

Preliminary Environmental Information Report

Calderdale Energy Park

7 April 2026

Volume 2, Chapter 11 : Carbon and Climate Change

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Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations
2009 – Reg 5 (2) (a).



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11 Carbon and Climate Change

11.1 Introduction

11.1.1 This Chapter of the Preliminary Environmental Impact Assessment (PEIR) has been prepared by Logika Group on behalf of the Applicant and assesses and presents the preliminary likely significant effects of the Proposed Development with regards to Carbon and Climate Change. It is based on the environmental information available to date (which is detailed in this Chapter), as well as the current description of the Proposed Development as set out in **Chapter 4: The Proposed Development**.

11.1.2 This Chapter concludes there is a significant beneficial environmental effect of the Proposed Development on Greenhouse Gas (GHG) emissions across the lifetime of the Proposed Development, including construction, operation and maintenance and decommissioning phases.

11.1.3 This Chapter concludes there are no likely significant effects on the resilience of the Proposed Development to future climate change during the construction, operation and maintenance and decommissioning phases.

11.1.4 The conclusions of the following topic assessments are relevant to the receptors of this assessment, and have been taken into account in the assessment for Carbon and Climate Change:

- **Chapter 8: Biodiversity;**
- **Chapter 10: Hydrology, Hydrogeology, Geology and Peat;** and
- **Chapter 14: Transport and Access.**

11.1.5 This Chapter is supported by:

- **Volume 3 Appendix 11-1: GHG Background Data.**

11.2 Legislation, Policy and Guidance

11.2.1 Key policy, legislation and guidance relating to Climate Change and of relevance to this preliminary assessment comprises the following, as shown in **Table 11-1**.

Table 11-1: Legislation, Policy and Guidance

Type	Name	Relevance to Assessment
Legislation	Climate Change Act 2008 ¹	Sets a target for the year 2050 for the reduction of greenhouse gas emissions and provides a system for setting UK carbon budgets (among others).
	Climate Change Act 2008 (2050 Target Amendment) Order 2019 ²	Amends the 2050 carbon emissions target in the Climate Change Act 2008 from 80% below 1990 levels to net zero carbon (i.e. 100 % below 1990 levels). This new target will essentially end the UK's contribution to climate change by 2050.
	Carbon Budget Order 2009, Carbon Budget Order 2011, Carbon Budget Order 2016, Carbon Budget Order 2021 ³	Set the UK's carbon budgets for the 1st through 6th carbon budget periods (2008-2037)
	Energy Act 2023 ⁴	Makes provisions regarding energy production and security and the regulation of the energy market (among others).
	Net Zero Strategy: Build Back Greener (2021) ⁵	Sets out the strategy for achieving the UK's binding commitment to net zero carbon emissions by 2050, including

¹ HMSO (2008) *Climate Change Act 2008*. Available at:

<https://www.legislation.gov.uk/ukpga/2008/27/contents>

² HMSO (2019) *The Climate Change Act 2008 (2050 Target Amendment) Order 2019*. Available at:

<https://www.legislation.gov.uk/ukdsi/2019/9780111187654/data.pdf>

³ HMSO (2021) *The Carbon Budget Order 2021*. Available at:

<https://www.legislation.gov.uk/ukdsi/2019/9780111187654>

⁴ HMSO (2023) *Energy Act 2023*. Available at:

<https://www.legislation.gov.uk/ukpga/2023/52/contents>

⁵ HM Government (2021) *Net Zero Strategy: Build Back Greener*. Available at:

<https://assets.publishing.service.gov.uk/media/6194dfa4d3bf7f0555071b1b/net-zero-strategy-beis.pdf>

Type	Name	Relevance to Assessment
		that all of the UK’s electricity supply is from low carbon sources by 2035 and to accelerate the development of renewable energy generation such as wind and solar.
	Energy White Paper: Powering our Net Zero Future (2020) ⁶	Sets out the plan for growth and decarbonisation of the UK’s energy supply out to 2050, in line with the 2050 net zero target. Provides a framework of policies and incentives to accelerate investment in renewable energy infrastructure and acknowledges that “onshore wind and solar will be key building blocks of the future generation mix”.
	Clean Power 2030 Action Plan: A new era of clean electricity (2024) ⁷	States an ambition of 27-29GW of onshore wind electricity delivered by 2030, with the expectation the grid carbon intensity will reduce from 171gCO ₂ e/kWh in 2023 to less than 50gCO ₂ e/kWh in 2030.
	Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025 ⁸	This order reintroduces onshore wind into the definition of nationally significant infrastructure projects under the 2008 Act, and sets the capacity threshold at which

⁶ HMSO (2020) *The Energy White Paper. Powering our Net Zero Future*. Available at: <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

⁷ DESNZ (2024) *Clean Power 2030 Action Plan: A new era of clean electricity*. Available at: <https://assets.publishing.service.gov.uk/media/677bc80399c93b7286a396d6/clean-power-2030-action-plan-main-report.pdf>

⁸ HMSO (2025) *Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025*. Available at: <https://www.legislation.gov.uk/ukdsi/2025/9780348269765/data.pdf>

Type	Name	Relevance to Assessment
		<p>onshore wind projects are considered to be nationally significant infrastructure projects, at more than 100 megawatts.</p>
National Planning Policy	Overarching National Policy Statement for Energy (EN-1) (2025) ⁹	<p>NPS EN-1 recognises the UK’s target to cut greenhouse gas emissions to net zero by 2050.</p> <p>Paragraph 3.3.23 confirms that wind and solar are the lowest cost ways of generating electricity and that “a secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar”.</p> <p>Section 5.3.4 of the NPS EN-1 makes clear that all applications for energy infrastructure should include a whole life GHG assessment as part of the Project’s Environmental Statement (ES),</p> <p>Section 4.10.9 states that the ES should set out how the proposal will take account of the projected impacts of climate change, and Section 4.10.11 states that Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain</p>

⁹ DESNZ (2025) *Overarching National Policy Statement for Energy (EN-1)*.

Available at:

<https://assets.publishing.service.gov.uk/media/695d1015f41883f4e50ed9ab/overarching-national-policy-statement-for-energy-en-1-web-accessible.pdf>

Type	Name	Relevance to Assessment
	National Policy Statement for Renewable Energy Infrastructure (EN-3) (2025) ¹⁰	<p>resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections.</p> <p>NPS EN-3 covers renewable energy infrastructure including onshore wind, and states (Section 2.12) that the deployment of onshore wind farms is critical in meeting the government’s Clean Power 2030 mission.</p> <p>Section 2.12.151 states that where developments are proposed on peat, to ensure the development will result in minimal disruption to the ecology, or release of carbon dioxide (CO₂), and that the carbon balance savings of the scheme are maximised, the Secretary of State should be satisfied that the onshore wind farm layout and construction methods have been designed to minimise soil disturbance and other peatland impacts during construction and maintenance of roads, tracks, and other infrastructure. Section 2.152 also states that the Secretary of State should be satisfied that Applicants have ruled out other locations before siting developments on peatland. Please refer to Chapter 5: Alternatives and</p>

¹⁰ DESNZ (2025) National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: <https://assets.publishing.service.gov.uk/media/695d1368b5c46330350ed9a2/national-policy-statement-for-renewable-energy-infrastructure-en-3-web-accessible.pdf>

Type	Name	Relevance to Assessment
		<p>Design Evolution for the site selection process. Section 2.152 also states that the Secretary of State should be satisfied that areas of deep peat within a Proposed Development have been avoided through development design. See Chapter 10: Hydrology and Hydrogeology, Geology and Peat for information on the selection of infrastructure location to avoid areas of deep peat within the Proposed Development.</p>
	<p>National Policy Statement for Electricity Networks Infrastructure (EN-5) (2025)¹¹</p>	<p>NPS EN-5 covers substations and electricity transmission systems (among others) and sets out impacts of climate change on the risk to the resilience of electricity network infrastructure that should be assessed, including flooding for substations, increased transmission losses from higher average temperatures, earth movements from flooding or drought, and coastal erosion.</p>
	<p>National Planning Policy Framework (NPPF) (2024)¹²</p>	<p>Provides guidance on climate change, specifically Section 14: Meeting the challenge of climate change, flooding and coastal change. Paragraphs</p>

¹¹ DESNZ (2025) *National Policy Statement for Electricity Networks Infrastructure (EN-5)*. Available at: <https://assets.publishing.service.gov.uk/media/695d12e1b5c46330350ed9a1/national-policy-statement-for-electricity-networks-infrastructure-en-5-web-accessible.pdf>

¹² Ministry of Housing, Communities & Local Government (2024) *National Planning Policy Framework*. Available at: <https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf>

Type	Name	Relevance to Assessment
		<p>163 and 164 provide guidance in relation to adaptation, mitigation and climate change resilience. Paragraph 161 supports the increased use and supply of renewable and low carbon energy, and Paragraph 168 provides guidance to local planning authorities in determining planning applications for renewable and low carbon development. The latter paragraph states that <i>“local planning authorities should: a) not require Applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; b) approve the application if its impacts are (or can be made) acceptable”</i>.</p>
	<p>Draft National Planning Policy Framework (NPPF) (2025)¹³</p>	<p>The Draft NPPF sets out planning policy for England. The draft NPPF supports renewable energy production, with the addition of Section 10, relating specifically to low carbon energy supplies.</p>
<p>Local Planning Policy</p>	<p>Calderdale Council Local Plan 2018/19 to 2032/33¹⁴</p>	<p>Policy CC5 on “Supporting Renewable and Low Carbon Energy” sets out the Council’s positive consideration of renewable and low carbon</p>

¹³ Ministry of Housing, Communities & Local Government (2025) *Draft National Planning Policy Framework*. Available at: https://assets.publishing.service.gov.uk/media/697b71c52ff8d10a830d5d4a/Draft_NPPF_December_2025.pdf

¹⁴ Calderdale Council (2023). The Calderdale Local Plan. Available at: <https://new.calderdale.gov.uk/planning-and-building-control/planning-policy/local-plan>

Type	Name	Relevance to Assessment
		developments, subject to there being no unacceptable adverse effects.
	Bradford Council Core Strategy Development Plan Document 2017-2030 ¹⁵	Policy EN6 relates to energy, and states a target for increased installed renewable and low carbon energy.
	Pendle Local Plan 2021-2040 ¹⁶	Policy DM03 on renewable heat and energy supporting text 5.59 says that Pendle must contribute towards national and international (carbon) targets, and that Pendle would need to generate 15.4MW of electricity from renewable and low carbon sources.
	The West Yorkshire Climate and Environment Plan 2021-2024 ¹⁷ .	The West Yorkshire Climate and Environment Plan 2021-2024 acknowledges that achieving their emission reduction pathway to net zero in 2038 would require a significant upscaling of onshore wind (and other low carbon energy solutions).

