This strategy sets out sectoral policies and proposals for decarbonising all sectors of the UK economy to meet the coming carbon budgets, the NDC and the net zero target by

[23] Department for Business, Energy and Industrial Strategy (2017) Clean Growth Strategy. (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf (Accessed 18 July 2022).
[24] Department for Business, Energy & Industrial Strategy (2020). The UK's Nationally Determined Contribution under the Paris Agreement (online). Available at: https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc (Accessed 13 October 2021).
[25] HM Government (2020). The Ten Point Plan for a Green Industrial Revolution. (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf (Accessed 18 July 2022).
[26] Department for Business, Energy & Industrial Strategy (2021). Net Zero Strategy: Build Back Greener. (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf (Accessed 18 July 2022).

Policy	Policy context
	2050. It aims to enable the delivery of the objectives set out in the Ten Point Plan[25]. Section 3ii. covers fuel supply and hydrogen, including commitments to reduce emissions from conventional fossil fuels and scale up low carbon alternatives such as hydrogen.
Local planning policies	
Harrogate District Local Plan 2014-2035 (Harrogate Borough Council, 2020)[27]	**Policy CC3: Renewable and Low Carbon Energy** is reported to be achieved through the reduction of carbon dioxide emissions. Harrogate Borough Council (HBC) have set a local target to reduce emissions by 57% by 2030. HBC report that reducing emissions relating to energy use is imperative in order to meet wider local targets, national legislation and international agreements.
Hambleton Local Plan – Adopted February 2022 (Hambleton District Council)[28]	The Environment and Resource Management is discussed as a key strategic issue within the Hambleton Local Plan. The council reports that development that minimises greenhouse gas emissions will help achieve national commitments, which the council are committed to, to reduce greenhouse gas emissions to net zero by 2050. Policy **S1: Sustainable Development Principles** sets out the expectation of the council for all development in the district. Part g) states that policy S1 will be achieved by "*Supporting development and infrastructure provision that takes available opportunities to mitigate and adapt to climate change, including minimising greenhouse gas emissions"*
City of York Local Plan – Publication Draft (City of York, 2018)[29]	**Policy DP2: Sustainable Development** reports that development should be consistent with particular principles outlined within this policy. One of the principles is that the Development will help conserve and enhance the environment. One of the ways in which this is reported to be achieved is through "*improving air quality and limit environmental nuisance including noise, vibration, light, dust, odour, fumes and emissions from development."* (Part (iii)) According to **Policy CC1: Renewable and Low Energy Generation and Storage,** all applications will need to

[27] Harrogate Borough Council (2020). Harrogate district Local Plan 2014-2035 (online). Available at: https://www.harrogate.gov.uk/planning-policy-guidance/harrogate-district-local-plan-2014-2035 (Accessed 16 June 2022).
[28] Hambleton District Council (2022). Hambleton Local Plan. Adopted February 2022. (Online). Available at: https://www.hambleton.gov.uk/downloads/file/2745/hambleton-local-plan-final-february-2022 (Accessed: 16 June 2022).
[29] City of York Council (2018). City of York Local Plan Publication Draft. (Online) Available at: https://www.york.gov.uk/downloads/download/581/local-plan-publication-draft-2018-consultation (Accessed 16 June 2022)

Policy	Policy context
	consider their impact on "*local communities and residential amenity resulting from development, construction and operation such as air quality, atmospheric emissions, noise, odour, water pollution and the disposal of waste.*" (Part (ii)).
Selby District Core Strategy Local Plan (Selby District Council, 2013)[30]	**Policy SP15: Sustainable Development and Climate Change** requires development to ensure that it contributes towards reducing carbon emissions.

17.2.6 In addition to the local planning policy documents described above, **Table 17.5** includes the commitments that the host local authorities have made to decarbonisation in line with the UK's 2050 net zero GHG emissions target. Both Hambleton District Council and the City of York Council have declared a climate emergency and committed to setting priorities to mitigate climate change.

Table 17.5 – Decarbonisation targets of host authorities

Authority	Declared climate emergency	Decarbonisation target
Harrogate Borough Council	No	Net zero by 2038[31]
Hambleton District Council	Yes – December 2021	Net zero by 2034[32]
City of York	Yes – March 2019	Carbon neutral[33] by 2030[34]
Selby District Council	No	Carbon neutrality before 2050[35]

[30] Selby District Council (2013). Selby District Core Strategy Local Plan. (Online) Available at: https://www.selby.gov.uk/sites/default/files/Documents/CS_Adoption_Ver_OCT_2013_REDUCED.pdf (Accessed 25 June 2021).
[31] Harrogate Borough Council (2022). Carbon reduction strategy. (Online). Available at: https://www.harrogate.gov.uk/climate-change/carbon-reduction-strategy (Accessed 25 June 2021).
[32] Hambleton District Council (2021). Climate Change Strategy and Action Plan 2021 – 2034. (Online). Available at: https://www.hambleton.gov.uk/downloads/file/2752/climate-change-strategy-2021 (Accessed 25 June 2021).
[33] Carbon neutral, as defined by PAS 2060, refers to a policy of not increasing carbon emissions and of achieving carbon reduction through offsets. While net zero carbon, as defined by the Science Based Targets Initiative (SBTi), means making changes to reduce GHG emissions in line with the latest climate science and a 1.5ºC trajectory – and offsetting as a last resort (2022 The Carbon Trust).
[34] City of York Council (undated). Draft climate change strategy. (Online). Available from: https://www.york.gov.uk/downloads/file/8121/draft-climate-change-strategy (Accessed 25 June 2021).
[35] Selby District Council (2021). Low Carbon Strategy 2021 – 2030. (Online). Available from: https://www.selby.gov.uk/what-were-doing (Accessed 25 June 2021).

Table 17.6 – Planning policy relevant to the CCR assessment

Policy	Policy context
International policy	
UNFCCC Paris Agreement[15]	The UNFCCC is one of the major international bodies responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, of which one of the aims is stated as: *"Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production*" (Article 2, (1)).
UNFCCC Glasgow Climate Pact[17]	The Glasgow Pact emphasised the urgency of the scaling up of climate action and support to reduce the vulnerability to climate change by enhancing adaptive capacity and strengthening resilience.
National planning policy	
Overarching National Policy Statement for Energy (EN-1)[18]	EN-1 sets out the national policy for energy infrastructure and aims to speed up the transition to a low carbon economy to help realise the UK climate change commitments. Paragraph 4.8.5 sets out the requirement for the ES to include: *"how the proposal will take account of the projected impacts of climate change".* Paragraph 4.8.6 states that *"the IPC should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projects available."* Paragraph 4.6.7 sets out that applicants should apply as a minimum, the emissions scenario that the Independent Committee on Climate Change suggests the world is currently most closely following – and the 10%, 50% and 90% estimate ranges. Any adaptation measures should be based on the latest set of UK Climate Projections, the Government's latest UK Climate Change Risk Assessment, when available and in consultation with the Environment Agency. This is addressed in Section 17.9.
National Policy Statement for Electricity Networks Infrastructure (EN-5)[20]	Section 2.4 of EN-5 considers climate change adaptation and states that the applicant should in particular set out the "*extent the proposed development is expected to be vulnerable, and, as appropriate, how it would be resilient to:* • *flooding, particularly for substations that are vital for the electricity transmission and distribution network;* • *effects of wind and storms on overhead lines;* • *higher average temperatures leading to increased transmission losses; and*

Policy	Policy context
	• *earth movement or subsidence caused by flooding or drought (for underground cables).”* This is addressed in **Section 17.6**.
National Planning Policy Framework (NPPF)[22]	The NPPF sets out in paragraph 153 that Local Plans: “*should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply and changes to biodiversity and landscape, and the risk of overheating from rising temperatures*”. Paragraph 154 states that: “*New developments should be planned for in ways that:* *a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure”*. Paragraph 157 also states that: *“in determining planning applications, local planning authorities should expect new development to:* *a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable”*. The supporting Environment Agency planning practice guidance, flood risk assessments: climate change allowances[36], contains the percentage uplifts for climate change to be added to assessments. This is addressed in **Section 17.6.**
25 Year Environment Plan[37]	This plan sets out how government action will help the natural world and how the UK Government will tackle the effects of climate change, by ensuring all policies, programmes and investment decisions take into account the possible extent of climate change this century.
Local planning policy	

[36] Environment Agency (2021). Flood risk assessments: climate change allowances (online). Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances (Accessed: 13 June 2022).

Policy	Policy context
Harrogate District Local Plan 2014-2035 (Harrogate Borough Council, 2020)[27]	Objective 5 of the Local Plan aims to reduce the impacts of climate change by ensuring development is resilient to climate change impacts, and contributes to the resilience of the wider community and infrastructure. This is delivered by Policy CC4: Sustainable Design which requires all developments to be designed with the impacts of climate change in mind. This is addressed in **Section 17.6**
Hambleton Local Plan – Adopted February 2022 (Hambleton District Council)[28]	All development is expected to include appropriate measures to adapt to climate change to ensure future resilience to climate change. This is secured through Policy S1: Sustainable Development Principles which supports infrastructure integrates opportunities for climate change adaptation. Policy E3: Natural Environment also ensures biodiversity net gain delivery associated with development is resilience to climate change.
City of York Local Plan – Publication Draft (City of York, 2018)[29]	Policy CC2: Sustainable Design and Construction of New Development expects the integration of good practice adaptation measures into the design, construction and operation of the development. Developments are encouraged to conduct climate risk assessments and include adaptation measures which minimise climate related risks.
Selby District Core Strategy Local Plan (Selby District Council, 2013)[30]	One of the aims of the Core Strategy is to ensure that new development contributes to adaptation to climate change impacts.

Technical guidance

17.2.7 A summary of the technical guidance for the GHG assessment is given in **Table 17.7,** and for the CCR assessment is given in **Table 17.8**.

Table 17.7 – Technical guidance relevant to the GHG assessment

Technical guidance document	Context
Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition[38]	The Institute of Environmental Management and Assessment (IEMA) provides guidance on GHG emissions assessment, mitigation and reporting within an EIA context and this is the primary source of guidance for assessing GHG emissions. The 2022 guidance further builds upon the 2017 guidance,

[38] IEMA (2022). Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition. (online). Available at: [redacted] (Accessed 18 July 2022).

Technical guidance document	Context
	with key changes including an emphasis on mitigation at the Project outset and throughout its lifetime, and more nuanced levels of GHG emissions significance. It provides detail on the application of the five IEMA Principles on Climate Change Mitigation and EIA[39]: *"The GHG emissions from all projects will contribute to climate change, the largest inter-related cumulative environmental effect.* *The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality).* *The UK has legally binding GHG reduction targets – EIA must therefore give due consideration to how a project will contribute to the achievement of these targets.* *GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.* *The EIA process should, at an early stage, influence the location and design of projects to optimise GHG performance and limit likely contribution to GHG emissions."*
Publicly Available Standard (PAS) 2080: 2016 – Carbon management in infrastructure[40]	PAS 2080:2016 provides an approach to reducing GHG emissions from infrastructure projects including working with stakeholders throughout the project lifecycle.
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol)[41]	Provides standards and guidance for preparing a GHG emissions inventory. It covers the accounting and reporting of the six GHGs covered by the Kyoto Protocol[16]

[39] IEMA (2010). IEMA Principles Series: Climate Change Mitigation & EIA. (online) Available at: [redacted] (Accessed October 2022).

[40] British Standards Institute (BSI) (2016). PAS 2080: 2016 – Carbon management in infrastructure. BSI; London.

[41] World Resources Institute and World Business Council for Sustainable Development (2015). The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition). BSI; London.

Technical guidance document	Context
BS EN ISO 14064-1[42] and 14064-2[43]	ISO 14064 sets out guidance for quantification and reporting of GHG emissions and removals. The methodology for quantification of GHGs follows this guidance and the stated guidance on reporting will be taken into account as part of this assessment.
Methodology to calculate embodied carbon 1st edition[44]	The Royal Institution of Chartered Surveyors (RICS) guidance note represents best practice on how to estimate carbon emissions associated with product and construction process stages. The aim of the guidance is to provide a framework of practical guidance on how to calculate embodied carbon emissions associated with projects.
Net Zero – The UK's contribution to stopping global warming[45]	This report prepared by the Climate Change Committee (CCC) to the UK Government reassesses the UK's long-term emission target. In the UK, the report recommends a net zero date of 2050 achieved through known technologies, improvements in people's lives and policy updates. As a result of this report, emission targets in the UK were updated in the *Climate Change Act 2008*[3]
2022 Progress Report to Parliament[46]	This CCC annual report sets out the UK's progress for 2022 against emissions reduction targets to 2050. One of the CCC's key recommendations is funding and support for extra hydrogen production capacity. The UK Government are yet to respond to the CCC's recommendations.
Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6): Climate Change 2021 - The Physical Science Basis[47]	In August 2021 the contribution of Working Group I to AR6 was published by the IPCC. The publication reinforces the evidence presented in the previous IPCC report (AR5) and, through the utilisation of updated climate model simulations and analyses, states that "*it is unequivocal that human influence has warmed the atmosphere, ocean and land*". It is highlighted that "*global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in*

[42] BSI (2019). BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. BSI; London.
[43] BSI (2019). BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements. BSI; London.
[44] RICS. (2012). Methodology to calculate embodied carbon 1st edition. RICS; London.
[45] CCC (2019). Net Zero – The UK's contribution to stopping global warming. CCC; London.
[46] CCC (2022). 2022 Progress Report to Parliament. CCC; London.
[47] IPCC (2021). The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)). Cambridge University Press; Cambridge.

Technical guidance document	Context
	CO_2 and other greenhouse gas emissions occur in the coming decades". The publication states that "*limiting human-induced global warming to a specific level requires limiting cumulative CO_2 emissions, reaching at least net zero CO_2 emissions, along with strong reductions in other greenhouse gas emissions*" and it is this assertion which will underpin the international response to global warming.
IPCC AR6: Climate Change 2022 – Mitigation of Climate Change[48]	The IPCC finalised the third part of AR6, the Working Group III contribution, in April 2022. It provides an updated global assessment of climate change mitigation progress and pledges and examines the sources of global emissions. It explains developments in emission reduction and mitigation efforts, assessing the impact of national climate pledges in relation to long-term emissions goals.
Sector summaries CCC sixth Carbon Budget Report Sector Summaries – Electricity Generation	This document contains a summary of content for the electricity generation sector from the CCC's Sixth Carbon Budget Advice. A key message relating to the management of the system is that "*As electricity generation is increasingly decarbonised and demand grows, network requirements will also rise. Investments in transmission networks will be key to accommodate higher levels of generation that are located from demand, like offshore wind."* The CCC's recommended carbon budget sector allocations for the electricity generation sector are: • remaining third carbon budget, 2022 only, 48.48MtCO_2e; • fourth carbon budget, 2023 to 2027, 189.16MtCO_2e; • fifth carbon budget, 2028 to 2032, 92.57MtCO_2e; and • sixth carbon budget, 2033 to 2037, 35.74MtCO_2e.

[48] IPCC (2022). Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)). Cambridge University Press; Cambridge.

Table 17.8 – Technical guidance relevant to the CCR assessment

Technical guidance document	Context
UKCP18 projections[49]	UK Climate Projections 2018 (UKCP18) has been produced by the Met Office and provides the latest set of climate change projections for the UK. It includes projections of how climate variables could change in the coming decades, as well as forecasts for sea level rise. UKCP18 projections are used in the CCR assessment (**Section 17.5** and **Section 17.9**).
UKCP18 technical notes including: 1. Science Overview Report[50] 2. UKCP18 Land projections: Science Report[51] 3. UKCP18 Factsheets[52]	The UKCP18 Climate Projections were issued with a suite of accompanying scientific reports. The Overview Report and the Land Projections report give a summary of the anticipated climate change trends found within the projection data, evaluating the projection pathways, and provide direction on the use of the data in terms of the nature and degree of consistency within the modelling results. The Factsheets are available as a short qualitative overview of the UKCP18 results for the climate parameters. The Factsheets were used to inform the development of the future baseline in **Section 17.5**.
ISO14091 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment[53]	This international standard provides guidelines on approaches to assessing climate change-related risks. It highlights the role of risk assessments in improving climate change adaptation planning and informing climate change adaptation activities from their implementation through to monitoring.
Commission Notice – Technical guidance on the climate proofing of infrastructure in the period 2021 - 2027[54]	This note gives technical guidance on the climate proofing of infrastructure, which includes the adaptation to climate change (climate resilience). The note contains guidance on the methodology of assessments, include the role within Environmental Impact Assessments (EIAs). The methodology for the CCR assessment

[49] Defra / Met Office (2018). UK Climate Projections 2018 (online). Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/ (Accessed 13 June 2022).
[50] Lowe, J. A. et al. (2019). UKCP18 Science Overview Report (online). Available at: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf (Accessed: 13 June 2022).
[51] Murphy, J. M. et al. (2019). UKCP18 Land Projections: Science Report (online). Available at: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Land-report.pdf (Accessed: 13 June 2022).
[52] Met Office. UKCP18 Factsheets. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/data/factsheets (Accessed 13 June 2022)
[53] International Standards Organisation (2021). ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment (online). (Accessed 13 June 2022)
[54] Commission Notice – Technical guidance on the climate proofing of infrastructure in the period 2021 – 2017 (2021). Official Journal C 373 1-92.