¹⁵ Bradford Council (2017) Local Plan for the Bradford District. Core Strategy Development Plan. Available at: <https://www.bradford.gov.uk/Documents/planningStrategy/10/Adopted%20core%20strategy//1%20Core%20Strategy%20full%20document.pdf>

¹⁶ Pendle Borough Council Local Plan (adopted 2025). Core Strategy and Local Plans. Available at: https://www.pendle.gov.uk/downloads/file/12624/local_plan_adoption_version_-_final

¹⁷ West Yorkshire Combined Authority. West Yorkshire Climate and Environment Plan 2021-2024. Available at: <https://www.westyorks-ca.gov.uk/media/7382/west-yorkshire-climate-and-environment-plan.pdf>

Type	Name	Relevance to Assessment
National Guidance	Planning Practice Guidance for Climate Change ¹⁸	Provides guidance on integrating climate change assessment and mitigation into Local Plans and planning applications.
	Institute of Sustainability & Environment Professionals (ISEP, formerly IEMA) Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance ¹⁹	Guidance on quantifying GHG emissions.
	The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GHG Protocol) ²⁰	
	PAS 2080:2023 Carbon Management in Buildings and Infrastructure ²¹	
	Royal Institute of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the Built Environment ²²	

¹⁸ HM Government (2019) *Planning Practice Guidance for Climate Change*. Available at: <https://www.gov.uk/guidance/climate-change>

¹⁹ ISEP (2022) *Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition*. Available at: https://www.iema.net/media/xmgpooopk/2022_iema_greenhouse_gas_guidance_ei_a.pdf

²⁰ World Resources Institute, World Business Council for Sustainable Development (2001) *The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard. World Resource Institute, Revised Edition*. Available at: <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

²¹ BSI (2023) *PAS 2080: 2023 Carbon Management in Buildings and Infrastructure*. Available at: https://www.bsigroup.com/siteassets/pdf/en/insights-and-media/insights/brochures/pas_2080.pdf

²² RICS (2023) *Whole life carbon assessment for the built environment, 2nd edition*. Available at:

Type	Name	Relevance to Assessment
	Climate Change Committee (CCC) Net Zero Technical Report ²³	Information on UK climate mitigation goals and the technology and policy required to achieve them.
	Seventh Carbon Budget: Advice for the UK Government ²⁴	
	ISEP Environmental Impact Assessment (EIA) Guide: Climate Change Resilience and Adaptation ²⁵	Guidance on evaluating climate resilience and adaptation.
	The Third National Adaptation Programme (NAP3) and the Fourth Strategy for Climate Adaptation Reporting ²⁶	
	UK Climate Change Risk Assessment 2022 ²⁷	Sets out and evaluates sixty-one climate change risks on the UK, including risks for energy infrastructure.

https://www.rics.org/content/dam/ricsglobal/documents/standards/Whole_life_carb_on_assessment_PS_Sept23.pdf

²³ CCC (2019) *Net Zero, Technical Report*. Available at:

<https://www.theccc.org.uk/publication/net-zero-technical-report/>

²⁴ CCC (2025) *Seventh Carbon Budget: Advice for the UK Government*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf>

²⁵ ISEP (2020) *Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation*. Available at:

<https://www.iema.net/media/mabhqjino/iema-eia-climate-change-resilience-june-2020.pdf>

²⁶ DEFRA (2023) *The Third National Adaptation Programme and the Fourth Strategy for Climate Adaptation Reporting*. Available at:

https://assets.publishing.service.gov.uk/media/64ba74102059dc00125d27a7/The_Third_National_Adaptation_Programme.pdf

²⁷ HMSO (2022) *UK Climate Change Risk Assessment 2022*. Available at:

<https://assets.publishing.service.gov.uk/media/61e54d8f8fa8f505985ef3c7/climate-change-risk-assessment-2022.pdf>

Type	Name	Relevance to Assessment
	Climate Mitigation and England Peatlands (NERR142) ²⁸	Sets out peat emission factors and carbon related information.
	Spatial Prioritisation of Land Management for Carbon Dataset 2023 (NECR510) ²⁹	
Local Guidance	City of Bradford Climate Action Plan 2025-2028 ³⁰	Priority 2 supports renewable energy generation, including wind.
	Calderdale Climate Action Plan 2023-26 ³¹	The Green economy theme Renewable Energy topic mentions the need for a rise in land-based renewables to meet increasing electricity demands.

11.3 Scoping and Stakeholder Engagement

2025 Scoping Opinion

- 11.3.1 In September 2025, a request for a Scoping Opinion was submitted alongside a Scoping Report. **Table 11-2** presents the details of the Planning Inspectorate (PINS) Scoping Opinion relevant to Climate Change and confirms how the response is considered within the proposed scope of assessment (as set out below).

²⁸ Natural England (2025) Climate Mitigation and England Peatlands. Available at: <https://publications.naturalengland.org.uk/publication/6729247337742336>

²⁹ Natural England (2025) Spatial Prioritisation of Land Management for Carbon Dataset 2023. Available at: <https://publications.naturalengland.org.uk/publication/5029612187549696>

³⁰ City of Bradford Climate Action Plan 2025-2028. Available at: <https://www.bradford.gov.uk/media/bm3ps2mc/cbmdccclimateactionplan.pdf>

³¹ Zero Carbon Calderdale (2024) *Calderdale Climate Action Plan 2023-26*. Available at: <https://new.calderdale.gov.uk/sites/default/files/2024-04/Calderdale%20Climate%20Action%20Plan%202023.pdf>

Table 11-2: Consideration of PINS Scoping

Consultee	PINS ID	Scoping Opinion Comments	Consideration within Proposed Scope of Assessment
PINS	3.4.1	No matters have been proposed to be scoped out of the assessment	The scope of assessment remains as described in the Scoping Report.
	3.4.2	The GHG assessment within the ES should clearly describe any assumptions made in determining the quantification of any emissions reduction resulting from the Proposed Development such as the displacement of fossil fuel power generation.	Assumptions around displacement of fossil fuel power generation are described and justified (see Paragraphs 11.5.10 to 11.5.21).
	3.4.3	The ES should assess any likely significant effects arising from the presence of the turbine foundation and other components due to be left in situ in perpetuity on carbon capture and storage.	Qualitative statement on long-term (post-decommissioning) impact on carbon storage of leaving foundations and other components in situ (see Paragraphs 11.8.11 and 11.8.12). Note that this impact will be quantified, as relevant, in the ES, as decommissioning scenarios are progressed.

11.3.2 There has been no other consultation undertaken as part of the development of this PEIR for Carbon and Climate Change. Consultation will take place between the PEIR and preparation of the ES with statutory consultees.

11.4 Assessment Methodology

11.4.1 The Assessment Methodology for Carbon and Climate Change is presented in two parts, as follows:

- Part A: GHG Assessment: this provides a quantification of the GHG emissions resulting from the construction, operation and maintenance and decommissioning of the Proposed Development, and an assessment against the net GHG emissions saved by the Proposed Development in providing renewable electricity which reduces reliance on fossil fuels such as natural gas; and
- Part B: Climate Change Risk and Adaptation (CCRA) Assessment: this is an assessment of the ability of the Proposed Development to adapt to and be resilient to potential future changes in climate, such as hotter dryer summers, warmer wetter winters and increased storminess.

11.4.2 GHGs are gaseous compounds that have been identified as contributing to a warming effect in the earth's atmosphere. The primary GHG of concern is CO₂ which is emitted from combustion sources such as vehicular transport and energy plant (and is therefore relevant to the energy required to manufacture goods and materials used to construct the Proposed Development). Other GHGs also contribute to climate change and these are accounted for based on their Global Warming Potential (GWP). The combined effect of all GHG emissions will be presented as carbon dioxide equivalent (CO₂e) and will account for the seven GHGs included in the United Nations Framework Convention on Climate Change's (UNFCCC) Kyoto Protocol. These are: CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).

11.4.3 Within this Chapter, the term 'carbon' is used to describe all GHG emissions, i.e. all emissions which might contribute to climate change, the predominant contributor of which is CO₂. The term CO₂e is also used, which refers to Carbon Dioxide equivalent, which is the main metric for measuring and reporting GHG emissions.

Part A: GHG Assessment

Study Area

11.4.4 The study area for the GHG assessment is defined by the likely location of emissions sources that contribute to the Proposed Developments' lifecycle footprint. These include all on-site and off-site emissions directly and indirectly generated by the Proposed Development throughout its lifecycle, including during construction, operation and maintenance and decommissioning, and includes emissions that arise throughout the supply chains of the energy, materials and components that make up the Proposed Development. This also includes emissions from transportation of materials and workers to the site, and emissions from the treatment of decommissioned materials. These supply chain emissions will

occur in the UK and overseas. The emissions sources considered are detailed further in **Table 11-3**.

Sources

11.4.5 Data used in the GHG assessment are detailed in **Appendix 11-1: GHG Background Data**.

Methodology

11.4.6 The GHG assessment has taken a whole life-cycle approach to develop a GHG footprint for the Proposed Development, considering GHG emissions from the following lifecycle stages of the Proposed Development: construction (material embodied carbon, transport, and installation activities), operation and maintenance, and decommissioning.

11.4.7 The expected GHG emissions have been quantified using a calculation-based methodology as per the following equation, as stated in the conversion factors methodology for company reporting published by the UK Government³²:

$$\text{Activity data} \times \text{GHG emissions factor} = \text{GHG emissions value}$$

11.4.8 **Table 11-3** sets out in more detail what activities and sources of emissions are considered as part of the assessment.

Table 11-3: Sources of GHG Emissions

Lifecycle Stage	Activity	Primary Emission Sources
Construction (Material Embodied Carbon)	Raw material extraction and processing, and manufacturing of components forming part of the Proposed Development: <ul style="list-style-type: none"> • Turbines • Foundations • Internal Cabling • Onsite Substation • Bradford West Cable Corridor • Meteorological mast 	GHG emissions in extraction and production of raw materials. GHG emissions from vehicle use transporting raw materials and extraction to processing sites and on to product manufacture. GHG emissions during manufacture of components.

³² DESNZ (2025) UK Government GHG Conversion Factors for Company Reporting. Available at: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2025>

Lifecycle Stage	Activity	Primary Emission Sources
	<ul style="list-style-type: none"> Watercourse crossings 	
Construction (Transport to the Proposed Development)	Transportation of the Material required to construct the Proposed Development from the point of manufacture to the Proposed Development.	GHG emissions from the production and combustion of fuels used in transport.
Construction (Installation Activities)	<p>On-site construction activity.</p> <p>Transportation of construction workers to and from the Proposed Development.</p> <p>Raw material extraction and processing, and manufacturing of components used in the construction phase of the Proposed Development:</p> <ul style="list-style-type: none"> access tracks temporary construction compounds temporary onsite concrete batching plant <p>Excavation, temporary storage and re-homing of peat.</p>	<p>Energy (electricity, fuel, etc.) consumption from plant and vehicles, generators on-site, and construction worker commuting.</p> <p>GHG emissions from transportation of workers to and from the Proposed Development.</p> <p>GHG emissions in extraction and production of raw materials.</p> <p>GHG emissions from vehicle use transporting raw materials and extraction to processing sites and on to product manufacture.</p> <p>Emissions from peat loss.</p>
Operation and maintenance	<p>Operation of the Proposed Development.</p> <p>Maintenance of the Proposed Development.</p>	<p>GHG emissions from operational transport (e.g. maintenance vehicle movements).</p> <p>Embodied GHG emissions from replacement materials</p>

Lifecycle Stage	Activity	Primary Emission Sources
		<p>and components during the lifetime of the Proposed Development, including their transportation, and transport to remove life expired components.</p> <p>SF₆ emissions from electrical switchgear in turbines and substation (unless SF₆ is avoided, which will be defined at the ES stage, but a worst-case scenario is currently used).</p>
Decommissioning	<p>On-site decommissioning activity.</p> <p>Transportation of waste materials.</p> <p>Transportation of workers to and from the Proposed Development.</p> <p>Decommissioning related peat emissions.</p>	<p>Energy (electricity and fuel.) consumption from plant, vehicles, and machinery.</p> <p>GHG emissions from disposal and transportation of waste.</p> <p>GHG emissions from transportation of workers to and from the Proposed Development.</p>

Significance Criteria

11.4.9 ISEP guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (“ISEP GHG Guidance”)¹⁹ identifies three underlying principles to inform the assessment of significance, as follows:

- *GHG emissions from all projects will contribute to climate change, the largest interrelated 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.*

- *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.*

11.4.10 Based on these principles, ISEP states that:

- *when evaluating significance, all new GHG emissions contribute to an adverse environmental effect, however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;*
- *where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce a project's residual emissions at all stages; and*
- *where GHG emissions remain significant, but cannot be further reduced, approaches to compensate a project's remaining emissions should be considered.*

11.4.11 The first point above is important in the context of the Proposed Development as it is designed to provide zero emission energy that will reduce the reliance upon high-emission forms of power generation such as use of fossil natural gas. The GHG assessment will therefore consider the Proposed Development's lifecycle GHG emissions against a baseline or counterfactual scenario which is the generation of electricity using natural gas (see **Section 11.5** for more information on this counterfactual). The baseline will only consider the operational emissions and not hypothesise about the construction of any new fossil fuel power stations (i.e. it assumes there will be no new construction-related emissions in the baseline). The resulting comparison will allow the GHG benefits (i.e. GHG savings) of the Proposed Development to be contextualised.

11.4.12 In advising on the significance of any net change in GHG emission resulting from a development, ISEP identify that in order to limit the adverse effects from climate change, global temperature change needs to be limited to well below 2°C, aiming for 1.5°C. The implication of this objective is that global emissions need to fall to net zero by 2050.

11.4.13 The UK's response to limiting climate change is contained within the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which requires the UK economy to be net zero by 2050 following a trajectory set through five-yearly carbon budgets. The 2050 target (and interim budgets set to date) are, according to the CCC, compatible with the required magnitude and rate of GHG emissions reductions required in the UK to meet the goals of the Paris Agreement, thereby limiting severe adverse effects.

- 11.4.14 It follows, therefore, that the significance of any net change of GHG resulting from a development is not so much whether a project emits GHG emissions, nor even the magnitude of GHG emissions from the development alone, but the extent to which the development contributes to reducing GHG emissions consistent with a trajectory towards net zero by 2050.
- 11.4.15 To establish the significance of the GHG emissions from a development therefore requires judgements on:
- the consistency with policy requirements, since these have been specified to ensure the economy decarbonises in line with the UK’s net zero target; and
 - the degree to which the development has sought to mitigate its emissions.
- 11.4.16 Examining each of these dimensions allows the assessment to make professional judgement on the likely significant effects based on a set of significance criteria established in the ISEP GHG Guidance, summarised in **Table 11-4**.

Table 11-4: Significance Criteria for GHG Impact Assessment

Rating	Description	Criteria to Determine Significance of Net GHG Emissions
Major Adverse	A project with Major Adverse effects is locking in emissions and does not make a meaningful contribution to the UK’s trajectory towards net zero.	A project’s net GHG impacts are: <ul style="list-style-type: none"> • not mitigated or are only compliant with do-minimum standards set through regulation; and • do not provide further reductions required by existing local and national policy for projects of this type.
Moderate Adverse	A project with Moderate Adverse effects falls short of fully contributing to the UK’s trajectory towards net zero.	A project’s net GHG impacts are: <ul style="list-style-type: none"> • partially mitigated; and • may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type.

Rating	Description	Criteria to Determine Significance of Net GHG Emissions
Minor Adverse	A project with Minor Adverse effects is fully in line with measures necessary to achieve the UK’s trajectory towards net zero.	<p>A project’s net GHG impacts are:</p> <ul style="list-style-type: none"> • fully consistent with applicable existing and emerging policy requirements; and • in line with good practice design standards for projects of this type.
Negligible	A project with Negligible effects provides GHG performance that is well ‘ahead of the curve’ for the trajectory towards net zero and has minimal residual emissions.	<p>A project’s net GHG impacts are:</p> <ul style="list-style-type: none"> • reduced through measures that go well beyond existing and emerging policy; and • better than good practice design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.
Beneficial	A project with Beneficial effects substantially exceeds net zero requirements with a positive climate impact.	<p>A project’s net GHG impacts are:</p> <ul style="list-style-type: none"> • below zero; and • it causes a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-project baseline.

11.4.17 The ISEP Guidance states:

“A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and ‘good practice’ reduction measures to achieve that has a minor adverse effect that is not significant. It may have residual emissions but is doing enough to align with and contribute to the relevant transition scenario, keeping the UK on track towards

net zero by 2050 with at least a 78% reduction by 2035 and thereby potentially avoiding significant adverse effects.”

“A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.”

11.4.18 ISEP also advise that:

- Major adverse, moderate adverse and beneficial effects should be considered significant in the context of EIA. Minor adverse and negligible effects are considered to be not significant;
- In the case of large-scale developments, irrespective of the level of mitigation, if net GHG emissions exceed 5% of the UK or devolved administrations’ carbon budget, then this is a level of change that is considered significant;
- Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect, and it is recommended therefore that the assessment also considers emerging policy/standards and the guidance of expert bodies such as the CCC on necessary policy developments, particularly for multi-phased projects with long timescales; and
- To aid decision making it is important to inform the decision maker about the relative severity of environmental effects such that they can be weighed in a planning balance. Therefore, it is essential to provide context for the magnitude of GHG emissions reported in the EIA in a way that aids evaluation of these effects by the decision maker. ISEP advise that this context can be provided through comparison of the whole life GHG emissions resulting from the Proposed Development; with national, local and sectoral totals, as well as carbon budgets.

11.4.19 Therefore, the assessment of significance is established over two steps as follows.

Step 1: Establish Context of GHG Emissions

11.4.20 Context for decision making is provided by comparing the net change in the whole-life GHG emissions resulting from the Proposed Development, taking account of the counterfactual baseline scenario, and comparison of net emissions against national and sectoral GHG emissions totals, and carbon budgets.

11.4.21 In addition, a lifetime carbon intensity for the electricity generated by the Proposed Development will be calculated (i.e. gCO₂e/kWh taking account of all construction,

operational and maintenance and decommissioning emissions) for comparison to other energy generation forms.

Step 2: Determine Significance of Effects

11.4.22 Significance of effects is established through applying the criteria detailed in **Table 11-4** based on professional judgement that considers:

- The consistency of the development with national, regional and local policies designed to limit GHG emissions and meet the UK's net zero target]; and
- The robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG emissions.

11.4.23 In terms of mitigation, ISEP recommends that mitigation should in the first instance seek to avoid GHG emissions. Where GHG emissions cannot be avoided, a project should aim to reduce the residual emissions at all stages. Where additional GHG emissions remain but cannot be further reduced at source, approaches should be considered that compensate the project's remaining emissions, for example through offsetting.