Technical guidance document	Context
	detailed in **Section 17.8** draws from principles within this guidance.
Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation[55]	This IEMA guidance provides a framework for the effective consideration of CCR and adaptation in the EIA process.
UK Climate Risk Independent Assessment 2021[12] and UK Climate Change Risk Assessment 2022[11]	The UK Government Third Climate Change Risk Assessment (CCRA3) 2022 fulfils the requirement under the Climate Change Act 2008[3] for the Government to produce a five-yearly assessment of the risks for the UK of the current and predicted impacts of climate change. The CCRA highlights key climate risks that has been used to inform the assessment.
Climate Change Adaptation Manual (NE751)[56]	Updated in 2020, this manual is designed to support practical and pragmatic decision-making on considering climate change adaptation for impacts on habitats, green infrastructure, geology and geomorphology, and access and recreation.

17.3 Consultation and engagement

Overview

17.3.1 The assessment has been informed by consultation responses and stakeholder engagement. An overview of the approach to consultation is provided in **Chapter 4: Approach to preparing the ES, Volume 5, Document 5.2.4**.

Scoping Opinion

17.3.2 A Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 28 April 2021. Appendix 6A: EIA Scoping Opinion responses for climate change provides detailed responses to the Planning Inspectorate comments. A summary of the comments and how these have been addressed within the ES is presented in **Table 17.9**.

17.3.3 Chapter 17 of the Scoping Report proposed to scope out the assessment of climate change effects from the EIA. In paragraph 3.3.25 of the Scoping Opinion, the Planning Inspectorate stated that "*the Environmental Statement (ES) should include a description and assessment (where relevant) of the likely significant effects the Proposed Development has on climate*" and "*the vulnerability of the project to climate change. Where relevant, the ES should describe and assess the adaptive capacity that has been incorporated into the design of the Proposed Development."* Paragraph 4.13.1 also stated that the *"ES should provide an assessment of GHG emissions during*

[55] IEMA (2020). IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (online). Available at: [redacted] (Accessed 13 June 2022).

[56] Natural England and RSPB (2019). Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate, 2nd Edition. (Online). (Accessed 13 June 2022).

construction and operation." Comments from the Environment Agency in response to the Scoping Report in relation to climate change and flood risk effects and assessment are addressed in **Chapter 9 Hydrology, Volume 5, Document 5.2.9.**

Table 17.9 – Summary of EIA Scoping Opinion responses for Climate Change

Consultee	Consideration	How addressed in this ES
Planning Inspectorate	The ES should include a description and assessment (where relevant) of the likely significant effects the Project has on climate (for example having regard to the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change. Where relevant, the ES should describe and assess the adaptive capacity that has been incorporated into the design of the Project.	This Chapter includes an assessment of GHG emissions and a CCR assessment which assesses the resilience of the Project to climate change and measures that have improved the adaptive capacity of the Project.
Planning Inspectorate	The ES should provide an assessment of GHG emissions during construction and operation.	The GHG assessment detailed in this Chapter considers emissions from construction and operation.
Natural England	The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained.	The ICCI assessment provides an assessment of the extent to which climate change exacerbates the effects of the Project on the natural environment. It draws upon the available guidance and studies, incorporating the mission as set out in the England Biodiversity Strategy *"to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks".*[57]

Statutory Consultation

17.3.4 Statutory Consultation took place between 28 October 2021 and 9 December 2021 in accordance with section 42 of the Planning Act 2008[58]. Prescribed and non-prescribed consultees and members of the public were included in the consultation. Various

[57] Defra (2020). Biodiversity 2020: A strategy for England's wildlife and ecosystem services. (Online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf. (Accessed: 22 August 2022)
[58] UK Government (2008). Planning Act 2008 (online). Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents (Accessed October 2022).

methods of consultation and engagement were used in accordance with the SoCC including letters, website, public exhibitions, publicity and advertising in newspapers and webinar briefings. There were no comments received relating specifically to the GHG PEIR assessment during this consultation.

17.3.5 National Grid prepared a Preliminary Environmental Information Report (PEIR) which was publicised at this consultation stage. National Grid sought feedback on the environmental information presented in that report. Feedback received during statutory consultation was considered by National Grid and incorporated where relevant in the design of the Project.

17.3.6 Stakeholder engagement related to CCR has been undertaken as part of other aspect chapters which include issues around aspects of CCR, for example for **Chapter 9: Hydrology, Volume 5, Document 5.2.9** and **Chapter 8: Biodiversity, Volume 5, Document 5.4.8**. Resilience measures in response to the issues have been incorporated into this assessment. No statutory consultation feedback was received specific to GHG emissions.

17.4 Data gathering methodology

Study area

GHG assessment

17.4.1 The spatial scope for the GHG emissions assessment has been informed by the spatial extent of the Project, including all activities within the Order Limits during its construction, operation and decommissioning. The GHG emissions associated with transport movements generated by the Project have also informed the spatial scope for the GHG emissions assessment. Further details of activities considered are provided in **Table 17.17.**

17.4.2 The temporal scope of the GHG emissions assessment is consistent with the period over which the Project would be constructed, in operation and decommissioned (see **Chapter 2: The Project, Volume 5, Document 5.2.2**).

CCR assessment

17.4.3 The spatial scope making up the Study Area for data gathering for the CCR assessment is informed by the spatial extent of the Order Limits as defined in **Chapter 3, Volume 5, Document 5.2.3**. The CCR assessment considers the temporary and permanent assets associated with the Project within these Order Limits, however, the resilience of the Project is also assessed by its interdependencies on external infrastructure beyond the spatial scope of the Project, for example, the resilience of the third party assets which support the function of the Project, such as the wider Highways network or third-party telecommunications providers.

17.4.4 The temporal scope of the CCR assessment is consistent with the period over which the Project would be constructed, in operation and decommissioned, and has informed the selection of climate data periods obtained as described in **Table 17.10.**

Desk study

GHG assessment

17.4.5 The UK carbon budgets and the CCC's recommended sector allocations have been used to establish the assessment baseline. No other data sources have been gathered to inform the baseline for the GHG emissions assessment. Data sources used for the GHG assessment are discussed in **Section 17.8**.

CCR assessment

17.4.6 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 17.10** for the CCR assessment.

Table 17.10 – Data sources used to inform the CCR assessment

Organisation	Data source	Data provided
Met Office	Weather data: Leeming climate station[59]	The Met Office collect data from climate stations around the UK for a number of climate parameters. Leeming, North Yorkshire was the climate station used in the assessment as the most representative of the Project location.
Met Office	UK Climate Projections (UKCP18)[60]	Climate data for the specified climate parameters for the 2030s, 2050s, 2070s and 2090s have been obtained from the Met Office UKCP18 User Interface and have been presented for the location of the Project.

17.4.7 **Table 17.8** details the data sources and technical guidance used in the desk study for the CCR assessment, including UKCP18 climate data.

17.4.8 UKCP18 provides probabilistic data on projected climate variables for the UK. The data provides projections until the end of the 21st Century for different emissions scenarios, known as Representative Concentration Pathways (RCP).

17.4.9 With current progress towards achieving National Determined Contributions, RCP8.5 is considered a possible, but conservative, emission scenario suitable for evaluating the climate resilience of Projects. Data from UKCP18 for the RCP8.5 scenario has been obtained for the 2030s (2020-2039), 2050s (2040 – 2059), 2070s (2060-2079), and

[59] Met Office (2022). UK Climate Averages – Leeming (online). Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcwuvhmch (Accessed 17 June 2022).
[60] Met Office (2022). UK Climate Projections User Interface (online). Available at: [redacted] (Accessed 23 June 2022)

2090s (2080-2099) projections at the 10%, 50% and 90% probability level and has been used to determine the future baseline. The data ranges were chosen to reflect the Project lifetime i.e. construction, operation and decommissioning phases.

17.4.10 UKCP18 provides a range of different climate data available at different scales. For all climate variables, preference has been given to the UKCP18 probabilistic projections at 25km as these have more limited sampling of uncertainties and are therefore the preference for future risk assessments. The spatial scope of the UKCP18 data relevant to the Project is that of the Yorkshire and Humber administrative boundary, as shown in **Graphic 17.1** which is an aggregated regional average created from the 25km probabilistic projections.[61]

Graphic 17.1 Administrative boundary used within UKCP18 Data

17.4.11 For some climate variables (notably wind and snowfall), climate data is not available within the 25km probabilistic projections. Regional data (12km) is available which better represents local effects and therefore wind and snowfall data can be extracted. However, for the purposes of this assessment, qualitative literature has been utilised, due to the uncertainties mentioned above. Namely, the UKCP18 factsheets have provided this information.[52]

[61] Fung et al., (2018). UKCP18 Guidance: Data availability, access and formats (online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance-data-availability-access-and-formats.pdf (Accessed: 22 June 2022).

Survey work

17.4.12 No survey work is required to inform the GHG assessment or the CCR assessment.

17.5 Overall baseline

Current baseline

GHG assessment

17.5.1 The third carbon budget (2018 to 2022) of 2,544MtCO_2e and the CCC's recommended carbon budget sector allocations (see **Table 17.7**) can be considered as the current baseline for the GHG emissions assessment.

CCR assessment

17.5.2 The baseline for the climate change resilience assessment is the current climatic conditions within the Order Limits. They are used to provide context of the climate change impacts throughout the operation and decommissioning of the Project.

17.5.3 The Project is located within the Yorkshire and Humber region in the north-east of England. The high altitude of the Pennines, which forms the western boundary of the region, is responsible for the frequently cool and wet climate. The North Sea, forming the eastern boundary, cools the coastal districts, especially in Summer. The coldest waters around the UK are found off the north-east of England.

17.5.4 Key features of the climate that have defined the north east of England area over the last 30-year period[62] of 1981-2010[63] include:

- Temperature is strongly correlated with altitude within the region and affected by the cold coastal waters, leading the region to be generally cool throughout the year. In low-lying areas, mean annual temperatures range from 8.5°C to 10°C. The lowest temperature recorded in the region is 8km (5mi) from the Project site, Houghall, which is considered a 'frost hollow', recording -21.1°C in 1941. Extreme high temperatures can occur in the north-east of England, but they are less common than areas further south. For example, during a heatwave in August 1990 in the north-east, the temperature reached 33°C.
- The average number of days with air frost varies from about 30 days per year on the coast to about 55 days per year inland. Ground frost occurs on average about 80 days per year on the coast and over 135 days per year on high ground.
- Rainfall has been generally well-distributed throughout the year, with a seasonal pattern. The driest season is Spring, whilst there is a peak in Autumn/Winter in the uplands associated with the Atlantic depressions bringing most of the rain for the season. The total number of days with rainfall of 1mm or more ('wet days') in the

[62] The data for the 30-year climate period 1991 – 2020 is now available from the Met Office however, due to UKCP18 presenting climate data against the baseline 1981 – 2000, the climate period 1981 – 2010 has been chosen to represent the climate baseline.
[63] Met Office (2016). North East England: climate (Online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/north-east-england_-climate---met-office.pdf (Accessed 13 June 2022).

higher altitudes can be 45 – 50 days in Winter, decreasing to 35 days in Summer. In the drier coastal areas, 30 days in Winter and 25 days in Summer is typical.

- Thunderstorms are most frequent in July and August; the north of the region can experience 5 – 8 days with thunder each year. The Summer thunderstorms bring the heaviest falls of rain in the UK. On 28 June 2012, severe thunderstorms caused considerable flooding in the Newcastle area.
- On average, the number of days with snow falling is about 20 days per year in coastal and low-lying areas, rising to 50 days per year over the higher Pennines. However, the number of days of snow lying is only 10 days for the coasts and low-lying areas, and 40 days over the Pennines.
- Wind speeds and gusts are highest in December to February. A gale is when wind reaches a mean speed of 34 knots or more over any ten consecutive minutes. Coastal areas can experience 5 – 10 days of gales per year, whereas low-lying places inland can experience less than 5 gales per year. There are many significant gales historically affecting the region, causing property damage and disruption.

17.5.5 The nearest weather station with observable data available through the Met Office is Leeming, North Yorkshire.

17.5.6 Key data from the 1981 – 2010 period is contained within **Table 17.11**.[59] It presents data from the nearest weather station, Leeming, in comparison with the wider regional district of north-east and east England. This is contextualised against the national data for England.

Table 17.11 - Baseline climate data 1981 - 2010

1981 - 2010	Nearest climate station – Leeming (North Yorkshire)	Regional: North-east and East England	England
Monthly average rainfall (mm)	53.49	64.48	70.82
Days of rainfall > 1mm (days)	117.93	131.83	133.01
Minimum annual average temperature (°C)	5.61	5.21	5.85
Maximum annual average temperature (°C)	13.29	12.63	13.46
Maximum Summer average temperature (°C)	20.81	20.06	20.94
Mean wind speed at 10m (knots)	8.01	9.04	8.44
Air frost (days)	53.13	56.96	49.70

17.5.7 The unprecedented extreme heat wave which occurred across the UK in July 2022 saw temperatures reaching 38.8°C at Leeming, North Yorkshire on 19 July 2022.[64]

Future baseline

GHG assessment

17.5.8 The UK Government has set a net zero target which requires the UK to reduce GHG emissions by 100% below 1990 levels by 2050[4]. Policy has been implemented at national, regional and local scales in order to achieve targets for decarbonisation (see **Table 17.4**). GHG emissions are therefore expected and required to reduce in the future. The future baseline considers relevant policy and a number of the UK carbon budgets (including sectoral allocations) over the lifetime of the Project: the fourth carbon budget (2023 to 2027) of 1,950MtCO_2e, the fifth carbon budget (2028 to 2032) of 1,725MtCO_2e and the sixth carbon budget (2033 to 2037) of 965MtCO_2e.

17.5.9 Emissions from a 'without Project' case in the future baseline will not be quantified in this assessment as they are considered to be nil.

CCR assessment

17.5.10 The future baseline is used to set out general climatic conditions that would be experienced over the Project lifetime based on the following:

- The construction period is anticipated to be over four years six months from 2024 to approximately 2028, with minimal expected climate change from the baseline. This will be considered within the 2030s time period (2020 – 2039).
- The asset design life of the Project is 80 years. This is considered across the 2050s (2040 – 2059), the 2070s (2060 – 2079) and the 2090s (2080 – 2099). The operational design life extends into the 22nd Century however the 2090s projections are the maximum time slice available within UKCP18 and will therefore inform the assessment. Due to the uncertainties in climate projections presented in **Section 17** climate changes anticipated by the end of the Project design life which are beyond the scope of the data available from UKCP18 are not considered in this assessment.
- Decommissioning activity will likely involve the removal of the overhead lines and dismantling of assets. The timescales for this activity are currently not defined, as the operational life of the asset may be much longer than the design life, dependent on an ongoing repair and replacement programme. The climate projections for the 2090s will inform decommissioning activities at this stage, but it is likely that any decommissioning activities would be subject to an updated CCR assessment at that time, utilising updates to climate projections.

[64] Met Office (2022). Unprecedented extreme heatwave, July 2022 (Online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_03_july_heatwave.pdf (Accessed: 22 August 2022)

Table 17.12 - Future climate projections for the Yorkshire and Humber from UKCP18

Climate variable		Time period and projected change[65]				Trend[66]
		2030s (2020 – 2039)	2050s (2040 – 2059)	2070s (2060 – 2079)	2090s (2080 – 2099)	
Mean temperature change (Summer) (°C)	10%	0.35	0.94	1.41	2.50	↑
	50%	1.15	2.09	3.16	4.86	↑
	90%	1.98	3.32	5.00	7.30	↑
Mean temperature change (Winter) (°C)	10%	0.15	0.47	0.82	1.47	↑
	50%	0.97	1.60	2.41	3.49	↑
	90%	1.79	2.84	4.13	5.65	↑
Maximum temperature anomaly (Summer) (°C)	10%	0.13	0.78	1.31	2.49	↑
	50%	1.22	2.27	3.43	5.32	↑
	90%	2.32	3.87	5.73	8.39	↑
Minimum temperature anomaly (Winter) (°C)	10%	0.08	0.39	0.68	1.29	↑
	50%	0.88	1.56	2.37	3.42	↑
	90%	1.79	2.95	4.36	6.01	↑
Mean precipitation change (Winter) (%)	10%	-4.62	-3.78	-4.12	-2.32	⇔ / ↓
	50%	3.77	7.05	10.78	15.87	↑
	90%	13.15	19.69	28.03	37.81	↑
Mean precipitation change (Summer) (%)	10%	-21.04	-32.85	-46.98	-58.99	↓
	50%	-5.90	-15.77	-24.58	-32.01	↓
	90%	10.21	0.79	-1.78	-5.85	↓
1-day total Winter precipitation (mm)	10%	26.27	27.08	27.88	28.62	↑
	50%	29.80	31.24	33.12	35.25	↑
	90%	33.93	36.17	39.37	43.15	↑

[65] UKCP18 science reports, key messages, maps and graphs uses a 20-year baseline period of 1981 – 2000 to present the projected change in climate variables.
[66] Trendline is indicative of direction of travel but is not to scale or indicative of magnitude of change.