Limitations and Assumptions

11.4.24 It is necessary to make a number of assumptions when carrying out a GHG assessment, but these assumptions reflect a 'realistic worst-case' scenario. Key assumptions made in carrying out the GHG assessment include:

- The quantity and type of materials used in the Turbines, are as per the Vestas Life Cycle Assessment (LCA) of electricity production from an Onshore V162-6. .2MW wind plant ("the Vestas Study") (scaled to the 34 Wind Turbines that make up the Proposed Development), with substation materials from the Vestas LCA V236 15MW wind plant study (scaled to the energy capacity of the Proposed Development). The Vestas turbines are one of the candidate turbines being considered to be used in the final design of the Proposed Development. Data from any of the three would be a representative assumption for the assessment. The Vestas LCA study was chosen as it is highly granular, and allows for the extraction of relevant data points from the study, to be input into this assessment.
- When components are assumed to be imported (Nacelle, Hub, Blades) the same transport distances are used as in the Vestas study. Where UK production is assumed (substation, cables) a distance of 250km is assumed. For the cement materials, local production is assumed, with a transport distance of 30km. These distances represent realistic-but-conservative distances for local and national transport within the UK.

- Assumptions have been made on the rate of future decarbonisation of transport in line with the Department for Transport's (DfT's) WebTAG data book.
- All turbines (excluding foundations and towers) are assumed to be replaced once (on average) over the lifetime of the Proposed Development. The Vestas study assumes a 20-year lifetime, therefore this Chapter assumes an average of a full replacement over the 35-year lifetime of the Proposed Development as a reasonable worst-case scenario in terms of emissions from maintenance, at this stage. As stated in **Chapter 4: The Proposed Development**, further details on the anticipated maintenance activities will be confirmed in the ES.
- It is estimated that the Proposed Development will export 733 GWh of electricity annually, or 25,665 GWh over its 35-year lifetime. This is in line with the per-turbine assumed electrical output of the Vestas study.
- The decommissioning phase is assumed equal to the construction phase (for GHG emissions), with the following exceptions, which are lower than for construction:
 - Total on-site time is reduced from 30 months to 24 months;
 - Transport has decarbonised in line with DfT's WebTAG data book assumptions; and
- Materials at decommissioning are removed from the area (excluding material left in-situ), with emissions from transportation to the recycling plant or landfill (assumed distance: 250km – not that landfill facilities exist near Calderdale, but a larger distance was assumed to allow for a not-yet-existent recycling facility as the destination). Any emissions associated with recycling are assigned to the next life of the materials. Emissions from landfill in post-2050 (net zero) are assumed to be negligible, inert materials have low landfill related emissions today, and these will be reduced further as transport and energy decarbonised towards 2050.
- No credit is given for avoided emissions from recycling, as material production in 2067 is assumed to be fully decarbonised in line with the UK's 2050 net zero target, and therefore there are assumed to be no 'emission savings' from recycling above those of primary production.
- SF₆ emissions are assumed to be 0.1% per year, in line with the assumptions of the Vestas study. Note that SF₆ may not be present in the final design, but is modelled in this assessment as a reasonable worst-case assumption.

- Peat loss during temporary storage in construction is assessed at 10% of the volume of excavated peat as a reasonable worst-case assumption (see **Section 11.4** on peat methodology).
- All access tracks, hardstandings and turbine foundations are presumed to be left in-situ post decommissioning.
- All peat was assessed as uniform quality. A differentiation of peat into sub-qualities may be possible at ES, depending on data availability.

11.4.25 The full set of assumptions used in the study is available in **Appendix 11-1: GHG Background Data**.

11.4.26 Despite the assumptions in this section, the assessment is considered to be robust because in each case the assumption represents a reasonable worst-case, which means all GHG emission sources are reasonably captured by the assessment.

Peat Overview and Methodology

A description of the peat at the area of the Proposed Development is set out in the 'Area' Baseline section below (**Section 11.5**).

Peat in Construction

During construction, 559,645m³ of peat is assumed to be excavated (see **Chapter 10: Hydrology, Hydrogeology, Geology and Peat**). This peat is temporarily stored while construction activities are undertaken, and then deposited within the area of the Proposed Development in accordance with **Appendix 10.3: oPMP**.

There may be some peat loss during temporary storage, due to drying-out of the peat. This is estimated as 10% of the total excavated peat volume, and has been derived based on discussions with the competent peat expert on the team (see **Appendix 1.1: Statement of Expertise**). The aim of the outline Peat Management Plan (oPMP) is to prevent any substantial peat loss, and as such assessing a 10% loss is considered to be a reasonable worst-case assumption.

Assuming an average carbon storage of 40kg Carbon per m³³³, the full 559,645 m³ of excavated peat contains 82,081 tCO₂e (stored as 22,386 tonnes of carbon). The 10% of this assumed to be lost in temporary storage in excavation is therefore 8,208 tCO₂e.

³³ Forest research (2020) Peatlands, forestry and climate change. What role can forest-to-bog restoration play?

Peat in Operation

During operation and maintenance, the peat will continue to be a net emitter of GHG emissions, as set out in the future area baseline in **Section 11.5** below. Activities to restore the peat, as set out in the oPMP, should reduce the emissions rate of the peat to a lesser degree.

Peat in Decommissioning

If all underground elements of the Proposed Development are left in-situ, there is unlikely to be any further peat loss as a result of decommissioning activities. However, if underground elements are removed, the resultant space that was occupied by the underground elements will serve as drains, draining water from the nearby peat, and causing peat loss.

At this PEIR stage, it is expected that underground elements will remain in-situ following decommissioning, and therefore peat loss in decommissioning is evaluated as zero. However, should this change at the ES stage, the peat loss from removal of underground elements will be evaluated in the ES.

11.5 Baseline Conditions

Overview

- 11.5.1 Baseline emissions are the current and future GHG emissions in the absence of the Proposed Development.
- 11.5.2 As the Proposed Development generates electricity, it is appropriate to define two baseline scenarios when assessing GHGs:
- 1) The 'Area' baseline: the current and future GHG emissions of the physical Proposed Development; and
 - 2) The 'Energy' baseline: the current and future GHG emissions of the UK's energy supply.

'Area' Baseline

Current Baseline

- 11.5.3 The existing area where the Proposed Development would be situated is predominantly upland moorland (2,352 hectares), and includes substantial areas of bogs, marshes, water-fringed vegetation and fens, areas of which are used for sheep grazing. Peat is a major store of carbon. Only 1.3% of England's total peat area is in a (near) natural condition, with either low emissions, or acting as a small net source of carbon sequestration²⁸. The vast majority of England's peat is in

ecologically damaged condition due to past and/or current human activity, and is a net source of carbon emissions.

11.5.4 The area for the Proposed Development contains circa 22,250,000m³ of peat (see **Appendix 10.3: oPMP**). Assuming an average carbon storage of 40kg Carbon per m³³⁴, this gives a total carbon storage of the area of the Proposed Development of 890kt Carbon, or 3,263kt CO₂e.

11.5.5 The oPMP states:

Approximately 1,290 ha (c. 55%) of the Peat Survey Area (2,352 ha) is within 30m of artificial drains or hags / gully systems, while much of the wider area shows ample heather, minimal sphagnum and evidence of fires and patchy bare peat. This will be quantified more thoroughly post-PEIR, but at this stage and on the basis of these categories, much of the Site can be characterised as Modified-Drained, and therefore in need of restoration.

11.5.6 The baseline for the area where the Proposed Development would be located includes the annual GHG emissions from the modified-drained peat. The emission factor of heather dominated drained modified bog is 3.32t CO₂e per hectare per year³⁵, giving annual baseline emissions at the area for the Proposed Development of 7,809t CO₂e/yr.

Future Baseline

11.5.7 In the future, the existing peat within the baseline environment will continue to decline at or near current rates. Much of the peat has already had management intervention, however it will likely take decades before the peat starts to become a net sink, rather than a net source of carbon emissions:

11.5.8 “Halting the loss of carbon emissions can be achieved relatively quickly (within years) and almost as soon as the water table has been restored to a higher annual level (Evans et al 2021). The full restoration with active peat formation, when carbon again starts to build, takes much longer, generally over a few decades depending on the initial state of the peatland.”²⁸

11.5.9 The rate at which peat is lost may slow in the coming decades as a result of the management activities that have already occurred, with some additional slowing from ongoing management activities. The future baseline emissions may be lower than the current baseline, however this is not expected to be largely different from the current emissions rate of 3.32t CO₂e per hectare per year, and accurate

³⁴ Forest research (2020) Peatlands, forestry and climate change. What role can forest-to-bog restoration play?

³⁵ Natural England (2025) Climate Mitigation and England Peatlands

quantification is not possible in advance. In the long-term, the area may once again actively sequester carbon, but regardless, peat restoration activities help preserve the carbon already stored within the peat.

‘Energy’ Baseline

11.5.10 The UK’s energy use contributes to global GHG emissions predominantly through the combustion of fossil fuels in the generation of electricity, and directly in the use of fuels in internal combustion engine (ICE) vehicles, boilers, and other uses. As a greater number of renewable energy projects have come online, the carbon emissions associated with the UK’s energy use have decreased, and this trend is anticipated to continue into the future. The change in the emissions profile of the energy mix is driven by three main factors of relevance to this assessment:

- 3) Fossil fuel electricity power stations are directly replaced by renewable generation plants³⁶;
- 1) Fossil-fuel use in transport, heating homes and industry is replaced with electricity (e.g. ICE vehicles being replaced by electric vehicles³⁷), increasing total electricity demand; and
- 2) Energy demand is increasing in general, due in part to our increasing need for electricity for data storage and transfer in our increasingly digital world³⁸.

Current Baseline

11.5.11 While the overall UK electricity grid mix is decarbonising over time, the addition of the Proposed Development to the grid will replace fossil electricity, rather than average electricity, whether by allowing the phase-out of an existing fossil fuel power station, or by avoiding the need for a (likely natural gas fuelled) power source to meet increasing demand.