Climate variable		Time period and projected change[65]				Trend[66]
		2030s (2020 – 2039)	2050s (2040 – 2059)	2070s (2060 – 2079)	2090s (2080 – 2099)	
1-day total Summer precipitation (mm)	10%	40.55	39.49	37.56	34.84	↓
	50%	47.61	47.57	47.54	47.47	⇔ / ↑
	90%	56.52	57.99	60.48	63.99	↑
5-day total Winter precipitation (mm)	10%	62.17	63.23	64.07	64.59	↑
	50%	68.72	71.50	75.16	79.30	↑
	90%	76.56	81.60	88.75	97.29	↑
5-day total Summer precipitation (mm)	10%	78.04	75.31	70.91	65.40	↓
	50%	87.04	87.13	87.29	87.45	⇔ / ↑
	90%	97.16	100.81	106.48	113.35	↑

17.5.11 It is anticipated that there will be an increase in Winter precipitation (rainfall), coupled with an increase in intensity of Winter rainfall events shown by the increase in absolute amount of precipitation falling within the 1-day and 5-day rainfall event.

17.5.12 There is a clear shift to drier Summers across all time periods as shown by the decrease in Summer precipitation. Despite this overall trend towards drier Summers, new data from UKCP18 Local suggests future increases in the intensity of heavy Summer rainfall events[67] and the likelihood of individual wet Summers reduces only slightly[68]. This is reflected within the data for the 1-day and 5-day Summer precipitation event data as it shows only slight changes across all time periods.

17.5.13 UKCP18 has found an increase in surface wind speeds over the UK for the second half of the 21st Century during the Winter season, where more significant impacts of wind are experienced. It is anticipated that there will be an increase in the frequency of storms, however the increase in mean wind speeds is modest.[69]

[67] Met Office (2018). UKCP18 Headline Findings (Online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf (Accessed December 2021).
[68] Met Office (2018). UKCP18 Factsheet: Precipitation (Online). Available fromat: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-factsheet-precipitation.pdf (Accessed December 2021).
[69] Met Office (2018). UKCP18 Factsheet: Wind (online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind_march21.pdf (Accessed December 2021).

17.5.14 The UKCP18 2070s projections show a significant decrease in falling and lying Winter snow of around 80-100% for the north-east of England in both local (2.2km) and regional (12km) projections.[70]

17.6 Embedded measures

17.6.1 A range of environmental measures have been embedded into the Project as outlined in **Section 3.4, Volume 5, Document 5.2.3**. **Table 17.13** outlines how these embedded measures will influence the GHG assessment and **Table 17.14** for the CCR assessment.

Table 17.13 – Summary of the embedded environmental measures - GHG

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
Construction			
Global Climate	There are embodied GHG emissions associated with the raw materials used to construct the Project.	A Code of Construction Practice (CoCP) has been submitted with the application and certified under the DCO. It details measures to be implemented, such as goals to reduce embodied carbon in construction materials and therefore reduce GHG emissions, and encouragement of circular economy principles.	**CoCP, Volume 5, Document 5.3.3B** implemented by way of a Development Consent Order (DCO) requirement 5
Global Climate	There are GHG emissions associated with construction traffic.	The CoCP includes measures such as consolidating deliveries where possible and policies such as 'no idling'. These measures seek to minimise the GHG emissions associated with construction traffic.	**CoCP, Volume 5, Document 5.3.3B** and **CTMP, Volume 5, Document 5.3.3F** implemented via DCO requirement 5

[70] Met Office (2108). UKCP18 Factsheet: Snow (online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_factsheet_snow_jul-2021.pdf (Accessed December 2021).

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
		The Construction Traffic Management Plan (CTMP) seeks to minimise the number of construction trips where feasible. National Grid are committed to delivering carbon neutral construction by 2026 as part of their Environmental Action Plan.	
Global Climate	Use of construction materials has associated embodied carbon GHG emissions	The reconductoring works proposed as part of the Project utilise existing pylons as far as possible rather than introducing new construction materials.	DCO Works Plans, Schedule 1 of the DCO
Operation			
Global Climate	The use of SF_6 within switchgear equipment is a potential source of GHG emission during the operational lifetime of the Project. These GHG emissions have been estimated as part of the GHG assessment (See **Section 17.9**).	National Grid have adopted a Science Based Target (SBT) of reducing operational emissions by 50% and have equated this to a 30% reduction in SF_6 emissions[71]. To aid the achievement of this SBT, National Grid report to have a Network Asset Risk Metric (NARM) framework in place. The NARM framework is a scoring system and works to determine whether equipment intervention is required[71].	As reported within **Table 17.4**, the Draft NPS EN-5[21] requires applicants to design a plan for the monitoring and control of fugitive SF_6 emissions consistent with F-gas Regulations. The NARM framework forms this plan. National Grid would monitor SF6 via a density gauge which is fitted to the relevant equipment and is inspected regularly. This gauge also has alarm levels for low and falling SF6 density. Any top ups that are required are

[71] National Grid (2020). SF6 Investment Plan – Asset Group Strategy. National Grid; London.

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
			recorded in terms of the mass of gas used and this data forms part of the NARM framework for deciding upon Asset Health interventions meaning that, within certain criteria, leaking assets are prioritised for intervention.

Table 17.14 – Summary of the embedded environmental measures - CCR

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
Construction			
Buildings and infrastructure and human health	Climate change and extreme weather effects on the Project assets and the construction workforce.	The Contractor(s) will ensure that the relevant measures within the CoCP and health and safety procedures are implemented. For example, additional rest breaks in hot weather, dust management in hot and dry weather and emergency planning for extreme weather events such as flooding, storms and wildfires.	Embedded in design parameters (**Volume 2, Document 2.15**) consented via DCO Requirement 3 and through use of the **CoCP, Volume 5, Document 5.3.3B** implemented via DCO requirement 5
Buildings and infrastructure	Overwhelming of the construction site drainage system causing flooding across the site.	All necessary embedded drainage design measures assessed in the Flood Risk Assessment (FRA) will be incorporated into the Project such as the application of the Environment Agency's climate change allowances for flood risk and drainage design during construction	Drainage design implemented via DCO requirement 6
Operation			

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
Buildings and infrastructure	Increased rainfall resulting in pluvial and fluvial flooding affecting Project assets.	All necessary embedded drainage design measures assessed in the Flood Risk Assessment (FRA) will be incorporated into the Project such as the application of the Environment Agency's climate change allowances for flood risk and drainage design for the operational scheme.	Drainage design requirements implemented via DCO requirement 6
Buildings and infrastructure	Climate change trends such as high temperatures and drought conditions affecting Project assets.	Material specifications and the detailed design of Project assets, such as M&E equipment, overhead lines, foundations and road surfacing, will include operating tolerances taking into account future climate change. Additionally, the design of cables will include cable rating calculations considering a range of tolerances for changes in soil moisture and resistivity.	Design plans, DCO Requirement 3
Human health	Climate change trends such as high temperatures and drought conditions affecting maintenance and operation workforce.	Risk Assessment Method Statement (RAMS) will be used as part of operating procedures to plan operation and maintenance activities. For example, the RAMS will include measures for working in increasingly high temperatures, prolonged wet weather and set out adequate planning for extreme weather events such as flooding and wildfire.	Requirements of legislation, Appointed contractor Risk Assessment Method Statement
Buildings and infrastructure	Climate change trends such as high	Adaptative capacity has been built into the	Design plans, DCO Requirement 3 – or

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
	temperatures and drought conditions affecting Project assets or resulting in a prolonged growing season resulting in vegetation interfering with the overhead lines.	operation and maintenance of the Project. For example, maintenance will highlight any heat-related or water-related deterioration and replacement requirements would accommodate climate change trends or increasing vegetation management regimes.	Requirement 8 and 9 Landscape and mitigation planting (if in relation to planting)
Buildings and infrastructure	Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells resulting in cascading failures from interdependencies.	The Project design incorporates resilience measures to the interdependencies that affect the operation of the Project, such as back up telecommunication connections, or diesel generators in substations.	Design plans, DCO Requirement 3
Decommissioning			
Human health	Climate change and extreme weather effects on the decommissioning workforce.	It is anticipated that similar environmental measures to those embedded into the Project design for the construction phase (for example health and safety procedures and emergency planning relating to extreme weather) would be implemented at the decommissioning phase. The decommissioning phase would be subject to a written phase of decommissioning for approval by the local planning authority (DCO Requirement 16)	DCO requirement 16
Buildings and infrastructure	Climate change and extreme weather	It is anticipated that similar environmental measures to those embedded into the	DCO requirement 16

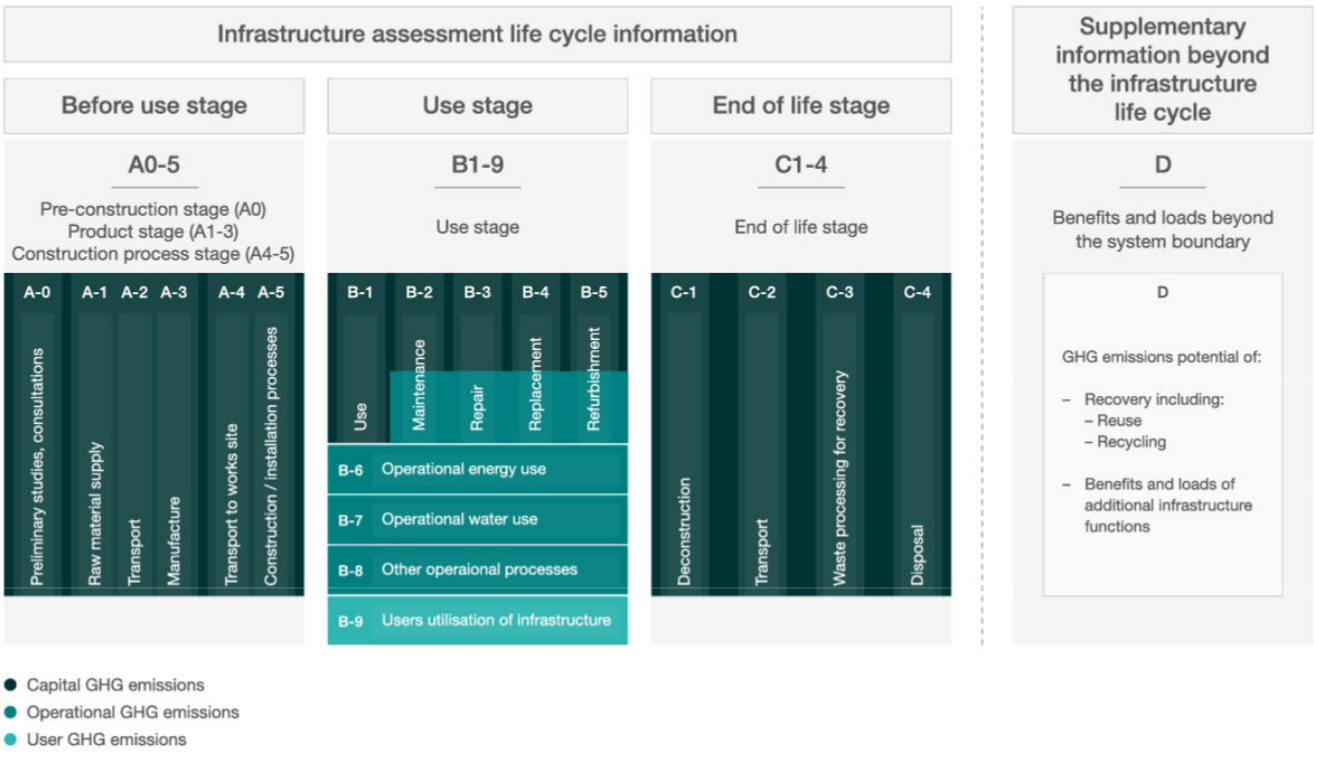
Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
	effects on the Project assets.	Project design for the construction phase (for example material specifications in accordance with the climate conditions at that time) would be implemented at the decommissioning phase. The decommissioning phase would be subject to a written phase of decommissioning for approval by the local planning authority (DCO Requirement 16)	

17.7 Scope of the assessment

The Project

17.7.1 The Project life cycle, as described within PAS 2080: Carbon Management in Infrastructure[40] (see **Graphic 17.2**), has been considered for the GHG assessment. The Likely significant effects section below reports the specific aspects of the Project which apply to each Project life cycle phase.

Graphic 17.2 Infrastructure life cycle stages[40]



Spatial scope

17.7.2 The spatial scope of the GHG and CCR assessment covers the area of the Project contained within the Order Limits, together with the Study Area described in **Section 17.4**.

Temporal scope

GHG assessment

17.7.3 The temporal scope of the GHG assessment is consistent with the period over which the Project would be carried out. Construction is expected to commence in 2024 aiming to be fully operational by 2027. The asset design life is anticipated to be 80 years and decommissioning works are likely to involve removal of the overhead lines and dismantling of assets. The temporal scope for the GHG assessment will also include the decommissioning period. The decommissioning period will cover the period after the Project's operational lifetime, and is reported to take place over a 2 year period (See **Chapter 3: Description of the Project, Volume 5, Document 5.2.3**)

CCR assessment

17.7.4 The temporal scope of the CCR assessment is consistent with the period over which the Project would be carried out. Construction is expected to commence in 2024 aiming to be fully operational by 2027. The asset design life is anticipated to be 80 years and decommissioning works are likely to involve removal of the overhead lines and dismantling of assets. It is likely that the asset will be operational beyond the design life, depending on its condition. Therefore, the future climate variables will be analysed for the following time periods from UKCP18: the '2030s' (2020 – 2039), the '2050s' (2040 – 2059), '2070s' (2060 – 2079) and the 2090s (2080 – 2099). Using 20-year periods allows the effects of climate variability on annual to decadal time scales to be accounted for.

Potential receptors

GHG assessment

17.7.5 The principal receptor that has been identified as part of the GHG assessment as being potentially subject to effects is summarised in **Table 17.15**.

Table 17.15 – GHG assessment receptors subject to potential effects

Receptor	Reason for consideration
The global climate	GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global climate is therefore the only receptor for the GHG assessment. The receptor has a high sensitivity, given the severe consequences of global climate change and the cumulative contributions of all GHG emission sources[38]

CCR assessment

17.7.6 The receptors that are considered as part of the CCR and ICCI assessment can be grouped into the following categories.

- Building and infrastructure receptors i.e. the Project assets, both temporary and permanent, throughout the lifecycle of the Project.
- Human health receptors i.e. construction workers, maintenance staff.
- Environmental receptors i.e. habitats and species, waterbodies.

17.7.7 The principal receptors that have been identified as part of the CCR assessment as being potentially subject to effects are summarised in **Table 17.16**.

Table 17.16 – CCR receptors subject to potential effects

Receptor	Reason for consideration
Building and infrastructure including: temporary and permanent infrastructure and buildings considered Project assets; new and existing access roads; materials, plant and equipment; drainage assets; and third party assets where the Project is interdependent.	The CCR assessment considers the resilience of the Project as an amalgamation of its individual temporary and permanent assets. The resilience of the individual Project assets is essential to the resilience of the overall Project.
Human health including site operatives during construction, operation and decommissioning of the Project.	The CCR assessment considers the effects of climate change on the Project and the resilience of the Project to these effects, including the health of the workforce required during the construction, operation and decommissioning activities of the Project.
Environmental including existing habitats and waterbodies, and habitat creation and restoration areas.	The CCR and ICCI assessment considers the natural environment that exists within the spatial extent of the Project as receptors that could be impacted by climate change. The Project assets include habitat creation and biodiversity net gain measures as part of the operation which are assessed in terms of their resilience to climate change to ensure their success.

Likely significant effects

GHG assessment

17.7.8 The effects on the GHG assessment receptor which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 17.17**. This is based on phases as defined within PAS 2080: Carbon Management in Infrastructure[40] (see **Graphic 17.1**).