11.5.12 The energy generated by the Proposed Development will therefore displace electricity generated by use of natural gas.

11.5.13 It is assumed that the electricity generated in the energy baseline is from an unabated natural gas-fired CCGT power station.

³⁶ See, for example: <https://www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024>

³⁷ See, for example: <https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-files>

³⁸ See, for example: <https://dso.nationalgrid.co.uk/downloads/15083/data-centre-impact-study2.pdf>

- 11.5.14 The direct operational emissions from unabated natural gas fired CCGT power stations are assumed to be 382 gCO_{2e}/kWh, which is taken from the Government’s 2024/2025 fuel mix disclosure data³⁹.
- 11.5.15 The indirect Well-to-Tank (WTT) emissions (the emissions from the extraction and processing of the natural gas and transportation to the power station), taken from DESNZ 2025 UK Government GHG Conversion Factors for Company Reporting³², are 423.16 kgCO_{2e}/tonne of natural gas. The quantity of natural gas required to produce 1 kWh of electricity is calculated by comparing direct emissions in natural gas fired power stations to the direct emissions of burning natural gas. This yields indirect (WTT) emissions of 0.628 kgCO_{2e}/kWh.
- 11.5.16 Total electricity produced annually by the natural gas fired power station is 733,312 MWh, set equal to that generated by the Proposed Development. This means that the energy generated by the Proposed Development replaces the equivalent quantity of energy that would otherwise be produced by the natural gas fired power station.
- 11.5.17 Emissions from the generation of electricity from natural gas fired CCGT power stations in the UK, is provided in **Table 11-5** below.

Table 11-5: Current Annual Energy Baseline Emissions (tCO_{2e}/yr)

Indirect Emissions (WTT)	Direct Emissions	Total Emissions (tCO _{2e} /yr)
46,026	280,125	326,151

Future Baseline

- 11.5.18 For the future energy baseline, it is assumed that natural gas power generation is retained in operation in the absence of the Proposed Development and is retrofitted with carbon capture and storage (CCS) technology as part of the UK’s industrial decarbonisation strategy (see paragraph 4.9.25 of NPS EN-1).
- 11.5.19 It is assumed that the existing energy baseline (unabated natural gas-fired CCGT power station) continues until 2035, and from then until the end of life of the Proposed Development (2067) the CCGT power station would have a Carbon CCS installed. This assumption is in line with the UK’s Net Zero Strategy⁵, which states that the UK will be powered entirely by clean electricity by 2035. Natural gas with CCS technology is included within ‘clean electricity’ technologies. It has been assumed that this CCS system would reduce direct GHG emissions by 90%, in line

³⁹ DESNZ (2025) *Fuel mix disclosure data table*. Available at: <https://www.gov.uk/government/publications/fuel-mix-disclosure-data-table>

with requirements of the Environmental Agency’s Decarbonisation Readiness Guidance⁴⁰.

11.5.20 From 2035, the 382 gCO₂e/kWh of emissions from natural gas CCGT is assumed to reduce to 38.2 gCO₂e/kWh to account for CCS. The indirect (WTT) emissions from the natural gas remains unchanged with the addition of CCS, at 0.628 kgCO₂e/kWh.

11.5.21 With annual electricity generation of 733,312 MWh/yr, the annual emissions of the future energy baseline, from 2035 until the end of life of the Proposed Development in 2067, are set out in **Table 11-6** below.

Table 11-6: Future Annual Energy Baseline Emissions (tCO₂e/yr)

Indirect Emissions (WTT)	Direct Emissions	Total Emissions (tCO ₂ e/yr)
46,026	28,013	74,039

11.6 Environmental Measures

11.6.1 This section describes details of the environmental measures which have been included within the design of the Proposed Development (as presented in Chapter 4). These measures are an inherent part of the design of the Proposed Development, and have been included to mitigate GHG emissions and achieve positive effects where possible, as well as avoid, reduce or compensate for the adverse environmental effects of the Proposed Development.

Construction

11.6.2 The environmental measures included within the design of the Proposed Development, during the construction phase, include:

- Reduction of traffic movements from staff travel during the construction phase, and encouraging low-emission transport modes (ride-share, electric vehicle, and active mode transport, where feasible) via the development of a Travel Plan for local staff movements.
- Procedures to separate and recover construction waste, increase recycling rates, and promote use of circular economy materials and processes.

⁴⁰ Environment Agency (2025) *Decarbonisation Readiness (DR) Guidance*. Available at: <https://consult.environment-agency.gov.uk/environment-and-business/decarbonisation-readiness-dr-guidance/>

- Use of existing roads and tracks to locate Access Routes as much as practicable to minimise land take for access.
- Avoid placing infrastructure on deep peat, to reduce peat land take, wherever possible (see **Appendix 10.3: oPMP**).
- Measures to re-home Peat displaced by the Proposed Development to areas within the Proposed Development boundary, to minimise net Peat loss (see **Appendix 10.3: oPMP**).
- Construction techniques employed to minimise peat loss in excavation, which will be defined in more detail within the ES and the final oPMP.

11.6.3 The environmental measures include the objectives of management plans to be adhered to during the construction phase of the Proposed Development; to achieve positive effects and/or avoid or reduce adverse effects, such as the use of the following plans:

- The outline Construction Environmental Management Plan (oCEMP) (**Appendix 4-2**), outline Construction Traffic Management Plan (oCTMP) (**Appendix 14-2**) and Site Waste Management Plan are submitted alongside the Development Consent Order (DCO) application. These documents detail the measures included to codify best-practice working measures to avoid, mitigate or reduce environmental impacts (including on peat and from GHG emissions), and includes the principles of the Considerate Constructors Scheme and its Code of Considerate Practice (CoCP), as well as measures to minimise the creation of waste and to maximise the use of materials with lower embodied GHG emissions.

Operation and Maintenance

11.6.4 The environmental measures included within the design of the Proposed Development, during the operation and maintenance phase, include:

- Switchgear and other electrical equipment requiring electrical insulation will be assessed, with components not requiring the use of SF₆ prioritised over other models, where practicable.
- Off-site biodiversity compensation (with an uplift compensation factor applied on the biodiversity lost), and Biodiversity Net Gain (at least 10%), will increase net carbon sequestration from the Proposed Development

11.6.5 The environmental measures include the objectives of management plans to be adhered to during the operation and maintenance of the Proposed Development;

to achieve positive effects and/or avoid or reduce adverse effects, such as the use of the following plans:

- Outline Operational Environmental Management Plan (oOEMP).
- Outline Landscape and Ecology Management Plan (oLEMP).
- oPMP (see **Appendix 10-3**).

Decommissioning

11.6.6 The environmental measures included within the design of the Proposed Development, during the decommissioning phase, include:

- Maximising material recovery rates (in line with the Circular Economy) through best-practice management procedures for material removal during decommissioning.

11.6.7 The environmental measures include the objectives of management plans to be adhered to during the decommissioning phase of the Proposed Development; to achieve positive effects and/or avoid or reduce adverse effects, such as the use of the following plans:

- The outline Decommissioning Environmental Management Plan (oDEMP) provided as part of the DCO application, provides management procedures for the removal and treatment of materials on-site during decommissioning and will seek to minimise traffic movements during decommissioning.
- The oDEMP and oPMP will include the management of decommissioning activities that will reduce impacts on peat.

11.7 Potential Effects Scoped Out

11.7.1 A small number of minor activities were scoped out of the assessment, consistent with the ISEP Guidance. ISEP recommends that activities with emissions that are individually less than 1%, and in total equal less than 5% of the lifecycle emissions of the Proposed Development, may be scoped out of the assessment. These are as follows:

- Emissions from construction waste;
- Emissions from water use during construction and decommissioning; and
- Emissions from minor components of the Proposed Development:
 - CCTV

- Fencing
- Drainage
- Landscaping
- Lighting

11.7.2 Where effects have likely significant effects and are therefore scoped in, please refer to the scoped in effects section in the Preliminary Environmental Assessment below.

11.8 Preliminary Environmental Assessment

11.8.1 The Preliminary Environmental Assessment will detail a preliminary assessment of the likely significant effects of the Proposed Development and provide details of how and why such a conclusion has been reached.

11.8.2 This is a preliminary assessment of likely significant effects with the environmental measures in place, but without additional mitigation.

GHG Emissions

Receptors and Receptor Sensitivity

11.8.3 The assessment of GHGs does not include identification of local sensitive receptors, as GHG emissions do not directly affect specific locations, but lead to indirect effects by contributing to global climate change. Identification of sensitive areas for climate change has been undertaken by the Intergovernmental Panel on Climate Change (IPCC)⁴¹. Impacts on specific areas are not included within this assessment since the impacts of GHG emissions will affect the global atmosphere and therefore need to be considered in a total context, rather than focus on localised areas.

11.8.4 The sensitive receptor with respect to GHG emissions is therefore the global atmosphere, where GHGs contribute to increasing atmospheric temperatures and resultant climate change effects.

Preliminary Assessment

11.8.5 A summary of the GHG emissions of the Proposed Development is provided below in **Table 11-7**.

⁴¹ IPCC (2022) 'AR6 Climate Change 2022: Impacts, Adaptation, and Vulnerability'. Available at: <https://www.ipcc.ch/report/ar6/wg2/>

Table 11-7: Lifecycle GHG Footprint of Proposed Development

Lifecycle Stage	Total Emissions (tCO _{2e})	Emissions Intensity (gCO _{2e} /kWh)	Percentage Contribution of Stage (%)
Material Embodied Carbon	96,555	3.76	57
Transport to the Proposed Development	6,862	0.27	4
Installation Activities	16,766	0.65	10
Operation and maintenance	38,324	1.49	23
Decommissioning	10,286	0.40	6
Total	168,793	6.58	100

11.8.6 The data and assumptions used to derive these results are available in **Appendix 11.1: GHG Background Data**. Note that numbers may not add to the total due to rounding.

Construction emissions

11.8.7 Material Embodied Carbon constitutes 57% of total GHG emissions for the Proposed Development. The relative contribution of different material components is provided in **Table 11-8**.

Table 11-8: GHG breakdown of Material Embodied Carbon

Emission Source	Total Emissions (tCO _{2e})	Emissions Intensity (gCO _{2e} /kWh)	Percentage Contribution to Lifecycle (%)
Turbines	69,010	2.69	41
Foundations	18,129	0.71	11
Onsite Cables	3,201	0.12	2
Onsite Substation	1,256	0.05	1
Bradford West Cable Corridor	4,192	0.16	2
Other materials	767	0.03	<1

Emission Source	Total Emissions (tCO ₂ e)	Emissions Intensity (gCO ₂ e/kWh)	Percentage Contribution to Lifecycle (%)
Total	96,555	3.76	57

11.8.8 Installation activities include on-site construction activity, transportation of construction workers to and from the Proposed Development, raw material extraction and processing, and manufacturing of components used in the construction phase of the Proposed Development, and the excavation, temporary storage and re-homing of peat, and installation activities constitute 10% of the total GHG emissions for the Proposed Development. The relative contribution of different installation activities is provided in **Table 11-9**.

Table 11-9: GHG breakdown of Installation Activities

Emission Source	Total Emissions (tCO ₂ e)	Emissions Intensity (gCO ₂ e/kWh)	Percentage Contribution to Lifecycle (%)
Construction Site Activities	7,243	0.28	4
Staff Travel	491	0.02	<1
Temporary construction materials	824	0.03	<1
Peat loss	8,208	0.32	5
Total	16,766	0.65	10

Operational and maintenance emissions

11.8.9 Operational emission sources are the embodied emissions in replacement parts, transport of replacement and damaged parts, staff travel, and SF₆ emissions, and make up 23% of total GHG emissions for the Proposed Development. The relative contribution of different operational emission sources is provided in **Table 11-10**.

Table 11-10: GHG breakdown of Operational and maintenance Emissions

Emission Source	Total Emissions (tCO ₂ e)	Emissions Intensity (gCO ₂ e/kWh)	Percentage Contribution to Lifecycle (%)
Replacement Parts	24,325	0.95	14

Emission Source	Total Emissions (tCO ₂ e)	Emissions Intensity (gCO ₂ e/kWh)	Percentage Contribution to Lifecycle (%)
Material Transport	6,787	0.26	4
Staff Travel	90	0.00	<1
SF ₆ Emissions	7,122	0.28	4
Total	38,324	1.49	23

Decommissioning emissions

- 11.8.10 Decommissioning emission sources consist of on-site decommissioning activities, staff travel, and waste transport, and constitute 6% of total GHG emissions for the Proposed Development. Decommissioning emissions are detailed in **Table 11-11**.

Table 11-11: GHG breakdown of Decommissioning Emissions

Emission Source	Total Emissions (tCO ₂ e)	Emissions Intensity (gCO ₂ e/kWh)	Percentage Contribution to Lifecycle (%)
On-site Activities	5,794	0.23	3
Waste Transport	4,436	0.17	3
Staff Travel	56	0.00	<1
Peat	0	0	0
Total	10,286	0.40	6

- 11.8.11 At this stage, it is likely that decommissioning will include the removal of most of the above ground infrastructure, with the exception of turbine foundations, hardstandings and access tracks which are likely to remain in-situ. Underground elements such as cabling is also likely to remain in situ.
- 11.8.12 Should underground elements remain in situ, there is unlikely to be any further loss of peat. Peat loss due to decommissioning would only normally occur if underground elements are removed, as the vacant space left by the removed elements causes water to drain out of adjacent peat. Decommissioning activities will however, be confirmed within the ES and assessed based on a more detailed design.

Comparison Against Baseline

- 11.8.13 Baseline emissions at the area of the Proposed Development are 7,809 tCO₂e per year (see **Section 11.5**), or 312,346 tCO₂e over the 40-year lifetime (including the

time required for construction and decommissioning) of the Proposed Development. These emissions are due to ongoing peat loss at the area of the Proposed Development. These baseline emissions are likely to continue regardless of whether the Proposed Development is progressed.

- 11.8.14 Lifetime emissions from the Proposed Development are 168,793 tCO₂e, of which 8,208 tCO₂e are due to peat loss during construction. The peat-related emissions from the Proposed Development represent 2.6% of total Area baseline emissions over the 40-year period.
- 11.8.15 With reference to the energy baseline, the Proposed Development will provide renewable electricity that would otherwise be generated via the combustion of natural gas. Specifically, the Proposed Development is supportive of government policy to transition the national grid to renewables, enabling the removal of fossil fuel generated fuel electricity (e.g. natural gas) from the grid. The energy baseline therefore compares the lifecycle carbon emissions of the Proposed Development to that of a natural gas-fired power generation plant using CCGT, with CCS assumed to be installed from 2035.

Table 11-12: Comparison of Proposed Development against Energy Baseline

Timeframe	Energy Baseline Emissions (tCO ₂ e)	Proposed Development Emissions (tCO ₂ e)	Net emissions savings (tCO ₂ e)
Upfront Carbon	0 ^a	120,183	-120,183
2032-2034 (no CCS in baseline)	652,303	2,190	650,113
2035-2067 (with CCS in baseline)	2,443,277	36,134	2,407,143
Decommissioning	0 ^b	10,286	-10,286
Lifetime total	3,095,580	168,793	2,926,787

^a It is assumed the natural gas power station is already constructed and therefore upfront emissions have already occurred. For simplicity and to provide a conservative assessment, no upfront carbon for the CCS system is accounted for.

^b While decommissioning emissions will occur as part of decommissioning of natural gas power stations, these emissions are assumed to be zero to provide a conservative assessment.

- 11.8.16 The lifetime emissions of the Proposed Development are less than those of a single year of a natural gas power plant without CCS (see **Table 11-5**), or the equivalent

of just over two years of operation for a natural gas power plant with CCS (see **Table 11-6**).

- 11.8.17 This is not strictly a like-for-like comparison, as the Proposed Development includes full life cycle emissions (construction, operation and maintenance and decommissioning) whereas the Energy baseline includes only emissions from the operational phase of the natural gas power plant. However, operational emissions are many times greater than those of construction and decommissioning for the natural gas power plant, and can be excluded from the analysis without impacting the conclusions.

Assessment of Significance of Effects

- 11.8.18 The assessment of the significance of the GHG emissions is informed through ISEP guidance detailed in **Paragraphs 11.4.19 to 11.4.22** above, and follows a two-step process detailed below.

Step 1: Establish Context

- 11.8.19 To establish context, the GHG emissions from the Proposed Development are compared to:

- UK carbon budgets; and
- Calderdale Local Authority carbon budgets.

- 11.8.20 The UK has legislated a 2050 net zero target following recommendations and analysis completed by the CCC⁴². To meet this target, the CCC sets carbon budgets to establish carbon emissions limits.

- 11.8.21 Recommended carbon budgets at the Local Authority level have been extrapolated from this CCC analysis and from historical Local Authority emissions to provide recommended carbon budgets for the Calderdale Local Authority⁴³.

- 11.8.22 The construction emissions of the Proposed Development (occurring between 2029 and 2031) coincide with the UK's 5th carbon budget period 2028-2032. The operational emissions of the Proposed Development (occurring from 2031 onwards) coincide with the UK's 5th, 6th and 7th carbon budgets, which cover the periods 2028-2032, 2033-2037, and 2038-2042 respectively (noting that the 7th carbon budget has not yet been adopted into legislation). There are no official UK carbon budgets available for the period 2043 onwards, however these have been

⁴² Most recently: <https://www.theccc.org.uk/publication/the-seventh-carbon-budget/>

⁴³ <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=5404875c-6eba-444e-bcd8-2cfc6eca29df>

projected forward to 2050 based on the CCC’s Balanced Pathway to net zero in 2050.

11.8.23 **Table 11-13** summarises the GHG emissions from the Proposed Development, taking account of both the construction and operational and maintenance phases, as a percentage of the UK’s and Calderdale Local Authority’s 5th, 6th, 7th, 8th and 9th carbon budgets. Note that decommissioning emissions are excluded from this contextualisation exercise, as they occur beyond the end of the 2050 net-zero target date.

11.8.24 All construction emissions, along with the first two years of operational emissions, occur within the 5th Carbon Budget period (2028-2032). The remaining 5-year budget periods each include 5-years of operational emissions, with the final (projected) “9th” budget including 3 years of operational emissions to reach 2050.

Table 11-13: Contribution of Proposed Development to Local and National Carbon Budgets

Budget	Budget Period	UK Budget (MTCO _{2e})	Calderdale Budget (MTCO _{2e})	Proposed Development (tCO _{2e})	Contribution to UK Budget (%)		Contribution to Calderdale Budget (%)	
					Gross ^a	Net	Gross	Net
5 th Carbon Budget	2028-2032	1,725	3.47	122,099	0.0071	-0.03	3.5	-15
6 th Carbon Budget	2033-2037	965	2.19	4,791	0.0005	-0.09	0.2	-40
7 th Carbon Budget ^b	2038-2042	535	1.23	4,791	0.0009	-0.07	0.4	-30
8 th (estimated) ^c Carbon Budget	2043-2047	190	0.51	4,791	0.0025	-0.19	0.9	-72
9 th (estimated) Carbon Budget	2048-2050	20	0.06	2,874	0.0144	-1.10	4.8	-365

^a Gross emissions exclude avoided emissions from alternative electricity production, Net emissions include them.

^b The 7th Carbon Budget has not yet been adopted into legislation (expected June 2026).

^c The 8th and 9th Carbon Budgets have been estimated based on the CCC's balanced pathway to Net Zero.

11.8.25 Note that much of the embodied GHG emissions (which make up the majority of construction emissions and emissions from operational replacement parts) will be emitted abroad during product manufacture and therefore sit outside the scope of the UK's carbon budgets⁴⁴.