Table 17.17 – Summary of effects considered for further assessment - GHG

Project phase	Main stages of Project life cycle	Sources of GHG emissions and effects	Scoped in/out
Construction	A0 – Pre-construction stage	Is likely to comprise preliminary studies and works, for example strategy and brief development, design efforts, EIA and cost planning. Most, if not all, of these functions will be largely office-based functions with contributions from across the value chain. GHG emissions related to office-based activities as part of the pre-construction stage are not expected as part of the Project. GHG emissions associated with transport emissions from site preparation activities are included within the **A4 Construction transport** stage discussed below. Therefore, this stage of the Project lifecycle has been scoped out of the assessment.	Scoped out
Construction	A1-A2-A3 – Raw materials supply, transport and manufacture	GHG emissions associated with the materials used to construct new and temporary overhead lines, pylons, Cable Sealing End Compounds (CSECs), substations and underground cabling. These comprise embodied GHG emissions associated with the raw material assets required to construct the Project. An estimate of materials required to construct the Project has been developed based on the current design and upon liaison with project engineers.	Scoped in
Construction	A4 – Construction transport	Transport of construction materials resources and equipment from point of purchase to the work sites. Commuting of workforce during construction.	Scoped in
Construction	A5 - Construction process stage	Emissions associated with construction and installation processes (including fuel and electricity consumption) of the temporary works, ground works, landscaping and permanent works. Emissions associated with site water demand. This has included the consideration of the embodied carbon	Scoped in

Project phase	Main stages of Project life cycle	Sources of GHG emissions and effects	Scoped in/out
		associated with the raw materials removed as part of the Project. Waste management activities (transport, processing, final disposal) associated with waste arising from the Project.	
Construction	A5 - Construction process stage	Emissions associated with land use change. The changes in land use type associated with the Project are not expected to impact peatland (See **Chapter 11: Agriculture and Soils, Volume 5, Document 5.2.11**). Peat consists of soils which are of high environmental value due to its carbon storage capabilities. This Project stage has therefore not been considered as part of the assessment.	Scoped out
Operation	B1 – Boundary of use stage: installed products and materials	Called 'use', this represents the carbon emitted directly from the fabric of products and materials once they have been installed as part of infrastructure and it is in normal use. This includes the use of sulphur hexafluoride (SF_6) in switch gear equipment installed as part of the Project.	Scoped in
Operation	B2-B5 – Maintenance, repair, replacement and refurbishment	Represents the works activities and new materials for the maintenance, repair, replacement and refurbishment of the infrastructure during the use stage / operation of infrastructure. GHG emissions associated with the refurbishment of permanent structures of the Project have been considered within the GHG assessment. These will include embodied carbon GHG emissions associated with the raw materials being refurbished during the operational lifetime of the Project. Due to the likely low number of staff to be employed at each of the substations, which will not be manned on a permanent basis, and limited maintenance activity required for the components of the Project	Scoped in Scoped out

Project phase	Main stages of Project life cycle	Sources of GHG emissions and effects	Scoped in/out
		GHG emissions from traffic associated with operation and maintenance has been scoped out of the ES. See **Chapter 12: Traffic and Transport, Table 12.3, Volume 5, Document 5.2.12** for the Planning Inspectorate's decision and also **Table 12.14** for effects scoped out of the traffic and transport ES assessment.	
Operation	B6 – Operational energy use	Emissions resulting from the energy used by the Project to enable it to deliver its service during operation. For example, the GHG emissions associated with the generation of power. The nature of the Project is such that it largely transmits rather than uses energy although there would be some minimal uses, for example lighting used within control buildings at the substations. The GHG emissions associated with lighting at the control buildings has been scoped out on the basis that they are less than 1% of the total GHG emissions associated with this Project. In accordance with IEMA guidance[38] for GHG assessments, activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions.	Scoped out
Operation	B7 – Operational water use	Emissions resulting from the consumption of water required by the Project to operate and deliver its service. Consumption of water is not expected during operation of the Project.	Scoped out
Operation	B8 – Other operational processes	Represents other process GHG emissions arising from the Project to enable it to operate and deliver its service including management of operational waste. Emissions associated with the transport of workforce would be very minimal and associated with occasional maintenance works. The substations would not be manned on a permanent basis. No other operational processes of the	Scoped out

Project phase	Main stages of Project life cycle	Sources of GHG emissions and effects	Scoped in/out
		Project have been identified, additional to the transport of workforce associated with the maintenance and repair of materials, considered in stage **B2-B5.**	
Operation	B9 – User's utilisation of infrastructure	Represents the activities associated with user's utilisation of the Project during the use stage. This is defined by the principle of control and influence whereby the GHG emissions are B9 (user's utilisation) when they arise from an activity that the user has control over. Activities such as those described for this stage have not been identified for the Project.	Scoped out
Decommissioning	C1-C4 – End of life stage: deconstruction, transport, waste processing for recovery and disposal	Represents the on-site activities of deconstructing, dismantling and demolishing the infrastructure. All GHG emissions due to transport, disposal and / or until the end-of-waste state of waste materials arising. Activities associated with treatment and processing for recovery, reuse and recycling of waste materials arising from infrastructure. GHG emissions resulting from final disposal of demolition materials.	Scoped in
General	D – Benefits and loads beyond the infrastructure life cycle	Includes avoided carbon emissions associated with the Project including potential for re-use, recovery and recycling of materials and/or energy and associated GHG emissions beyond the system boundary. Avoided carbon emissions associated with the Project could include the reconductoring works of the Project. This is since these reconductoring works will utilise existing pylons, therefore there are GHG emissions avoided through no introduction of new raw materials. This is accounted for within the **A1-A2-A3 – Raw materials supply, transport and manufacture** stage discussed above. The Project is needed to improve the transfer of clean energy across the	Scoped out

Project phase	Main stages of Project life cycle	Sources of GHG emissions and effects	Scoped in/out
		country. Maximising the potential of renewable energy generation to provide clean energy to homes will help to avoid CO_2 emissions and have a beneficial impact on the Climate. The avoided emissions discussed here cannot be quantified at this time, and therefore will not influence the determination of the significance of effects from GHG emissions associated with the Project.	

CCR assessment

17.7.9 The effects on CCR receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 17.18**.

Table 17.18 – Summary of effects scoped in for further assessment - CCR

Climate Impact	Receptor	Likely significant effects	Phase
Increased annual mean temperatures, especially in the Summer months, and an increase in the frequency and intensity of hot spells	Human health	Increased heat stress or heat exhaustion experienced by staff.	Construction, operation and decommissioning
	Building and infrastructure	Restriction of certain construction activities during hot weather, for example, the pouring of concrete in higher temperatures could reduce the strength and durability of the finished product, and the laying of asphalt could become difficult as it fails to maintain profile during compaction. This could cause programme delay and increased costs.	Construction and decommissioning
	Building and infrastructure	Overheating of mechanical and electrical (M&E) assets such as substations, transformers, switchgears and underground cables, leading to a decrease in asset performance and rating and/or requiring additional electricity demand for mechanical cooling units.	Operation

Climate Impact	Receptor	Likely significant effects	Phase
	Building and infrastructure	Increased rate of degradation of compound access road surface material, such as asphalt, increasing maintenance requirements for access roads.	Operation
	Building and infrastructure	Sagging of overhead lines, reducing capacity and amount of power that is able to be transmitted and distributed.	Operation
	Building and infrastructure	Increased vegetation growth due to a prolonged growing season interfering with overhead lines and requiring increased maintenance requirements.	Operation
	Building and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as overheating of ICT equipment leading to loss of monitoring telecommunications.	Operation
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased Summer precipitation	The natural environment	Landscape and biodiversity planting could fail resulting in increased replacement and management and associated environmental costs e.g. water use.	Operation
	Human health	Increased dust creation from construction activities, leading to impacts on the health of construction workers and the failure of machinery and equipment.	Construction and decommissioning
	Building and infrastructure	Wildfires restricting access to the compounds or causing damage to the equipment.	Construction, operation and decommissioning
	Human health	Risk of wildfires affecting the operational and maintenance workforce.	Construction, operation and decommissioning
Decrease in Summer precipitation, leading to drought conditions	Building and infrastructure	Drought conditions impacting water available through abstraction licenses to use during construction, e.g. for dust suppression and commissioning.	Construction and decommissioning

Climate Impact	Receptor	Likely significant effects	Phase
	Building and infrastructure	Changes to soil moisture levels causing shrink swell within the soils, affecting soil resistivity and causing a reduction in cable ratings and the effectiveness of earthing.	Operation
Fluctuations in mean rainfall across the year, coupled with an increase in mean temperatures, resulting in changes to soil moisture.	Building and infrastructure	Changes to soil moisture levels causing shrink swell within the soils, leading to deterioration of structure foundations of the overhead lines and pylons from ground movement.	Operation
	Building and infrastructure	Changes in soil moisture levels causing ground movement resulting in mechanical damage to buried cables.	Operation
Increase in precipitation resulting in fluvial or pluvial flooding.	Human health	Wet weather leading to increased possibility of slips, trips and falls.	Construction, operation and decommissioning
	Building and infrastructure	Flooding of construction site access roads causing delays to construction programme.	Construction and decommissioning
	Building and infrastructure	Flooding of M&E equipment resulting in loss of supply through flood damage and/or increased corrosion rate.	Operation
	Building and infrastructure	Increased surface water exceeding the capacity of attenuation and drainage, causing flooding across the site or elsewhere.	Operation
	Building and infrastructure	Increased corrosion of footings leading to instability of poles and pylons.	Operation
	Building and infrastructure	Access to the equipment could be restricted due to flooding, affecting any emergency or routine maintenance works.	Operation
	Building and infrastructure	Flooding causing groundwater saturation leading to cable faults.	Operation
	Building and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as flooding of wider	Operation

Climate Impact	Receptor	Likely significant effects	Phase
		road network preventing access to equipment.	
Increased frequency and intensity of storm events.	Building and infrastructure	There is an increased risk of disruption to construction work, such as cranes unable to operate in high winds.	Construction and decommissioning
	Buildings and infrastructure	Increased wind loading on substation equipment and security fencing leading to damage.	Operation
	Buildings and infrastructure	Increased wind speeds and frequency of storm events weakening poles and fittings and the overhead lines.	Operation
	Human health	Wind blown debris leading to risk to maintenance personnel.	Operation
	Buildings and infrastructure	Lightning strikes on assets, such as overhead lines and transformers, resulting in physical damage, fire, power surge and shock waves, causing short power outages.	Operation
	Buildings and infrastructure	Increased wind speed and wind blown debris causing damage to overhead lines.	Operation
	Buildings and infrastructure	Cascading failures due to interdependencies on third party assets such as lightning strikes causing intermittent loss of telemetry.	Operation
Cold Winters can still occur.	Buildings and infrastructure	Snow, sleet and ice accretion affecting the structural integrity of the overhead line and reducing clearance under heavy ice.	Operation

17.7.10 There are no effects that are to be scoped out of the CCR assessment at this stage.

17.8 Assessment methodology

GHG assessment

17.8.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4: Approach to Preparing the ES**, **Volume 5, Document 5.2.4**. However, whilst this has informed the approach that has been used in this climate change

assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this climate change assessment.

17.8.2 The approach to the GHG assessment is to quantify and contextualise the GHG emissions of the Project. The 'with Project' case will consider the life cycle stages of the Project as set out within **Table 17.17**. The only assessment case to consider for the GHG assessment of the Project is the 'with Project' case, as future GHG emissions will be nil in the context of the 'without Project' case.

17.8.3 The change in GHG emissions associated with the Project is evaluated against national targets for decarbonisation (the future baseline), this is to allow the impact of the GHG emissions associated with the Project to be contextualised. The UK's carbon budgets are the key quantities against which emissions are contextualised. They are legally binding, and represent the UK's goals in addressing the impact of GHG emissions on the global climate.

Quantification of GHG emissions

17.8.4 The approach to quantifying the GHG emissions associated with the Project will consider the whole infrastructure life cycle of the Project. The infrastructure life cycle phases as described within the PAS 2080: Carbon Management in Infrastructure[40] and in **Table 17.17** will be used. These phases will allow for the identification of the GHG emission sources associated with the Project. This methodology is in line with the latest IEMA guidance[44].

17.8.5 GHG emissions associated with the emission sources described in **Table 17.17** will generally be calculated using the following equation:

$$Activity\ data\ X\ GHG\ emissions\ factor = GHG\ emissions\ value$$

17.8.6 Assumptions have been made to characterise the likely activities associated with the Project and therefore enable GHG emissions to be determined. These assumptions ensure a proportionate assessment has been carried out. All assumptions are detailed below.

Construction

17.8.7 For construction emissions, the cumulative emissions of processes up to handover of the construction phase to the use (operational) phase have been considered.

17.8.8 A significant proportion of the emissions associated with the Project are likely to be the embodied carbon of the materials used. This represents the sum of GHG emissions covering extraction of raw and primary materials and their manufacture and refinement into products and construction materials, as well as the transport and supply logistics to the factory gate. The RICS methodology to calculate embodied carbon[50] along with the embodied carbon figures reported by the Inventory of Carbon and Energy (ICE) Database[72] have been used. In this case, the embodied carbon figures from the ICE database[72] are considered as the *emission factor,* and the weight of the materials considered as the *activity data.* The embodied carbon figures from the ICE database[72] have been multiplied by the weight of materials associated with material resources. A list of material resources has been based upon available design information (See

[72] Circular Ecology (2019). Embodied Carbon – The ICE Database. Circular Ecology; Brighton.

Chapter 3: Description of the Project, Volume 5, Document 5.2.3) from project engineers on the materials required for the following Project components:

- the construction of the new overhead lines;
- the construction of new pylons;
- the introduction of new underground cabling;
- the construction of CSECs
- the construction of substations;
- the installation of temporary infrastructure; and
- replacement of steel on existing pylons.

17.8.9 Surface access emissions associated with construction activities have been estimated, based on trip length and using the Department for Environment, Food and Rural Affairs (Defra) Emissions Factor Toolkit (EFT)[73]. The EFT accounts for introduction of newer vehicles into the fleet in accordance with the NAEI Vehicle Fleet Composition Projection for 2021. Details on the number of Heavy Goods Vehicles (HGVs) and Light Goods Vehicles throughout the construction of the Project have been estimated through the traffic and transport modelling (**Chapter 12: Traffic and Transport, Volume 5, Document 5.2.12**).

17.8.10 In the absence of specific data for the Project, the one-way transport distance for construction materials (HGVs) and LGVs) is estimated to be 100km. This is based on the Department for Transport (DfT)[74] dataset on domestic road freight transport by commodity and length of haul (calculated as the average distance travelled to move “Glass, cement and other non-metallic mineral products” and “Metal products”).

17.8.11 The precise details of the nature and quantity of plant and machinery for each sub-phase are unknown at this stage. Therefore, a combination of the value of the Project and an industry benchmark for process emissions, published by RICS, have been used to calculate the construction process emissions. These include emissions related to energy consumption, plant use and waste. The RICS Key Performance Indicator (KPI) suggests, that in the absence of specific data, a suitable estimate for emissions related to building construction site emissions is 1,400kg CO_2e/£100k[75]. Embodied carbon figures from ICE database[72] for the existing structures removed and also the removal of temporary structures have also contributed towards the construction process stage of the Project lifecycle. **Chapter 3: Description of the Project, Volume 5, Document 5.2.3** informed the basis of this inclusion. The same material list for these permanent structures to be removed, and temporary structures was used for this calculation.

[73] Defra (2021). Emissions Factors Toolkit v11. (online). Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/ (Accessed July 2022).
[74] DfT (2021). TSGB0430 (RFS0105): Goods lifted and moved by commodity and length of haul. (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815863/rfs0105.ods (Accessed July 2022).
[75] RICS (2017). Professional standards and guidance, UK: Whole life carbon assessment for the built environment. (online). (Accessed July 2022).

Operation

17.8.12 Operational GHG emissions associated with the Project include the GHG emissions that can arise from the leakage of SF_6 used in switch gear equipment. Design information was obtained from Project engineers for the total weight of SF_6 expected in circuit breakers, expected to be operating during the operational phase of the Project.

17.8.13 A worse case leakage factor[71] was applied to estimate the GHG emissions from this weight of SF_6 found within circuit breakers. National Grid[71] report that: *"Closed pressure systems such as those used for high voltage switchgear typically have design leak rates in the range 0.1%-1.0% per annum".* Therefore, a worse case leakage factor of 1.0% of SF_6 lost per annum has been applied.

17.8.14 The operational GHG emissions were calculated in CO_2e by multiplying the estimated weight of SF_6 by the Global Warming Potential (GWP) of SF_6. The GWP of SF_6 was obtained from the IPCC's AR5 Climate Change 2013: The Physical Science Basis[76].

17.8.15 Operational GHG emissions associated with the Project can also include those which arise from maintenance and refurbishment activities. As per **Chapter 3: Description of the Project, Volume 5, Document 5.2.3**, refurbishment or replacement of all parts of the Project is expected over the lifetime of the Project. Therefore, the GHG emissions associated with the embodied carbon of the permanent structures has been included again to represent the GHG emissions associated with refurbishment and repairs works during the operation stage of the Project.

Decommissioning

17.8.16 As described in **Chapter 3: Description of the Project**, **Volume 5, Document 5.2.3**, if the overhead line connection is no longer required, overhead lines may be removed using the same process as described for the construction process of the Project.

17.8.17 Based on the above, the estimated GHG emissions associated with the construction phase of the Project and the RICS KPI have been used to estimate the GHG emissions associated with the decommissioning of the Project. The RICS KPI allowed for decommissioning process GHG emissions to be accounted for.

17.8.18 The embodied carbon GHG emissions associated with the construction of the permanent structures and the GHG emissions associated with the construction traffic have been used as they are considered as a suitable estimate of the total GHG emissions for the decommissioning of the Project.

Assessment of significance

17.8.19 Current IEMA guidance[38] states that: *"The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

17.8.20 The significance of GHG emissions associated with the Project has been evaluated based on the extent to which the Project materially affects the ability to achieve national,

[76] IPCC (2013). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

regional and local targets for decarbonisation. The primary basis of contextualisation is the UK carbon budgets (see **Table 17.2**), including the relevant CCC sectoral allocations (see **Table 17.7**) and the UK carbon target of 'net zero' in 2050. Regional and local policy for reducing GHG emissions will also be considered, but are not the basis of assessment. The UK's carbon budgets are legally binding and represent the UK's goals in addressing the impact of GHG emissions on the global climate and are therefore the quantities against which emissions are contextualised. Consideration has also been given as to whether GHG emissions are appropriately mitigated and compliant with relevant policy.

17.8.21 The significance of the GHG emissions from the Project is determined based on the criteria in **Table 17.19** developed from the IEMA guidance[38]. Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

Table 17.19 - Significance criteria

Magnitude	Effect
Major adverse	The Project does not make a meaningful contribution to the UK Government meeting its carbon budgets / targets. Adverse GHG impacts are not mitigated / do-minimum and are not compliant with requirements of national, regional and local policy.
Moderate adverse	The Project falls short of fully contributing to the UK Government meeting its carbon budgets / targets. Adverse GHG impacts are partially mitigated and partially meet the requirements of national, regional and local policy.
Minor adverse	The Project is fully in line with the trajectory of the UK Government meeting its carbon budgets / targets. Adverse GHG impacts are mitigated with good practice design standards and meet the requirements of national, regional and local policy.
Negligible	The Project has minimal residual GHG emissions and is 'ahead of the curve' for the trajectory of the UK Government meeting its carbon budgets / targets. GHG impacts are mitigated through measures that go beyond good practice design standards and the requirements of national, regional and local policy.
Beneficial	The Project has net GHG emissions below zero, causing a direct or indirect reduction in atmospheric GHG emissions which has a positive impact on the UK Government meeting its carbon budgets / targets.

CCR assessment

17.8.22 The likelihood of the climate change impact on the receptor occurring takes into account the climate change trends (**Table 17.12**) and the anticipated exposure of the receptor to the trend. An indicative scale used for assessing the likelihood of the climate change impact on the receptor is contained in **Table 17.20**.

Table 17.20 - Indicative scale for assessing the likelihood of a climate change impact on the receptor.

Likelihood category	Description (probability and frequency of occurrence)
Very likely	The impact is almost certain to occur during the phase of the Project considered
Likely	The impact is considered likely to occur during the phase of the Project considered
Possible	The impact is as likely as not to occur during the phase of the Project considered
Unlikely	The impact is unlikely to occur during the phase of the Project considered, but still could occur at least once.
Very unlikely	The impact is high unlikely to occur during this phase of the Project considered and is considered rare.

17.8.23 The consequence if the climate change impact was to occur is the magnitude of change felt by the receptor. The vulnerability of the receptor to the climate change impact is considered when assessing the consequence level. An indicative scale used for assessing the consequence of the climate change impact on the receptor is contained within **Table 17.21**.

Table 17.21 - Indicative scale for assessing the consequence (magnitude of change) of a climate change impact on the receptor.

Consequence category	Consequence criteria
Catastrophic	The impact could lead to complete shutdown of operations, loss of the asset, or collapse. There could be single or multiple fatalities and significant harm to the environment with limited prospect of full recovery. Social implications could lead to community protests and high financial implications.
Major	The impact could lead to disruption to activities lasting more than 1 week. There could be major or multiple injuries which could be permanent. Environmental damage could be significant with recovery times over a year and non-compliance with regulations and consents. National and long-term social impacts could be endured. The impact would require extensive mitigation actions.
Moderate	The impact could lead to disruption to activities lasting more than 1 day but less than 1 week. There could be moderate environmental damage with wider effects and recovery of up to a year. Moderate cost and social implications which are localised yet long-term. This could lead to a serious injury requiring lost time. The impact would require emergency mitigation actions to be in place.

Consequence category	Consequence criteria
Minor	The impact could lead to disruption to activities lasting less than 1 day. There could be localised environmental impact within the site boundary, localised and temporary social or reputational impacts, and a minor cost implication. This could lead to a minor injury requiring medical treatment. The impact could be rectified through additional mitigation actions to be put in place.
Minimal	The impact could lead to disruption to an isolated section of activity with limited social, economic and environmental consequences. It could equate to a minor first aid case. The impact could be rectified through usual activity.

17.8.24 The level of the risk of the climate change impacts on the Project is concluded in this risk assessment as a function of the likelihood and magnitude. This will identify any significant potential risks and where further mitigation and adaptation measures will be required, shown as significant effects within the matrix in **Table 17.22**.

Table 17.22 - Significance of CCR effects

Likelihood	Magnitude				
	Minimal	Minor	Moderate	Major	Catastrophic
Very unlikely	Negligible (NS)	Negligible (NS)	Minor (NS)	Moderate (S)	Moderate (S)
Unlikely	Negligible (NS)	Minor (NS)	Minor (NS)	Moderate (S)	Major (S)
Possible	Minor (NS)	Minor (NS)	Moderate (S)	Major (S)	Major (S)
Likely	Moderate (S)	Moderate (S)	Major (S)	Major (S)	Major (S)
Very likely	Moderate (S)	Major (S)	Major (S)	Major (S)	Major (S)

Note: (S) denotes a significant or potentially significant effect, (NS) denotes a not significant effect.

17.9 Assessment of significant effects: GHG assessment

Construction phase

Raw Materials supply, transport and manufacture

17.9.1 The RICS methodology to calculate embodied carbon[44] along with the ICE Database[72] has been used (see **Paragraph 17.8.8** for more information). The GHG emissions

associated with the embodied carbon of material resources needed for the construction of the Project are estimated to be 67.15ktCO_2e.

Construction transport

17.9.2 The total GHG emissions arising from surface access for HGVs and LGVs to transport this material, and the surface access emissions from workers during the construction of the Project, are estimated to be 10.80ktCO_2e. The full methodology for the calculation of this figure is provided in **Paragraphs 17.8.9** and **17.8.10**.

Construction process

17.9.3 Construction process GHG emissions have been estimated using the RICS methodology to calculate embodied carbon[44] along with the ICE Database[72] to calculate the embodied GHG emissions of the materials which are expected to be removed during construction. RICS' construction KPI for process emissions per value of the Project[75] was also used to account for other construction process GHG emissions. **Paragraph 17.8.11** reports the methodology adopted when undertaking this calculation.

17.9.4 Total GHG emissions are estimated to be 29.22ktCO_2e for the construction process phase.

Operational phase

Boundary of use stage: installed products and materials

17.9.5 Operational GHG emissions associated with the leakage of SF_6 are estimated to be 31.03ktCO_2e.

Maintenance, repair, replacement and refurbishment

17.9.6 Operational GHG emissions associated with the refurbishment of permanent structures are estimated to be 64.82 ktCO_2e.

Decommissioning phase

17.9.7 The total GHG emissions for the decommissioning phase of the Project are estimated to be 79.97ktCO_2e.

Summary

17.9.8 The GHG assessment is reported in **Table 17.23** and concludes 282.99 ktCO_2e emissions associated with the construction, operation and the decommissioning of the Project.

Table 17.23 - GHG emission estimates during the lifecycle of the Project

Stage of Project	Main stage of Project life cycle	Estimated emissions (ktCO_2e)
Construction	A1 – A2 – A3 - Raw materials supply, transport and manufacture	67.15

Stage of Project	Main stage of Project life cycle	Estimated emissions ($ktCO_2e$)
	A4 – Construction Transport	10.80
	A5 – Construction process stage	29.22
Operation	B1 - Boundary of use stage: installed products and materials	31.03
	B2-B5	64.82
Decommissioning	C1-C4 – End of life stage: deconstruction, transport, waste processing for recovery and disposal	79.97
Total		**282.99**

Contextualisation against UK carbon budgets

17.9.9 The significance of GHG emissions associated with the Project is evaluated based on the extent to which the Project materially affects the ability to achieve national, regional and local targets for decarbonisation. The primary basis of contextualisation is the UK carbon budgets, including the relevant CCC sectoral allocations and the UK carbon target of 'net zero' in 2050. Regional and local policy for reducing GHG emissions is also considered, but are not the basis of assessment. The basis of having the global climate as one receptor for the GHG assessment remains. This is since the UK's carbon budgets are legally binding, and represent the UK's goals in addressing the impact of GHG emissions on the global climate. Consideration is also given as to whether GHG emissions are appropriately mitigated and compliant with relevant policy.

17.9.10 The GHG emissions assessment has considered GHG emissions from the Project in three separate phases: construction, operation and decommissioning. The construction of the Project runs from late 2024/2025 to 2027, with reinstatement works completed in 2028. GHG emissions from the construction phase will therefore fall within the fourth carbon budget. GHG emissions from the operation phase of the Project (considered to be 80 years) will fall into the fifth and sixth carbon budgets, and subsequent future budgets once set through from 2038 and beyond. GHG emissions from the decommissioning of the Project will fall entirely within future budgets once set.

17.9.11 **Table 17.24** presents the net tCO_2e associated with construction, operation and decommissioning phases of the Project during each of the legislated carbon budget periods.

Table 17.24 - Estimates GHG emissions contextualised against the relevant UK carbon budgets

Project phase	Estimated total GHG emissions from the Project (tCO_2e)	Net Project GHG emissions per relevant carbon budget and 2050 net zero target (tCO_2e)			
		4th (2023 to 2027)	5th (2028 to 2032)	6th (2033 to 2037)	2050 only
Total UK carbon budget		**1,950,000,000**	**1,725,000,000**	**965,000,000**	**net zero target**
CCC sector budget		**189,160,000**	**92,570,000**	**35,740,000**	
Construction		107,169.44	0.00	0.00	
Operation		1,183.27	5,916.33	5,916.33	1,183.27
Decommissioning		-	-	-	-
Total		108,352.71	5,916.33	5,916.33	1,183.27
Total % of UK carbon budget		0.006	0.0003	0.0006	-
Total % of CCC sector budget		0.06	0.006	0.02	-

17.9.12 In 2050, when the UK net carbon budget is zero, the Project will have an impact equivalent to 1,183.27tCO2e/yr. In this context, it is concluded that the Project will not have a material effect on the UK Government meeting its carbon budgets / targets.

17.9.13 **Table 17.13** details the embedded measures to minimise GHG emissions associated with the Project. These are considered to be in line with good practice design standards and the requirements of national, regional and local policy. These embedded measures cannot be quantified in the calculation of GHG emissions from the Project, due to a lack of data, but they are expected to reduce emissions. Therefore the GHG emissions from the Project are expected to be lower than reported here as a result of the embedded measures.

17.9.14 The contributions of GHG emissions from the Project has been established and equates to <0.01% of each of the UK's carbon budgets. The contributions of GHG emissions from the Project equate to <0.06% of the CCC sector budgets. In this context the Project will not materially impact on achieving carbon reduction targets as set out by the UK Government. The Project is assessed as having a **minor (adverse) effect** in line with IEMA guidance[38], as the Project will increase GHG emissions (albeit to a degree

that will not affect the ability to meet UK carbon budgets), and this effect is **not significant**.

17.10 Assessment of significant effects: CCR assessment

17.10.1 An assessment of CCR effects has been undertaken for the construction, operation and decommissioning phases of the Project, as shown in **Table 17.25, Table 17.26** and **Table 17.27,** respectively. For the identified climate change trends in **Section 17.5,** the potential climate change impacts are assessed for each receptor group considered in **Section 17.70**. Following the implementation of embedded environmental measures (see **Section 17.6**), an assessment of the likelihood and magnitude of the climate change impact is made using the methodology set out in **Section 17.8**, to conclude any likely significant effects

Table 17.25 – Assessment of CCR effects – construction phase

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Human health	Increased heat stress or heat exhaustion experienced by the construction workforce.	The Contractor(s) will ensure that the relevant measures within the **CoCP, Volume 5, Document 5.3.3B** (implemented via DCO requirement) and health and safety procedures are implemented. For example, all construction activities will be planned through use of a Risk Assessment Method Statement (RAMS) alongside issued safety bulletins such as alerts for upcoming hot spells. The RAMS will identify measures such as altering shift patterns to cooler times of the day, additional rest breaks and PPE. All staff will undergo toolbox talks regarding working in hot weather.	Possible	Minor	**Minor (NS)**
	Building and infrastructure	Restriction of certain construction activities during hot weather, for example, the pouring of concrete in higher temperatures could reduce the strength and durability of the finished product, and the laying of asphalt	Construction activities will be planned through use of a Risk Assessment Method Statement (RAMS) alongside safety bulletins as part of the **CoCP, Volume 5, Document 5.3.3B**.	Very unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		could become difficult as it fails to maintain profile during compaction. This could cause programme delay and increased costs.				
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased summer precipitation.	Human health	Increased dust creation from construction activities, leading to impacts on the health of construction workers and the failure of machinery and equipment.	The Contractor(s) will ensure that the relevant measures within the **CoCP, Volume 5, Document 5.3.3B** and health and safety procedures are implemented. For example, all construction activities will be planned through use of a RAMS alongside issued safety bulletins such as working in hot and dry conditions. The RAMS will identify measures such as dust management and dampening down, alongside appropriate Personal Protective Equipment (PPE). All staff will undergo toolbox talks regarding working in dry weather. Plant and machinery will be routinely inspected.	Very unlikely	Minimal	**Negligible (NS)**
	Human health	Risk of wildfires affecting the construction workforce.	All construction activities will be planned through use of a RAMS alongside issued safety bulletins such as alerts to upcoming rainfall events. The RAMS will identify measures for wildfire events such as delaying the activity.	Very unlikely	Moderate	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Decrease in summer precipitation	Building and infrastructure	Drought conditions impacting water available through abstraction licenses to use during construction, e.g. for dust suppression.	Construction compounds would utilise water brought in using tankers for all activities within construction compounds including dust suppression. This will be unaffected by any local observed drought conditions as water would be brought in from outside the local area.	Unlikely	Minimal	**Negligible (NS)**
Increase in precipitation resulting in fluvial or pluvial flooding.	Human health	Wet weather leading to increased possibility of slips, trips and falls.	The Contractor(s) will ensure that the relevant measures within the **CoCP, Volume 5, Document 5.3.3B** (implemented via a DCO requirement) and health and safety procedures are implemented. For example, all construction activities will be planned through use of a RAMS alongside issued safety bulletins such as alerts to upcoming rainfall events. The RAMS will identify measures such as signing up to the Environment Agency's flood risk warning system, appropriate PPE, and delaying the activity.	Unlikely	Minimal	**Negligible (NS)**
	Building and infrastructure	Flooding of construction sites including access roads causing delays to construction programme.	The Contractor(s) will ensure that the relevant measures within the **CoCP, Volume 5, Document 5.3.3B** (implemented via a DCO requirement) and health and safety procedures are implemented. Embedded measure:	Possible	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			The FRA will assess the flood risk from more frequent flooding events across the construction timeframe. An Emergency Response Plan for Flood Events (ERPFE) would be prepared and implemented for the construction phase, including safe access and egress routes where required. Works within flood risk zones will be programmed to be out of the winter months where possible.			
	Building and infrastructure	Water ingress to equipment or machinery related to construction activities or permanent assets in place during construction, leading to equipment failures or damage.	Weather warning systems will allow for mobile construction equipment to be moved to avoid flood damage in response to any potential flooding events.	Unlikely	Minimal	**Negligible (NS)**
	Building and infrastructure	Overwhelming of the construction site drainage system causing flooding across the site.	The FRA (**Volume 5, Document 5.3.9D**) assesses the flood risk from more frequent flooding events across the construction timeframe. The hydrological design of the drainage scheme areas has been based on a 1 in 100 year (1% AEP) event with a 25% allowance for climate change for the 2050s. Where the temporary drainage scheme involves	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			Sustainable Urban Drainage Systems (SUDS), the discharge will not exceed the present day greenfield runoff rate.			
Increased in frequency and intensity of storm events.	Building and infrastructure	There is an increased risk of disruption to construction work, such as cranes unable to operate in high winds.	All construction activities will be planned through use of a RAMS alongside issued safety bulletins such as alerting to upcoming high winds or storm events. The RAMS will identify measures such as identifying wind speeds in which cranes will not operate or are restricted, delaying the activity and making the site safe ahead of storm events.	Possible	Minimal	**Minor (NS)**
	Human health	Increased risk of lightning strike when working in close proximity of existing assets, resulting in a risk to construction personnel.	The Contractor(s) will ensure that the relevant measures within the **CoCP, Volume 5, Document 5.3.3B** and health and safety procedures are implemented. For example, all construction activities will be planned through use of a RAMS alongside issued safety bulletins such as alerting to upcoming lightning or storm events. The RAMS will identify measures such as checking of lightning risk when working near existing assets. Where lightning risk is identified, the activity will be delayed.	Very unlikely	Minor	**Negligible (NS)**