Step 2: Determine Significance

11.8.26 The significance of effects is established through applying the criteria detailed in Table 11-4. This requires judgments on:

- The consistency of the Proposed Development with national, regional and local policies designed to limit GHG emissions and meet the UK's net zero target; and
- The robustness, timeliness and efficacy of mitigation measures adopted by the Proposed Development to avoid, reduce and compensate GHG emissions.

11.8.27 The above two judgements are considered further below as Step 2a and Step 2b respectively.

Step 2a: Consistency of the Proposed Development with National, Regional and Local Policies

National

11.8.28 The key relevant national policies and legislation are the Energy Act 2023, NPS EN-1, EN-3, EN-5 and the NPPF (noting that the Climate Change Act and Carbon Budget Orders address emission levels in general, and the compliance of the Proposed Development with this legislation has been addressed in Step 1: Establish Context, above). Paragraph 160 of the NPPF specifically relates to the use and supply of renewable and low carbon energy, and Annex 3 identifies wind turbines as being essential infrastructure.

11.8.29 The whole lifecycle GHG assessment provided in this Chapter also satisfies the requirements of NPS EN-1 that a whole lifecycle GHG assessment be included in the ES for all nationally significant energy projects.

⁴⁴ For information on how the UK's GHG emissions inventory is calculated, see https://naei.energysecurity.gov.uk/sites/default/files/2025-06/DA_GHG_Inventories_1990-2023.pdf

- 11.8.30 Overall, the Proposed Development is demonstrated to result in a benefit by its net GHG emissions savings and contributes in the transition to net zero and is supported by key national policy.
- 11.8.31 NPS EN-3 Paragraph 2.12.151 states: Where developments are proposed on peatland, to ensure the development will result in minimal disruption to the ecology, or release of CO₂, and that the carbon balance savings of the scheme are maximised, the Secretary of State must be satisfied that the onshore wind farm layout and construction methods have been designed to minimise soil disturbance and other peatland impacts during construction and maintenance of roads, tracks, and other infrastructure. The Secretary of State should be satisfied that areas of deep peat within a PEIR Boundary have been avoided through development design.
- 11.8.32 The oPMP sets out how peat will be managed to minimise peat loss. This includes designing the Proposed Development to avoid areas of deep peat, and re-homing all peat excavated during construction. The approach to further peat restoration will be agreed in consultation with Natural England, and will be reported in the ES.
- 11.8.33 The NPS EN-3 also states (Paragraph 2.12.2) that the Secretary of State should be satisfied that Applicants have ruled out other locations before siting developments on peatland. Site selection is set out in Chapter 5: Alternatives and Design Evolution.
- 11.8.34 NPS EN-5 Paragraph 2.10.14 states that the climate-warming potential of SF₆ is such that Applicants should, as a rule, avoid the use of SF₆ in new developments, and Paragraph 2.10.15 states that where no proven SF₆-free alternative is commercially available, and where the cost of procuring a bespoke alternative is grossly disproportionate, the continued use of SF₆ is acceptable, provided that emissions monitoring and control measures compliant with the F-gas Regulation and/or its successors are in place.
- 11.8.35 SF₆ gases are assumed to be used in the Proposed Development as a reasonable worst case, as alternatives are costly, however, we will seek to look at alternatives to SF₆ switchgear, where these alternatives are technically compliant and commercially available. If used, the switchgear for the Proposed Development will be selected to have low leak rates (estimated at 0.1% year on year as per the Vestas LCA study) and comply with F-gas regulations. This leakage has been included in the GHG Assessment, and constitutes 4% of the total lifecycle emissions of the Proposed Development. In addition, emissions monitoring and control measures will be implemented throughout the operational life of the Proposed Development.

Regional

- 11.8.36 The West Yorkshire Climate and Environment Plan 2021-2024⁴⁵, in their objective of “Secure, cost effective and clean energy for all” acknowledge that achieving their emission reduction pathway to net zero in 2038 would require renewable energy generation of 1.2TWh per year.
- 11.8.37 The Proposed Development will produce enough electricity to power 9% of the approximately 7,900 GWh West Yorkshire consumes annually⁴⁶, contributing to West Yorkshire’s 2038 net zero ambitions.

Local

- 11.8.38 Calderdale Council have a pledge to be Net Zero by 2038 and to safeguard the natural and historic environment, including following the Biodiversity Mitigation Hierarchy to manage impacts [on sequestering biodiversity]¹⁴.
- 11.8.39 Bradford Council Core Strategy Development Plan 2017-2030¹⁵ Policy EN6 states a target for increased installed renewable and low carbon energy, measurable by an increase in megawatts of installed renewable and low carbon energy capacity.
- 11.8.40 The Proposed Development provides up to 240MW of renewable energy capacity, positively contributing to this indicator.
- 11.8.41 Calderdale Local Plan aims to address both the causes and effects of climate change, become more energy efficient, and provide jobs for its residents whilst safeguarding the natural environment.
- 11.8.42 The Proposed Development would increase the clean energy capacity of the region, reducing carbon emissions whilst reducing household energy costs, and creating skilled jobs; at the same time following the Biodiversity Mitigation Hierarchy which preserves sequestering habitats.

Step 2b: Robustness, Timeliness and Efficacy of Mitigation

- 11.8.43 The principles of the ISEP guidance are that where GHGs cannot be avoided, mitigation (in the form of environmental measures) should be provided to minimise GHGs.

⁴⁵ West Yorkshire Combined Authority. West Yorkshire Climate and Environment Plan 2021-2024. Available at: <https://www.westyorks-ca.gov.uk/media/7382/west-yorkshire-climate-and-environment-plan.pdf>

⁴⁶ DESNZ (2024). Regional and local authority electricity consumption statistics. Available at: <https://www.gov.uk/government/statistics/regional-and-local-authority-electricity-consumption-statistics>

11.8.44 Environmental measures adopted by the Proposed Development to minimise GHG emissions from the construction, operational and maintenance and decommissioning phases are described in **Section 11.6**.

Assessment of Significance: Summary of GHG Assessment

11.8.45 The assessment of significance has followed a two-step process consistent with ISEP guidance and is summarised below in **Table 11-14**.

Table 11-14: Assessment of Significance

Step	Description	Assessment	Applicable ISEP rating
Step 1	Context	The Proposed Development’s gross emissions contribute to a very small component of the UK’s and Calderdale’s carbon budgets. When considering whole life GHG emissions, the Proposed Development will result in a net reduction in GHG emissions through provision of renewable electricity compared to electricity generated from fossil fuels.	Beneficial Significant
Step 2	Consistency with Policy	The Proposed Development is consistent with applicable policy requirements.	
	Mitigation	The Proposed Development has adopted measures to avoid and minimise GHG emissions during the construction, operational and maintenance and decommissioning phases and will support the transition to net zero by or before 2050.	

11.8.46 Based on **Table 11-14** and with reference to ISEP’s significance criteria (see **Table 11-4**) the GHG assessment therefore finds that the effects are indirect, long-term, UK-wide **significant beneficial effects** across the lifetime of the Proposed Development. This is a judgement based on the balance of the effects, but applying considerable weight to the Proposed Development resulting in a net reduction in GHG emissions from power generation compared to electricity generated from fossil fuels.

Part B: Climate Change Risk and Adaptation (CCRA) Assessment

Study Area

- 11.8.47 The study area for CCRA, unlike other disciplines, focusses on the impact that climate will have on the Proposed Development (as opposed to the impact of the Proposed Development on the environment). The study area is therefore the Proposed Development, split into its constituent parts (receptors, as identified in Paragraph 11.12.4 below).

Sources

- 11.8.48 Historic climate data has been obtained from the Met Office website, recorded by the closest Met Office station to the Proposed Development, which is Bradford Station, approximately 18km northeast of the area of the Proposed Development.
- 11.8.49 Data from the Met Office is used to describe the existing frequency and severity of climate hazards including flooding, heatwaves and drought.
- 11.8.50 The current flood risk climate hazards for the Proposed Development have been identified based on the Flood Risk Assessment that is provided as part of this planning application.
- 11.8.51 UKCP18 probabilistic projections have been obtained for the climate variables set out in **Table 11-15**.

Table 11-15: Future Projected Climate Variables

Climate Factor	Month (1981-2010)
Mean annual temperature	Mean annual rainfall
Mean summer temperature	Mean summer rainfall
Mean winter temperature	Mean winter rainfall

- 11.8.52 The future baseline conditions have been defined by potential climate risks identified in the UK Climate Change Risk Assessment²⁷, National Adaptation Programme²⁶, and the Key Climate Projections: Headline Findings produced by the Met Office UK⁴⁷. These are based on the UKCP18 dataset.

⁴⁷ Met Office UK (2018) *UK Climate Projections*, and Met Office UK (2019) *UK Climate Projections: Headline Findings*. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/index>

Methodology

- 11.8.53 The EIA Regulations require the inclusion of information on the vulnerability of a project to climate change. Consequently, an assessment of CCRA for the Proposed Development has been undertaken which identifies potential climate change impacts in accordance with ISEP’s *Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation* (“ISEP CCRA Guidance”)²⁵.
- 11.8.54 Resilience to climate change is principally considered in the design of the Proposed Development which needs to anticipate future risks and build in appropriate adaptation measures. There is, therefore, a focus on measures adopted by the Proposed Development to address future climate change.
- 11.8.55 The CCRA assessment includes five steps, in accordance with ISEP CCRA Guidance:
- 1) Establishing the scope and study area of the Proposed Development (see **Paragraph 11.8.47**),
 - 2) Establishing Baseline Conditions (see **Section 11.9**)
 - 3) Identifying and assessing the vulnerability and sensitivity of receptors (see **Paragraph 11.12.4**).
 - 4) Assessing the magnitude of effect for each hazard (see **Paragraphs 11.8.56 to 11.8.58**)
 - 5) Identifying likely significant effects, and, where necessary, identifying additional mitigation to address any significant effects and concludes on the residual risks (see **Paragraphs 11.8.59 to 11.8.60**).