Operation

Table 17.26 - Assessment of CCR effects – operation phase

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Buildings and infrastructure	Overheating of mechanical and electrical (M&E) assets such as substations, transformers, switchgears and underground cables, leading to a decrease in asset performance and rating and/or requiring additional electricity demand for mechanical cooling units.	All M&E equipment as part of the Project, including control boards, are designed to be temperature controlled and fitted with air conditioning which will operate unaffected by changes in ambient temperatures due to climate change. The equipment will undergo routine maintenance which will highlight any heat-related deterioration and replacement requirements.	Very unlikely	Minor	**Negligible (NS)**
	Buildings and infrastructure	Increased rate of degradation of the surface material of the substation access roads, such as asphalt, increasing the maintenance requirements or disrupting maintenance activities at the substations.	The material specification of the access roads will be to current design standards incorporating a range of tolerances accounting for climate change. The access roads will experience infrequent use associated with routine monitoring and maintenance and the routine inspections of the access roads will highlight any increased degradation. Throughout the asset life, the material specification could accommodate	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			increasing temperatures during maintenance or replacement of the road.			
	Buildings and infrastructure	Sagging of overhead lines, reducing capacity and amount of power that is able to be transmitted and distributed.	The design will take into account the anticipated range of temperatures due to climate change, as ice loading remains a consideration. The conductors operate at high temperatures with a range of tolerances which are unlikely to be affected by changes to ambient temperatures with climate change.	Very unlikely	Minimal	**Negligible (NS)**
	Buildings and infrastructure	Sagging of overhead lines, decreasing clearance to objects/ground.	All overhead lines are designed to meet clearance criteria throughout various conditions, including maximum operating temperature, in accordance with industry design standards. The design will include a range of operating tolerances which are unlikely to be affected by changes to ambient temperatures with climate change.	Very unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Human health	Increased heat stress or heat exhaustion experienced by the operational and maintenance workforce.	Operational and maintenance activities will be planned through use of a Risk Assessment Method Statement (RAMS). The RAMS will include mitigation for working in hot weather, including delaying the routine maintenance activity or altering shift patterns for emergency maintenance. Weather warnings are issued to all workforce to help with adequate planning. As a result of climate change, maintenance works may become delayed or interrupted more frequently.	Unlikely	Minor	**Minor (NS)**
	The natural environment	Increased vegetation growth due to a prolonged growing season interfering with overhead lines and requiring increased maintenance requirements.	The substations will include low-growing and low-maintenance native plant species close to equipment, with appropriate neutral zones where required. Vegetation will be managed to maintain appropriate clearances of the overhead lines. Routine inspection will highlight where frequency of landscaping maintenance will need be revised throughout the asset life. As a result of climate change, maintenance works may become more frequent.	Possible	Minimal	**Minor (NS)**
	Buildings and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as overheating of ICT	The monitoring telecommunications for the Project will have two connections with one acting as a reserve to ensure continued function of the telecommunications system. Equally, any	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		equipment leading to loss of monitoring telecommunications.	interruptions with power connections to substations will be served by back up diesel generators with reserve fuel. Timely refuelling will occur in the case of prolonged events.			
Decrease in summer precipitation, leading to drought conditions.	The natural environment	Landscape and biodiversity planting could fail resulting in increased management and associated environmental costs e.g. water use.	The species seed mix used within the biodiversity planting will include a range of native species that are generalist species which are tolerant of broad environmental conditions. The diversity of species planted will help ensure that any gaps left by localised failures would be naturally colonised by other suitable species over the maintenance period. Shrubs and trees planted on the site will be drought tolerant native species, including trees with a low water demand, such as hawthorn. The maintenance strategy will aid the success of establishment of planting by setting out measures such as watering in droughts. These mitigation measures will ensure a resilient mix of planting for the entire maintenance period.	Unlikely	Minimal	**Negligible (NS)**
	Buildings and infrastructure	Wildfires causing damage to the equipment.	The assets such as pylons are inherently resistant to the effects of fires due to steel being about to withstand high temperatures. Some assets are more vulnerable such as the conductors. Following a wildfire event, inspections of the assets will be made and maintenance	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			and replacement will be undertaken as required.			
	Human health	Risk of wildfire affecting the operational and maintenance workforce or restricting access to substations.	Operational and maintenance activities will be planned through use of a Risk Assessment Method Statement (RAMS). The RAMS will include mitigation for wildfire risk including delaying the routine maintenance activity. Weather warnings are issued to all workforce to help with adequate planning. As a result of any increased risk of wildfire, maintenance works may interrupted more frequently.	Very unlikely	Moderate	**Minor (NS)**
	Buildings and infrastructure	Droughts and dried soils affecting cable ratings of buried cables, reducing effectiveness.	The design of the cables includes cable rating calculations which consider dried out soil resulting from prolonged drought conditions. Routine maintenance throughout the asset life will determine whether recalculations are required to improve cable ratings through replacement.	Very unlikely	Minor	**Negligible (NS)**
	Buildings and infrastructure	Changes in soil resistivity causing a reduction in cable ratings and the	The cable ratings are designed utilising current National Grid and industry technical specifications, which account for a range of long term variations in soil	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Fluctuations in mean rainfall across the year, coupled with an increase in mean temperatures, resulting in changes to soil moisture.		effectiveness of earthings.	resistivity. The design of the earthing system ratings will account for ranges of tolerances for changes in soil moisture and resistivity, dependant on soil types across the Project. Geotechnical design during the detailed design will take into account fluctuations in critical moisture levels at circuit depth and revise the ratings or specify greater design requirements of increased number of earthing rods, for example.			
	Buildings and infrastructure	Changes to soil moisture levels causing shrink swell within the soils, leading to deterioration of structure foundations of the overhead lines and pylons from ground movement, or damage to buried cables.	The civils design of the foundations and supports of the overhead lines will allow for some movement and the detailed design will conduct a stress analysis for the soil type and range of change anticipated with climate change. Where there are any potential locations at risk of subsidence, the cable system and supports will be designed with additional protection. Routine monitoring, maintenance and replacement will identify any ground movement affecting assets across the design life.	Unlikely	Minor	**Minor (NS)**
Increase in precipitation resulting in fluvial or pluvial flooding.	Human health	Wet weather leading to increased possibility of slips, trips and falls.	Operational and maintenance activities will be planned through use of a RAMS. The RAMS will include mitigation for working in wet weather, including delaying the activity. Weather warnings are issued to all workforce to help with adequate planning. As a result of climate	Very unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			change, works may become delayed or interrupted more frequently.			
	Buildings and infrastructure	Flooding of M&E equipment resulting in loss of supply through flood damage.	All necessary embedded drainage measures contained within the FRA (**Volume 5, Document 5.3.9D**) will be incorporated into the design of the Project such as the application of the Environment Agency's climate change allowances for flood risk and drainage design by way of a DCO requirement. The proposed substations are all located within the current Flood Zone 1, however, due to climate change, the Overton Substation becomes at risk of flooding during the 1% AEP + 50% climate change event. In this location, the Overton substation will be built on a raised platform with a floor level of 13.71 mAOD. The substation and raised platform have been designed to be out of the 1% AEP +30% climate change flood extent so that there is no requirement to provide compensatory flood storage. Permanent attenuation is not required for the substations and any overflow of the drainage system has been routed to	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			grassed areas within the compounds or adjacent agricultural land, ensuring flooding does not affect sensitive aspects of the infrastructure.			
	Buildings and infrastructure	Increased surface water exceeding the capacity of attenuation and drainage, causing flooding across the site or elsewhere.	All necessary embedded measures contained within the Flood Risk Assessment (**Volume 5, Document 5.3.9D**) will be incorporated into the Project such as the application of the Environment Agency's climate change allowances for flood risk and drainage design. For permanent drainage schemes involving SUDS, attenuation storage will be designed to a 1% AEP standard with the upper end (45%) 2070s epoch allowance for rainfall scenarios, ensuring flooding does not occur elsewhere. In locations where land raising is proposed there will be no impact of flooding to third party receptors due to the design of the drainage measures and compensatory storage.	Unlikely	Minor	**Minor (NS)**
	Buildings and infrastructure	Increased corrosion of footings leading to instability of poles and pylons.	Once operational, at least annual inspections of the overhead lines will take place which can be programmed to be at times considered generally low risk of flood events. All components of the overhead lines have a design lifetime of at least 50 years and refurbishment	Very unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			works would be required over this lifetime if any water-related corrosion had taken place.			
	Buildings and infrastructure	Access to the equipment could be restricted due to flooding, affecting any emergency or routine maintenance works.	The access to the substations are located outside of flood zones including the 1 in 1,000 year event plus climate change. Some access routes to pylons could become flooded and maintenance activities would be restricted during this time.	Unlikely	Minor	**Minor (NS)**
	Buildings and infrastructure	Flooding causing groundwater saturation leading to cable faults.	The buried cables will be protected from groundwater infiltration and are designed to be water compatible. This mitigation would be effective despite any increased frequency or length of groundwater saturation. The telecommunications system will highlight any faults and maintenance and replacement will take place, with some possible disruption to the electricity network.	Very unlikely	Moderate	**Minor (NS)**
	Buildings and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as flooding of wider road network	The main road network serving the new proposed access roads to the substations are largely outside of flood zones. Maintenance activities can be delayed during such flood events that	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		preventing access to equipment.	may prevent or restrict access from the road network.			
Increased frequency and intensity of storm events.	Buildings and infrastructure	Increased wind loading on substation equipment and security fencing leading to damage.	The design of the substation equipment accounts for a range of tolerances in wind speed beyond those likely to be experienced with climate change. Large surface areas will be avoided to prevent excessive wind loading.	Very unlikely	Minimal	**Negligible (NS)**
	Buildings and infrastructure	Increased wind speeds and frequency of storm events weakening poles and fittings and the overhead lines.	The current National Grid and wider industry design standards ensure that the design of the pylons and overhead lines can withstand the loading resulting from extreme storm conditions. The telecommunications systems will highlight any faults and maintenance activities will take place.	Possible	Minor	**Minor (NS)**
	Human health	Wind blown debris leading to risk to maintenance personnel.	Operational and maintenance activities will be planned through use of a RAMS. The RAMS will include mitigation for working in storm conditions including delaying the activity. Weather warnings are issued to all workforce to help with adequate planning. As a result of climate change, routine maintenance works may become delayed or interrupted more frequently. Emergency works would be	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			undertaken where safe to do so and following RAMS.			
	Buildings and infrastructure	Lightning strikes on assets, such as overhead lines and transformers, resulting in physical damage, fire, power surge and shock waves, causing short power outages.	The design includes for lightning protection which is built into overhead lines and pylons and the provision of earthing mats within the substation. The lightning protection is effective regardless on the frequency of strikes. Increased frequency of strikes could result in damaged insulators however these items would be replaced during maintenance activities.	Very unlikely	Minor	**Negligible (NS)**
	Buildings and infrastructure	Increased wind speed and wind blown debris causing damage to overhead lines.	Any wind blown debris affecting the overhead line would trigger a fault on the line. Emergency maintenance would repair any damage and disruption to the electricity network would be kept to a minimum.	Unlikely	Moderate	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Buildings and infrastructure	Cascading failures due to interdependencies on third party assets such as lightning strikes causing intermittent loss of telemetry.	The monitoring telecommunications for the Project will have two connections with one acting as a reserve to ensure continued function of the telecommunications system. Equally, any interruptions with power connections to substations will be served by back up diesel generators with reserve fuel. Timely refuelling will occur in the case of prolonged events.	Very unlikely	Minor	**Negligible (NS)**
Cold winters can still occur.	Buildings and infrastructure	Snow, sleet and ice accretion affecting the structural integrity of the overhead line and reducing clearance under heavy ice.	All overhead lines are designed to meet clearance criteria at various operating conditions, including heavy ice, in accordance to industry design standards, which are unlikely to be affected by the changes in temperatures associated with climate change due to the current tolerances.	Unlikely	Minimal	**Negligible (NS)**

Decommissioning

Table 17.27 - Assessment of CCR effects – decommissioning phase

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Human health	Increased heat stress or heat exhaustion experienced by the workforce.	All decommissioning activities are assumed to be planned through use of a Risk Assessment Method Statement (RAMS) alongside issued safety bulletins such as alerts for upcoming hot spells. The RAMS will identify measures such as altering shift patterns to cooler times of the day, additional rest breaks and Personal Protective Equipment (PPE). All staff will undergo toolbox talks regarding working in hot weather.	Possible	Minor	**Minor (NS)**
	Building and infrastructure	Restriction of certain reinstatement activities during hot weather, for example, the pouring of concrete in higher temperatures could reduce the strength and durability of the finished product, and the laying of asphalt could become difficult as it fails to maintain profile during compaction. This could	Materials for reinstatement following decommissioning would be selected in accordance with relevant standards and design specifications would be altered to suit projected weather conditions at the time.	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		cause programme delay and increased costs.				
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased summer precipitation.	Human health	Increased dust creation from decommissioning activities, leading to impacts on the health of construction workers and the failure of machinery and equipment.	All decommissioning activities are assumed to be planned through use of a RAMS alongside issued safety bulletins such as working in hot and dry conditions. The RAMS will identify measures such as dust management and dampening down, alongside appropriate PPE. All staff will undergo toolbox talks regarding working in dry weather. Plant and machinery will be routinely inspected.	Unlikely	Minimal	**Negligible (NS)**
	Human health .	Risk of wildfires affecting the construction workforce.	All decommissioning activities are assumed to be planned through use of a RAMS alongside issued safety bulletins such as alerts to upcoming rainfall events. The RAMS will identify measures for wildfire events such as delaying the activity	Unlikely	Moderate	**Minor (NS)**
Decrease in summer precipitation	Building and infrastructure	Drought conditions impacting water available through abstraction licenses to use during decommissioning activities, e.g. for dust suppression.	The requirement of any abstraction for decommissioning activities would be assessed at the point of decommissioning and will be in consultation with key stakeholders, such as United Utilities and the Environment Agency. The import of water via tankers would be investigated but the re-use of water will	Possible	Minimal	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			take place wherever possible e.g. treated runoff for use in activities such as dust suppression.			
Increase in precipitation resulting in fluvial or pluvial flooding.	Human health	Wet weather leading to increased possibility of slips, trips and falls.	All decommissioning activities are assumed to be planned through use of a RAMS alongside issued safety bulletins such as alerts to upcoming rainfall events. The RAMS will identify measures such as signing up to the Environment Agency's flood risk warning system, appropriate PPE, and delaying the activity.	Unlikely	Minimal	**Negligible (NS)**
	Building and infrastructure	Flooding of substations including access roads causing delays to decommissioning programme.	Decommissioning of the substations would utilise operational access roads. Extreme precipitation events are assumed to be managed through RAMS and weather warnings to delay activities.	Very unlikely	Minor	**Negligible (NS)**
Increased in frequency and intensity of storm events.	Building and infrastructure	There is an increased risk of disruption to decommissioning activities, such as cranes unable to operate in high winds.	All decommissioning activities are assumed to be planned through use of a RAMS alongside issued safety bulletins such as alerting to upcoming high winds or storm events. The RAMS will identify measures such as identifying wind speeds in which cranes will not operate or are restricted, delaying the activity and making the site safe ahead of storm events.	Possible	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Human health	Increased risk of lightning strike when working in close proximity of existing assets, resulting in a risk to personnel.	All decommissioning activities are assumed to be planned through use of a RAMS alongside issued safety bulletins such as alerting to upcoming lightning or storm events. The RAMS will identify measures such as checking of lightning risk when working near existing assets. Where lightning risk is identified, the activity will be delayed.	Unlikely	Minor	**Minor (NS)**

17.11 Assessment of cumulative effects

GHG assessment

17.11.1 The approach to cumulative effects assessment (CEA) for GHGs differs from that for many EIA aspects. All global cumulative GHG sources are relevant to the effect on climate change, and this is taken into account in defining the receptor as being of 'high' sensitivity'. Effects of GHG emissions from specific cumulative projects are not assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. Additionally, the contextualisation of GHG emissions, by its nature, incorporates the cumulative contributions of other GHG sources which make up that context. Therefore, it has not been necessary to carry out a separate CEA of GHG emissions as part of this ES. This approach is in accordance with IEMA guidance[38].

CCR assessment

17.11.2 The ICCI assessment considers the extent to which climate change exacerbates the identified effects on identified receptors resulting from the Project. It also considers whether climate change effects the efficacy of proposed environmental measures. It is the combination of effects from both the Project and climate change on environmental receptors. The ICCI assessment is provided within **Table 17.28**.

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Table 17.28 - ICCI assessment

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Decrease in summer precipitation resulting in drought conditions.	Chapter 6: Landscape and Visual	New planting proposed associated with the Overton Substation, Monk Fryston Substation and Tadcaster CSECs to reduce the potential impact upon landscape character and visual amenity.	Drought conditions across the operational lifetime of the Project causing failure of the proposed planting at the substations and CSECs, impacting on visual amenity and landscape character. Long term maintenance and management have been considered in the landscape design and there will be a 5 year aftercare period which will include management and maintenance schedules to minimise or replace any losses due to drought conditions, such as through watering.	Outline Landscape Mitigation Strategy (**Figure 3.10 - 3.12, Volume 5, Document 5.4.3**). 5 year Management Plan aftercare programme (DCO requirement 8, 9).	Unlikely	Moderate	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Chapter 6: Landscape and Visual	New planting proposed associated with the Overton Substation, Monk Fryston Substation and Tadcaster CSECs to reduce the potential impact upon landscape character and visual amenity.	Increase in the frequency and intensity of hot spells during the operational lifetime of the Project can cause failure of the proposed planting at the substations and CSECs, impacting on visual amenity and landscape character. Long term maintenance and management have been considered in the landscape design and there will be a 5 year aftercare period which will include management and maintenance schedules to minimise or replace any losses due to hot spells.	Outline Landscape Mitigation Strategy (**Figure 3.10 - 3.12, Volume 5, Document 5.4.3**). 5 year Management Plan aftercare programme (DCO requirement 8, 9).	Unlikely	Moderate	**Minor (NS)**
Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 6: Landscape and Visual	New planting proposed associated with the Overton Substation, Monk Fryston Substation and Tadcaster CSECs to reduce the potential impact upon landscape character and visual amenity.	Due to flood risk increasing with climate change, the Overton Substation will be constructed on a raised platform have been designed to be out of the 1% AEP +30% climate change flood extent. In this location, there are no landscape proposals in areas prone to flooding.	No landscape proposals in areas prone to flooding. Outline Landscape Mitigation Strategy (**Figure 3.10 - 3.12, Volume 5, Document 5.4.3**). 5 year Management Plan aftercare programme (DCO requirement 8, 9).	Very unlikely	Minimal	**Negligible (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increased frequency and intensity of storm events.	Chapter 6: Landscape and Visual	New planting proposed associated with the Overton Substation, Monk Fryston Substation and Tadcaster CSECs to reduce the potential impact upon landscape character and visual amenity.	Increase in storm conditions during the operational lifetime of the Project can cause failure of the proposed planting at the substations and CSECs, impacting on visual amenity and landscape character. Long term maintenance and management have been considered in the landscape design and there will be a 5 year aftercare period which will include management and maintenance schedules to minimise or replace any losses due to storm conditions, such as uprooting from wind events.	Outline Landscape Mitigation Strategy (**Figure 3.10 - 3.12, Volume 5, Document 5.4.3**). 5 year Management Plan aftercare programme (DCO requirement 8, 9).	Unlikely	Moderate	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Fluctuations in mean rainfall across the year, coupled with an increase in mean temperatures, resulting in changes to soil moisture.	Chapter 7: Historic Environment	Heritage assets may be subject to potential effects resulting from physical disturbance or from effects arising from change within the setting of a heritage asset	Changes to soil moisture levels causing shrink swell within the soils, exacerbated by groundworks associated with the Project could damage the foundations of historic building causing damage.	The embedded measures described in **Chapter 7, Volume 5, Document 5.2.7** has ensured the selection of the route alignment and pylon placement has avoided direct impacts on designated heritage assets due to their being sufficient distance from the proposed works. The presence of the Project will not exacerbate any impacts occurring to historic buildings resulting from changing ground conditions due to changes in precipitation.	Very unlikely	Minimal	**Negligible (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Fluctuations in mean rainfall across the year, coupled with an increase in mean temperatures, resulting in changes to soil moisture.	Chapter 7: Historic Environment	Potentially significant direct effects arising from the construction of the Project could include the disturbance or removal of archaeological remains by intrusive groundworks and the disturbance or dewatering of deposits of palaeoecological or geoarchaeological interest	Changes to soil moisture levels within the soils affecting the in-situ preservation of below-ground archaeology, exacerbated by groundworks associated with the Project leading to further disturbance or removal of archaeological remains.	No disturbance of archaeological remains or deposits preserved by extensive waterlogging has been identified and consequently the project would not exacerbate any impacts to these deposits.	Very unlikely	Minimal	**Negligible (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Decrease in summer precipitation resulting in drought conditions.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change resulting in habitat loss or degradation. Fragmentation of habitats resulting in a reduction in connectivity.	Permanent landtake/land use change at habitats sufficiently important to be scoped into the biodiversity assessment will be restricted to hedgerows and a single pond (all of which will be replaced with better quality habitat). In addition, there will be temporary loss/degradation of relatively small areas of broadleaved semi-natural woodland, coastal and coastal and floodplain grazing marsh and arable field margins, along with small stretches of river/stream/ditch habitat and longer lengths of hedgerows. Drought conditions during construction could make the habitat loss/degradation and reduction in connectivity effect worse in localised areas. Current habitats on site are mature and well established and they will have some resilience with regards to drought conditions however, the retained habitat adjacent to where habitat loss occurs, will be exposed and/or will be subject to changed ground conditions and this will affect resilience to drought conditions. Overall, during the construction phase there is a low risk of the impact occurring but this would not be significant.	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive vegetation removal 6. Maintaining habitat connectivity 7. Protection of ancient/veteran trees 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **Biodiversity mitigation Strategy (BMS), Volume 5, Document 5.3.3D**	Unlikely	Moderate	Minor (NS)

Decrease in summer precipitation resulting in drought conditions.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change and fragmentation of habitats resulting in potential habitat loss or degradation, potential loss/damage to protected species, kill/injure protected species, and/or affect distribution.	Drought conditions could affect waterbodies (standing and running) suitable for great crested newt (GCN), otters and water voles through reduced flows or drying up of ponds, coupled with habitat loss from the Project during construction. Otter home ranges cover very large areas and therefore they are not likely to be affected as they will seek out suitable habitat in the wider area. The effects of the Project on otters including embedded mitigation measures is considered to be not significant. Water voles are known to use ditches that periodically dry out and therefore unlikely to be affected by additional drought conditions during construction. The effects of the Project on water voles including embedded mitigation measures is considered to be not significant. GCN could be affected by drying up of waterbodies. The Project will result in the permanent loss of one waterbody (that does not support GCN) and construction of a new high quality pond. In addition, District Level Licensing (DLL) will ensure mitigation for pond loss is delivered and the temporary impacts on GCN terrestrial habitats mitigated through additional habitat creation to ensure that the Favourable Conservation Status (FCS) of the species is maintained. Therefore, even if waterbodies dry out during construction it is not likely to affect FCS of species. The effects of the Project on GCN including embedded mitigation measures is considered to be not significant. With the implementation of embedded mitigation measures, overall, during the construction phase there is a low risk of the impact occurring but this would not be significant.	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive vegetation removal 6. Maintaining habitat connectivity 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works 13. Protection of aquatic features 16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Unlikely	Minor	Minor (NS)

Decrease in summer precipitation resulting in drought conditions.	Chapter 8: Biodiversity	Pollution events resulting in damage to habitats and/or species through pollution (terrestrial and aquatic)	During drought conditions any pollution events such as spills of chemicals/fuel will be somewhat contained and will have a reduced speed in seeping into the ground and in the aquatic habitats and pollution from increased dust will likely be worse due to lack of moisture in the air. Pollution prevention measures to water and air are detailed in the Code of Construction Practice (CoCP) and are considered to be effective regardless if there is a drought during the construction phase to minimise impact of pollution to habitats or species.	2. Standard best practice 3. Minimise land take and micro-site 4. Dust management 9. Protection of retained habitats 12. Sensitive access and enabling works 13. Protection of aquatic features Water measures ID1. Good working practices. ID2. Stand-off distances from watercourses. ID4. Water discharges off-site. ID5. Soil stockpiles. ID7. Watercourse crossing design. ID8. Pylon footings. ID9. Fuel, oil and chemicals storage. ID11. Materials Management Plan. **BMS, Volume 5, Document 5.3.3D, CoCP, 5.3.3B**	Negligible	Minor	Neligible (NS)
Increased annual mean temperatures, especially in the	Chapter 8: Biodiversity	Permanent and temporary land take/land use change resulting in habitat loss or	Permanent landtake/land use change at habitats sufficiently important to be scoped into the biodiversity assessment will be restricted to hedgerows and a single pond (all of which will be replaced with better quality habitat). In addition,	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive	Unlikely	Moderate	Minor (NS)

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
summer months, and an increase in the frequency and intensity of hot spells.		degradation. Fragmentation of habitats resulting in a reduction in connectivity.	there will be temporary loss/degradation of relatively small areas of broadleaved semi-natural woodland, coastal and coastal and floodplain grazing marsh and arable field margins, along with small stretches of river/stream/ditch habitat and longer lengths of hedgerows. Increase in the frequency and intensity of hot spells during construction could make the habitat loss and degradation and reduction in connectivity effect worse in localised areas. Habitats on site are mature and well established and they will have some resilience with regards to hotter conditions however, the retained habitat adjacent to where habitat loss occurs, will be exposed and/or will be subject to changed ground conditions and this will affect resilience to hotter conditions. Overall, during the construction phase there is a low risk of the impact occurring but this would not be significant.	vegetation removal 6. Maintaining habitat connectivity 7. Protection of ancient/veteran trees 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**			

Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change and fragmentation of habitats resulting in potential habitat loss or degradation, potential loss/damage to protected species, kill/injure protected species, and/or affect distribution.	Increase in the frequency and intensity of hot spells could lead to increase in mortality for most species that are not tolerant of high temepraures or depend on water resources which will also be affected. Species that are considered receptors for this project are: bats, GCN, otter, water vole, reptiles, badgers, fish, tansy beetle and birds. The more mobile species (bats, otter, water vole, badgers and birds) can travel to find suitable refuges/alternative habtiats during hotter conditions. Other species such as GCN and reptiles have a reduced range but are likely to be able to move to find suitable refuges during hotter conditions. Tansy beetle has a very reduced range and is dependant on tansy plants within riparian habitat along the River Ouse, however established tansy plants are drought-tolerant and likely to be able to withstand hotter conditions therefore the species will be unaffected. Fish are present in the interconnected system of ditches, streams and rivers and they are able to move downstream to deeper water during hotter conditions. Therefore even if habitats are affected during construction by hotter conditions, it is not likely to affect the species present as these are mobile enough, are situated in habitats that are resilient or have sufficient habitat connectivity to move to suitable areas and survive the hotter conditions. With the implementation of embedded mitigation measures, climate trends in combination with impacts resulting from the Project will lead to effects which would be not significant.	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive vegetation removal 6. Maintaining habitat connectivity 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works 13. Protection of aquatic features 16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Possible	Minor	Minor (NS)
Increased annual mean temperatures	Chapter 8: Biodiversity	Pollution events resulting in damage to	During construction, increased frequency and intensity of hot spells could exacerbate any pollution events such as spills of chemicals/fuel by	2. Standard best practice 3. Minimise land take	Negligible	Minor	Neligible

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
, especially in the summer months, and an increase in the frequency and intensity of hot spells.		habitats and/or species through pollution (terrestrial and aquatic)	increased evaporation rates and will result in concentrated residual products seeping into the ground and in the aquatic habitats. Pollution from increased dust will likely be worse due to lack of moisture in the air. Pollution prevention measures to water and air are detailed in the CoCP and are considered to be effective regardless of increasing temperatures during the construction phase to minimise impact of pollution to habitats or species.	and micro-site 4. Dust management 9. Protection of retained habitats 12. Sensitive access and enabling works 13. Protection of aquatic features Water measures ID1. Good working practices. ID2. Stand-off distances from watercourses. ID4. Water discharges off-site. ID5. Soil stockpiles. ID7. Watercourse crossing design. ID8. Pylon footings. ID9. Fuel, oil and chemicals storage. ID11. Materials Management Plan. **BMS, Volume 5, Document 5.3.3D, CoCP, Volume 5, Document 5.3.3B**			

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change resulting in habitat loss or degradation. Fragmentation of habitats resulting in a reduction in connectivity.	Permanent landtake/land use change at habitats sufficiently important to be scoped into the biodiversity assessment will be restricted to hedgerows and a single pond (all of which will be replaced with better quality habitat). In addition, there will be temporary loss/degradation of relatively small areas of broadleaved semi-natural woodland, coastal and coastal and floodplain grazing marsh and arable field margins, along with small stretches of river/stream/ditch habitat and longer lengths of hedgerows. Only very limited areas of affected habitat are within the floodplain. However, increased flooding events during construction could make the habitat loss and degradation and reduction in connectivity effect worse in areas situated in the floodplain (with the exception of coastal and floodplain grazing marsh where additional flooding may benefit the habitat). Current habitats on site are mature and well established and they will have some resilience with regards to flood conditions however, the retained habitat adjacent to where habitat loss occurs, will be exposed and/or will be subject to changed ground conditions and this will affect resilience to flood conditions. Overall there could be a localised minor impact within the Order Limits, which would not be significant.	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive vegetation removal 6. Maintaining habitat connectivity 7. Protection of ancient/veteran trees 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**	Unlikely	Minor	Minor (NS)

Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change and fragmentation of habitats resulting in potential habitat loss or degradation, potential loss/damage to protected species, kill/injure protected species, and/or affect distribution.	Permanent landtake/land use change at habitats sufficiently important to be scoped into the biodiversity assessment will be restricted to hedgerows and a single pond (all of which will be replaced with better quality habitat). In addition, there will be temporary loss/degradation of relatively small areas of broadleaved semi-natural woodland, coastal and coastal and floodplain grazing marsh and arable field margins, along with small stretches of river/stream/ditch habitat and longer lengths of hedgerows. Only very limited areas of affected habitat are within the floodplain. Increased flooding events during construction could lead to increase in mortality for most species that are terrestrial and not able to relocate quickly (fly or swim). Bats, fish and birds are not included in this assessment as they can relocate quickly in case of flooding events. Species that are considered receptors for this impact are: GCN, otter, water vole, reptiles, badgers and tansy beetle. In case of increased flooding events these species could be injured/killed if they are within the floodplain at the time of the event and unable to move to higher ground. As a result of the Project low numbers of some species may migrate naturally away from construction areas and this could either result in higher number of animals in floodplains or in lower numbers present in the floodplain depending on localised circumstances. However, the majority of land within the Order Limits is outside higher flood risk areas (including predicted future changes) and with the implementation of those embedded mitigation measures aimed at minimising disturbance of species, such movement would be minimised. With respect to tansy beetle, this species is very restricted in range being limited to	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive vegetation removal 6. Maintaining habitat connectivity 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works 13. Protection of aquatic features 16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Possible	Minor	Minor (NS)

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
			tansy plants within riparian habitat along the River Ouse. Climate change leading to increased summer flooding has been identified as one of the potential causes of tansy beetle decline nationally (Buglife Tansy Beetle Project). Therefore, it is possible that increased flood events resulting from climate change may impact tansy beetles, however, only very short stretches of potentially suitable habitat are within the Order Limits relative to the wider extent of tansy plants along the River Ouse up and downstream of the Project location. Therefore, overall, climate trends in combination with impacts resulting from the Project could lead to a minor impact within the Order Limits, which would not be significant.				

Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 8: Biodiversity	Pollution events resulting in damage to habitats and/or species through pollution (terrestrial and aquatic)	During flooding events, any pollution events such as spills of chemicals/fuel will be dispersed quickly and will affect more aquatic habitats in a short period of time. In some cases clean up may not be possible where works are situated in the floodplain and the use of standard measures such fuelling within bunded areas/drip tray are not effective during flood events. Pollution from increased dust will likely be negligible as rain would dampen this effect. Pollution prevention measures to water and air and working within a flood plain are detailed in the CoCP.	2. Standard best practice 3. Minimise land take and micro-site 4. Dust management 9. Protection of retained habitats 12. Sensitive access and enabling works 13. Protection of aquatic features Water measures ID1. Good working practices. ID2. Stand-off distances from watercourses. ID4. Water discharges off-site. ID5. Soil stockpiles. ID7. Watercourse crossing design. ID8. Pylon footings. ID9. Fuel, oil and chemicals storage. ID11. Materials Management Plan. **BMS, Document 5.3.3D, CoCP, Document 5.3.3B**	Unlikely	Moderate	Minor (NS)
Increased frequency and intensity of storm events.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change resulting in habitat loss or	Permanent landtake/land use change at habitats sufficiently important to be scoped into the biodiversity assessment will be restricted to hedgerows and a single pond (all of which will be replaced with better quality habitat). In addition,	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive	Unlikely	Moderate	Minor (NS)

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
		degradation. Fragmentation of habitats resulting in a reduction in connectivity.	there will be temporary loss/degradation of relatively small areas of broadleaved semi-natural woodland, coastal and coastal and floodplain grazing marsh and arable field margins, along with small stretches of river/stream/ditch habitat and longer lengths of hedgerows. Increased storm events during construction could make the habitat loss and degradation and reduction in connectivity effect worse in localised areas. Current habitats on site are mature and well established and they will have some resilience with regards to storm conditions however, the retained habitat adjacent to where habitat loss occurs, will be exposed and/or will be subject to changed ground conditions and this will affect resilience to storm conditions. Mature/ancient/veteran trees are more prone to damage by high winds. However, with the implementation of embedded mitigation measures which minimise permanent and temporary habitat loss and have negligible potential to affect mature/ancient/veteran trees, overall, during the construction phase there is a low risk of the impact occurring but this would not be significant.	vegetation removal 6. Maintaining habitat connectivity 7. Protection of ancient/veteran trees 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**			

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increased frequency and intensity of storm events.	Chapter 8: Biodiversity	Permanent and temporary land take/land use change and fragmentation of habitats resulting in potential habitat loss or degradation, potential loss/damage to protected species, kill/injure protected species, and/or affect distribution.	Increased storm events during construction could lead to an increase in mortality for most species that are present. Even more mobile species such as bats, birds and fish could be affected due to the variety of changing conditions that accompany storms. Species that are considered receptors for this impact are: bats, GCN, otter, water vole, reptiles, badgers, fish, tansy beetle and birds. In case of storm events all these species located within the area affected could be injured/killed. The majority of the habitats of these species on site are mature and well established and they will have some resilience with regards to storm conditions. Due to the incorporation of embedded environmental measures, effects on the habitats of these species have been minimised, however, the retained habitat adjacent to where habitat loss occurs, will be exposed and/or will be subject to changed ground conditions and this will affect resilience to storm conditions in localised places. Overall, during the construction phase there is a low risk of the impact occurring but this would not be significant.	2. Standard best practice 3. Minimise land take and micro-site 5. Sensitive vegetation removal 6. Maintaining habitat connectivity 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works 13. Protection of aquatic features 16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	Minor (NS)

Decrease in summer precipitation resulting in drought conditions.	Chapter 8: Biodiversity	Any habitat reinstatement would be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives.	Drought conditions across the operational lifetime of the Project causing failure of reinstatement planting implemented as part of the Project. Habitat reinstatement will be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives where appropriate. More frequent drought conditions may result in a higher degree of failed planting and the establishment of habitats will take longer. Five year Management Plans will be produced for the aftercare of the habitats with standard measures including weed management to reduce competition on new planting and replacement of failed trees within a standard time period. The majority of mitigation planting would be undertaken at three locations within the Order Limits (Overton and Monk Fryston Substations and Tadcaster CSECs) at land owned by National Grid. In line with National Grid's Environmental Sustainability Policy, habitat planting at these sites would be managed in the long term as part of National Grid's operational management procedures including measures to mitigate climate change trends. Remaining habitat reinstatement for temporary losses across land within the Order Limits would be relatively localised with losses minimised through the incorporation of embedded environmental measures (including the incorporation of standard best practice, micro-siting within working areas, maintaining habitat connectivity, sensitive tree management for electrical safety clearance, protection of retained habitat, habitat reinstatement, and sensitive access and enabling works). Thus, with the implementation of embedded environmental measures and management of mitigation planting at National Grid-owned land in line with National Grid's	2. Standard best practice 3. Minimise land take and micro-site 6. Maintaining habitat connectivity 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	Minor (NS)

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
			Environmental Sustainability Policy commitments, climate trends in combination with impacts resulting from the Project would not result in a significant impact during the operational lifetime of the Project.				

Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Chapter 8: Biodiversity	Any habitat reinstatement would be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives.	Increase in the frequency and intensity of hot spells during the operational lifetime of the Project can cause failure of reinstatement planting implemented as part of the Project. Habitat reinstatement will be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives where appropriate. Management Plans will be produced for the aftercare of the habitats. Hotter conditions will result in higher degree of failed planting and the establishment of habitats will take longer. Five year Management Plans will be produced for the aftercare of the habitats with standard measures including weed management to reduce competition on new planting and replacement of failed trees within a standard time period. The majority of mitigation planting would be undertaken at three locations within the Order Limits (Overton and Monk Fryston Substations and Tadcaster CSECs) at land owned by National Grid. In line with National Grid's Environmental Sustainability Policy, habitat planting at these sites would be managed in the long term as part of National Grid's operational management procedures including measures to mitigate climate change trends. Remaining habitat reinstatement for temporary losses across land within the Order Limits would be relatively localised with losses minimised through the incorporation of embedded environmental measures (including the incorporation of standard best practice, micro-siting within working areas, maintaining habitat connectivity, sensitive tree management for electrical safety clearance, protection of retained habitat, habitat reinstatement, and sensitive access and enabling works). Thus, with the implementation of embedded environmental measures and	2. Standard best practice 3. Minimise land take and micro-site 6. Maintaining habitat connectivity 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
			management of mitigation planting at National Grid-owned land in line with National Grid's Environmental Sustainability Policy commitments, climate trends in combination with impacts resulting from the Project would not result in a significant impact during the operational lifetime of the Project.				

Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 8: Biodiversity	Any habitat reinstatement would be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives.	Increased flooding events during the operational lifetime of the Project can cause failure of reinstatement planting implemented as part of the Project. Habitat reinstatement will be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives where appropriate. Flooding conditions will result in higher degree of failed planting and the establishment of habitats will take longer. Five year Management Plans will be produced for the aftercare of the habitats with standard measures including weed management to reduce competition on new planting and replacement of failed trees within a standard time period. The majority of mitigation planting would be undertaken at three locations within the Order Limits (Overton and Monk Fryston Substations and Tadcaster CSECs) at land owned by National Grid. In line with National Grid's Environmental Sustainability Policy, habitat planting at these sites would be managed in the long term as part of National Grid's operational management procedures including measures to mitigate climate change trends. Remaining habitat reinstatement for temporary losses across land within the Order Limits would be relatively localised with losses minimised through the incorporation of embedded environmental measures (including the incorporation of standard best practice, micro-siting within working areas, maintaining habitat connectivity, sensitive tree management for electrical safety clearance, protection of retained habitat, habitat reinstatement, and sensitive access and enabling works). Thus, with the implementation of embedded environmental measures and management of mitigation planting at National Grid-owned land in line with National Grid's	2. Standard best practice 3. Minimise land take and micro-site 6. Maintaining habitat connectivity 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
			Environmental Sustainability Policy commitments, climate trends in combination with impacts resulting from the Project would not result in a significant impact during the operational lifetime of the Project.				

Increased frequency and intensity of storm events.	Chapter 8: Biodiversity	Any habitat reinstatement would be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives.	Increased storm events during the operational lifetime of the Project can cause failure of reinstatement planting implemented as part of the Project. Habitat reinstatement will be reflective of the type and extent of habitats affected by the Project, as well as local conservation objectives and initiatives where appropriate. Storm conditions will result in higher degree of failed planting and the establishment of habitats will take longer. Five year Management Plans will be produced for the aftercare of the habitats with standard measures including weed management to reduce competition on new planting and replacement of failed trees within a standard time period. The majority of mitigation planting would be undertaken at three locations within the Order Limits (Overton and Monk Fryston Substations and Tadcaster CSECs) at land owned by National Grid. In line with National Grid's Environmental Sustainability Policy, habitat planting at these sites would be managed in the long term as part of National Grid's operational management procedures including measures to mitigate climate change trends. Remaining habitat reinstatement for temporary losses across land within the Order Limits would be relatively localised with losses minimised through the incorporation of embedded environmental measures (including the incorporation of standard best practice, micro-siting within working areas, maintaining habitat connectivity, sensitive tree management for electrical safety clearance, protection of retained habitat, habitat reinstatement, and sensitive access and enabling works). Thus, with the implementation of embedded environmental measures and management of mitigation planting at National Grid-owned land in line with National Grid's	2. Standard best practice 3. Minimise land take and micro-site 6. Maintaining habitat connectivity 8. Sensitive tree management for electrical safety clearance 9. Protection of retained habitats 11. Habitat reinstatement 12. Sensitive access and enabling works **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
			Environmental Sustainability Policy commitments, climate trends in combination with impacts resulting from the Project would not result in a significant impact during the operational lifetime of the Project.				

Decrease in summer precipitation resulting in drought conditions.	Chapter 8: Biodiversity	Additional habitat creation will be undertaken as part of the DLL to ensure that the Favourable Conservation Status (FCS) of GCN is maintained	Drought conditions across the operational lifetime of the Project causing failure of habitats created as part of the DLL could affect the FCS of GCN. More frequent drought conditions may result in a higher degree of failed planting and/or drying of compensation ponds, and the establishment of habitats will take longer. All habitat creation as part of the DLL will be undertaken and managed by NE and third parties. At a national level, NE seeks to embed the findings of its climate change adaption risk report into its work (including DLL), applying a landscape scale approach to species regulation through targeted habitat creation to help species adapt to climate change. NE has stated that it now has sufficient national data to begin the evaluation and monitoring of the DLL approach for GCN, and is reviewing pond specifications to consider changes such as increasing the depths of ponds to take climate change into account. NE confirmed that compensation ponds for the Project will be dug to these new specifications (pers. comm Naila Qasmi, GCN Strategist, Natural England (e-mail received 03 November 2022)). Given that NE are responsible for the management of the habitats created as part of the DLL it is also reasonable to assume that any Management Plans associated with DLL will include standard measures such as weed management to reduce competition on new planting and replacement of failed trees within a standard time period. Therefore it can be concluded that measures to minimise effects of climate trends will be incorporated into DLL compensatory habitat creation, thereby minimising the risk of impact to unlikely and avoiding significant effects.	16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	**Minor (NS)**

Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Chapter 8: Biodiversity	Additional habitat creation will be undertaken as part of the DLL to ensure that the Favourable Conservation Status (FCS) of GCN is maintained	Increase in the frequency and intensity of hot spells across the operational lifetime of the Project causing failure of habitats created as part of the DLL could affect the FCS of GCN. More frequent and intense hot conditions may result in a higher degree of failed planting and/or drying of the ponds and the establishment of habitats will take longer. All habitat creation as part of the DLL will be undertaken and managed by NE and third parties. At a national level, NE seeks to embed the findings of its climate change adaption risk report into its work (including DLL), applying a landscape scale approach to species regulation through targeted habitat creation to help species adapt to climate change. NE has stated that it now has sufficient national data to begin the evaluation and monitoring of the DLL approach for GCN, and is reviewing pond specifications to consider changes such as increasing the depths of ponds to take climate change into account. NE confirmed that compensation ponds for the Project will be dug to these new specifications (pers. comm Naila Qasmi, GCN Strategist, Natural England (e-mail received 03 November 2022)). Given that NE are responsible for the management of the habitats created as part of the DLL it is also reasonable to assume that any Management Plans associated with DLL will include standard measures such as weed management to reduce competition on new planting and replacement of failed trees within a standard time period. Therefore it can be concluded that measures to minimise effects of climate trends will be incorporated into DLL compensatory habitat creation, thereby minimising the risk of impact to unlikely and avoiding significant effects.	16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 8: Biodiversity	Additional habitat creation will be undertaken as part of the DLL to ensure that the Favourable Conservation Status (FCS) of GCN is maintained	Increased flooding events across the operational lifetime of the Project causing failure of habitats created as part of the DLL could affect the FCS of GCN. All habitat creation as part of the DLL will be undertaken and managed by NE and third parties and the Project will have no control over the location where the compensatory habitats are created. However, given that ponds created/managed for GCN are normally created in areas outside the floodplains to prevent colonisation by fish during flood events it is reasonable to assume that this will be the case and that the FCS of the species will be maintained. Therefore it can be concluded that the risk of impact of climate trends in combination with impacts resulting from the operation phase of the Project is very unlikely and will not lead to significant effects.	16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Very unlikely	Moderate	**Negligible (NS)**

Increased frequency and intensity of storm events.	Chapter 8: Biodiversity	Additional habitat creation will be undertaken as part of the DLL to ensure that the Favourable Conservation Status (FCS) of GCN is maintained	Increased frequency and intensity storm events across the operational lifetime of the Project causing failure of terrestrial habitats created as part of the DLL could affect the FCS of GCN. Aquatic habitats are unlikely to be significantly affected by increased frequency and intensity storm events as they are resilient against impacts from wind. All habitat creation as part of the DLL will be undertaken and managed by NE and third parties. At a national level, NE seeks to embed the findings of its climate change adaption risk report into its work (including DLL), applying a landscape scale approach to species regulation through targeted habitat creation to help species adapt to climate change. NE has stated that it now has sufficient national data to begin the evaluation and monitoring of the DLL approach for GCN, and is reviewing pond specifications to consider changes such as increasing the depths of ponds to take climate change into account. NE confirmed that compensation ponds for the Project will be dug to these new specifications (pers. comm Naila Qasmi, GCN Strategist, Natural England (e-mail received 03 November 2022)). Given that NE are responsible for the management of the habitats created as part of the DLL it is reasonable to assume that any Management Plans associated with DLL will include standard measures such as weed management to reduce competition on new planting and replacement of failed trees within a standard time period. Therefore it can be concluded that measures to minimise effects of climate trends will be incorporated into DLL compensatory habitat creation, thereby minimising the risk of impact to unlikely and avoiding significant effects.	16. Protected species licences **BMS, Volume 5, Document 5.3.3D**	Unlikely	Moderate	**Minor (NS)**

Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 9: Hydrology and flood risk	Construction: changes to watercourse hydromorphology and flow conveyance arising from the presence of new or modified temporary watercourse crossings.	Increase in precipitation rates associated with extreme weather exacerbating geomorphological impacts on the watercourse resulting from the temporary watercourse crossings.	Where there is a requirement to install access crossings (assumed to be culverts for all Ordinary Watercourses) these will be kept to a minimum and ensure minimum change to existing morphology. Where culverts are required, these will either be arch culverts, leaving the natural bed alone, or they would be installed with the invert set below the natural bed level for a semi natural bed to establish within the culvert. The culverts would be removed, and all watercourses would be reinstated on completion of the works for which they were required. All Environment Agency Main Rivers and WFD reportable waterbodies crossings would be clear span bridges, involving no in	Very unlikely	Minor	**Negligible (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
				channel works. All construction related, temporary crossing will be designed to ensure that existing channel conveyance and floodplain storage are preserved, taking account of necessary climate uplifts based on Environment Agency guidance. This will avoid a cumulative effect of any morphological changes due to changes in channel flows with extreme weather events. The crossings will be removed following completion of the Project.			

Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 9: Hydrology and flood risk	Construction: deterioration in the water quality of aquatic environment receptors via generation of sediment laden run-off as a result of construction activities, e.g. watercourse crossings and excavations, mobilisation of contaminants or accidental spillage of pollutants.	Increased winter precipitation and extreme rainfall events resulting in erosion of stockpiled materials and soils within the construction site, leading to increased frequency or extent of silt run off and environmental pollution.	The soil stockpiles will comply with relevant standards to prevent silty runoff and any known or suspected contaminated soils will be contained on impermeable sheeting and covered prior to removal. In areas of flood risk, bog-matting and geotextiles will be considered for access tracks to reduce excess runoff of soils during adverse weather conditions. A Drainage Management Plans (DMP) during construction will detail pollution prevention measures for the control of run-off from the site to avoid impact to watercourses. The DMPs will include the appropriate rainfall climate uplifts for the construction phase of the project based on	Unlikely	Minimal	**Negligible (NS)**

	Environment Agencies guidance. Groundwater dewatered from excavations (e.g., pylon foundation excavations) would be discharged to adjacent grassed/vegetated agricultural land, away from watercourses as far as possible. Where there remains the potential for this silty water to runoff into nearby surface water features or agricultural land used for crops, additional control measures would be put in place, which may include surrounding the discharge area (grassed/vegetated agricultural land) with sediment fencing or passing the silt-laden water through a Siltbuster® or similar. This mitigation is effective regardless on the extent of precipitation change.

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 9: Hydrology and flood risk	Operation: deterioration in the water quality by accidental spillage/release of pollutants, which may affect the viability of an abstraction.	Increased winter precipitation and extreme rainfall events resulting in the introduction of contaminants through surface water run-off from the operational substations, leading to increased frequency or extent of environmental pollution.	The proposed embedded measures to prevent surface water pollution are mitigated through the development and implementation of a Drainage Strategy for the operational substations which sets out measures to ensure the protection of the water environment whilst taking into account changing precipitation rates with climate change.	Unlikely	Minimal	**Negligible (NS)**
Decrease in summer precipitation coupled with an increased frequency and intensity of storm events.	Chapter 11: Agriculture	Temporary loss of or damage to agricultural land and soil resources including BMV.	Increasing drought conditions or wind gusts associated with increased frequency and intensity of storm events resulting in wind stripping, affecting agricultural soil quality and yields of the reinstated agricultural land.	The design of the Project has avoided agricultural land as far as possible. Adoption of industry standard methods for the handling and storage of soils; based on Defra's	Unlikely	Minor	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Decrease in summer precipitation leading to drought conditions, followed by an increase in precipitation and frequency and intensity of storm events.	Chapter 11: Agriculture	Temporary loss of or damage to agricultural land and soil resources including BMV.	Heavy rainfall events on parched hydrophobic soil following drought events increasing the risk of erosion of soils on reinstated agricultural land.	current good practice guidelines, standard working methods and techniques used to protect soil resources. Reinstatement strategies will ensure equal or improved conditions of agricultural soil quality (ALC grade) following completion of the Project. An aftercare programme will be implemented for all agricultural land subject to disturbance and restoration. Managing the soils in this way will reduce any further negative impacts resulting from climate change.	Unlikely	Minor	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Decrease in summer precipitation	Chapter 13: Air quality	Increase in dust emissions and adverse effects on human receptors during construction.	Increased dust emissions (frequency or magnitude) due to increased drought conditions.	**CoCP, Volume 5, Document 5.3.3B** includes standard dust management measures. Dust measures may need to be employed more frequently as a result of worsening conditions due to climate change.	Possible	Minimal	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Chapter 14: Noise and Vibration	Potential increased noise levels at Noise Sensitive Receptors (NSRs) from the operational substations.	Potential increase in operational noise due to increased use of coolers, coupled with windows being open for cooling and ventilation.	The coolers are only expected to be used in emergency conditions during the daytime. Even under these conditions the predicted levels are such that an adverse impact would potentially be experienced but not a significant adverse effect. The embedded mitigation of the enclosure of Super Grid Transformers at the substation further reduces likelihood of adverse noise impact from the operational substation regardless of whether windows are open at NSRs.	Possible	Minimal	**Minor (NS)**

Climate trend	Discipline	Predicted effects / proposed environmental measures	Potential ICCI	Embedded mitigation measures	Likelihood of Impact	Consequence of Impact	Significance
Increase in precipitation resulting in fluvial or pluvial flooding.	Chapter 14: Noise and Vibration	Potential increased noise levels at Noise Sensitive Receptors from the operational 400kV overhead line.	Increased rainfall will lead to greater incidence of “wet” noise conditions relating to corona discharge on overhead lines.	The design of the route purposefully kept the overhead line from being close to NSRs. The Tier 2 noise assessment based on National Grid modelling results shows that impacts on residential receptors from noise levels from the overhead line are not significant. This is not expected to change irrespective of changes to rainfall rates in the local area.	Very unlikely	Minimal	**Negligible (NS)**

17.12 Significance conclusions

GHG assessment

17.12.1 In accordance with the assessment methodology and criteria for defining significance in **Table 17.19**, the Project is assessed as having a minor adverse effect and is therefore assessed as being not significant.

CCR assessment

17.12.2 The CCR and ICCI assessment has concluded that there are likely to be no significant effects remaining following the assessment of climate change impacts on the construction, operational and decommissioning phases of the Project. This is because all relevant and implementable environmental measures have been embedded into the Project and are likely to be effective and deliverable to address the likely significant effects of the Project.

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