Determining Magnitude of Effect

- 11.8.56 The magnitude of effect matrix in **Table 11-18** below, is based on scoring the consequence and likelihood (probability) of that hazard arising, as per ISEP guidance. The scoring of each is based on professional judgement, informed by an internally developed five-point scale, as described in **Table 11-16** and **Table 11-17**.

Table 11-16: Qualitative Description of Consequence

Measure of Consequence	Description
Very Small	No damage to the Development, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.

Measure of Consequence	Description
Small	Localised disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than one day. Small financial losses and/or slight adverse health or environmental effects.
Medium	Limited damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than one day but less than one week. Moderate financial losses. Adverse effects on health or the environment.
Large	Extensive damage and severe loss of service. Disruption lasting more than one week. Early renewal of 50-90% of the Development. Permanent physical injuries and/or fatalities. Major financial loss. Significant effect on the environment, requiring remediation.
Very Large	Permanent damage and complete loss of service. Disruption lasting more than one week. Early renewal of the Development >90%. Severe health effects or fatalities. Extreme financial loss. Very significant loss to the environment requiring remediation and restoration.

Table 11-17: Qualitative Description of Likelihood

Measure of Likelihood	Description
Very High	The event occurs multiple times during the lifetime of the Development, i.e. 60 times or approximately annually.
High	The event occurs several times (approximately every five years) during the lifetime of the Development.
Medium	The event occurs limited times (approximately every 15 years) during the lifetime of the Development.
Low	The event occurs once during the lifetime of the Development.
Very Low	The event may occur once during the lifetime of the Development or may not occur at all.

11.8.57 These determinants are combined to assess the magnitude of effects on receptors, as shown in **Table 11-18**. The assessment is qualitative and based on expert judgement based on knowledge of similar schemes, engagement with the wider Project Team and a review of relevant literature.

11.8.58 The assessment of magnitude of effect takes the environmental measures into account.

Table 11-18: Magnitude of Effect Matrix

Likelihood of Hazard Occurring	Consequence of Hazard Occurring				
	Very Small	Small	Medium	Large	Very Large
Very High	Minor	Moderate	Moderate	Major	Major
High	Negligible	Minor	Moderate	Major	Major
Medium	Negligible	Minor	Moderate	Moderate	Major
Low	Negligible	Negligible	Minor	Moderate	Major
Very Low	Negligible	Negligible	Negligible	Minor	Minor

Identify Likely Significant Effects

11.8.59 The likely significant effects are determined for each hazard based on the magnitude of effect and the receptor sensitivity., Effects with a major or moderate magnitude are considered to be significant for all receptors, while effects of negligible or minor magnitude are considered to be not significant.

11.8.60 Following identification of likely significant effects, further adaptation measures can be identified to mitigate any significant effects. These are identified through expert opinion based on knowledge of similar schemes and consultation with the Project Team. Residual effects of climate change on the identified receptors are then reassessed using **Table 11-16** to **Table 11-18**.

Limitations and Assumptions

11.8.61 The CCR assessment outlines the potential impacts of climate change on the Proposed Development based on a qualitative assessment and professional judgement using knowledge of similar schemes. The UKCP18 projections are the most up-to-date projections of climate change for the UK.

11.8.62 UKCP18 provides probabilistic projections of future climate for a range of emissions scenarios. Future GHGs emissions, and the resulting pathway, is uncertain. A precautionary approach, consistent with ISEP guidance has therefore been adopted by selecting a high emissions scenario (Representative Concentration Pathway 8.5 (RCP8.5)) and long-term time period (2060-2079), which offer the longest-term projections into the Proposed Development’s operational lifetime.

11.8.63 The environmental measures incorporated within the Proposed Development are based on information provided by the Applicant. The determination of significance

has been undertaken under the assumption that industry design standards will be adhered to where detailed design information is unavailable.

- 11.8.64 Despite the limitations in this Section, the assessment is considered to be robust because it is based on realistic worst-case assumptions and information, and follows ISEP guidance.

11.9 Baseline Conditions

Overview

- 11.9.1 The baseline for the CCRA is the climatic conditions and hazards at the location of the Proposed Development. These conditions remain unchanged by the Proposed Development.

Existing Baseline

- 11.9.2 Existing baseline conditions for the CCRA assessment relate to current, and recent historic (1981-2024), climate and meteorological conditions at the location of the Proposed Development.
- 11.9.3 Met Office historic climate data for the 30-year periods of 1981-2010 and 1991-2020 (the standard baseline for climate data), are summarised in **Table 11-19**.

Table 11-19: Historic Climate Data Summary

Climate Factor	Month (1981-2010)	Value	Month (1991-2020)	Value
Warmest month on average (Average daily mean temp °C)	Jul	16.15	Jul	16.32
Coldest month on average (Average daily mean temp °C)	Jan	4.03	Jan	4.30
Mean annual rainfall levels (mm)	-	54.99	-	56.88
Wettest month on average (Average monthly rainfall) (mm)	Oct	67.83	Oct	68.83
Driest month on average (Average monthly rainfall) (mm)	Feb	39.01	Feb	43.31

- 11.9.4 When comparing the 30-year climate averages between 1981-2010 and 1991-2020, there are small increases in temperature for both the warmest and coldest month, and increases in the mean annual rainfall level and rainfall during both the wettest month and driest month.

11.9.5 The Met Office historic 10-year averages for Bradford station identify gradual warming in both the winter and summer periods between 1955 and 2024, with an increase in winter average monthly rainfall. Information on average daily mean temperatures (°C) and mean monthly rainfall (mm) is summarised in **Table 11-20**.

Table 11-20: Historic 10-year Averages for Temperature and Rainfall at Bradford Station

Decade	Mean Daily Average Temperatures (°C)		Mean Monthly Rainfall (mm)	
	Winter (Oct-Mar)	Summer (Apr-Sep)	Winter (Oct-Mar)	Summer (Apr-Sep)
1955 - 1964	5.12	12.74	48.44	58.16
1965 - 1974	5.57	12.50	54.71	62.35
1975 - 1984	5.42	12.82	56.55	51.35
1985 - 1994	5.65	12.74	56.66	52.48
1995 - 2004	6.14	13.35	56.08	55.00
2005 - 2014	6.13	13.49	55.87	57.80
2015 - 2024	6.84	13.86	66.23	57.84

11.9.6 There has been a significant human influence on the observed warming in the UK annual temperature since 1950⁴⁸. Statistical results from extreme value analysis suggest that the UK daily maximum and minimum temperature extremes have increased by just over 1°C since the 1950s, and that heavy seasonal and annual rainfall events have also increased.

11.9.7 **Table 11-21** below sets out the current climate hazards within the area of the Proposed Development. Note that a Flood Risk Assessment has been provided as preliminary information for the PEIR, but fluvial, pluvial and groundwater flood risks may be updated further in the ES.

Table 11-21: Current Climate Change Hazards

Climate Hazard	Current Baseline
Fluvial/Pluvial Flooding	The majority of the area of the Proposed Development is located within Flood Zone 1,

⁴⁸ See, for example: <https://www.metoffice.gov.uk/blog/2023/how-have-daily-temperatures-shifted-in-the-uks-changing-climate>, and <https://assets.publishing.service.gov.uk/media/657043059462260721c569a6/HEC-C-report-2023-chapter-1-climate-projections.pdf>

Climate Hazard	Current Baseline
	<p>meaning that there is a low probability of flooding from fluvial sources. There are no recorded incidents of fluvial flooding within the area of the Proposed Development. Areas of Flood Zone 2 and 3 (medium and high risk respectively) are present in the centre of the Turbine Area, as well as some areas of the Western Access Route and Bradford West Cable Corridor, where these elements of the scheme cross the River Laneshaw and the Denholme Beck. The risk of flooding from the surface water dataset (see Flood Risk Assessment) indicates the majority of the area of the Proposed Development is at low risk of surface water flooding, however there are areas of medium and high risk that intersect the area for the Proposed Development. This assessment is being refined via modelling and will be further updated in the ES.</p>
Groundwater Flooding	<p>The majority of the area of the Proposed Development is at 0-25% susceptibility of groundwater flooding, with an area in the west at 25-50% susceptibility. Some of the areas of the Bradford West Cable Corridor are susceptible to groundwater flooding.</p>
Drought	<p>The Environment Agency (EA) has classified the area for the Proposed Development as being in an area of serious water stress and susceptible to drought⁴⁹. As such, Yorkshire Water operate a Drought Plan⁵⁰ which sets out the plan to maintain customer water supplies in the event of drought.</p>
Extreme Weather Events	<p>Calderdale is susceptible to winter storms (typically winds and rain) and summer heatwaves in recent years. Severe winter snow and ice events are infrequent.</p>

⁴⁹ Environment Agency (2021) Water stressed areas – final classification 2021. Available at: <https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>

⁵⁰ Yorkshire Water (2022) *Drought Plan 2022*. Available at: https://www.yorkshirewater.com/media/ny5nq2vk/yorkshire-water_drought-plan-2022_final_public-april-2022.pdf

Future Climate Conditions

- 11.9.8 The future baseline climate is expected to differ from the present-day baseline. The United Kingdom Climate Change Projections 2018 (UKCP18), developed by the Met Office, is the most up-to-date climate projections model for the UK, which is Government-endorsed and has been peer reviewed by an international panel of climate experts. The dataset provides probabilistic climate change projections for predefined 30-year periods for annual, seasonal and monthly changes to mean climatic conditions over land areas. UKCP18 probabilistic projections have been analysed for the Yorkshire and Humber region, which is where the Proposed Development is located. These figures are expressed as temperature/rainfall anomalies in relation to the 1981-2000 baseline.
- 11.9.9 UKCP18 uses a range of possible scenarios, classified as RCPs, to inform differing future emission trends. These RCPs “... specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels.” RCP8.5 has been used as a worst-case scenario for this assessment.
- 11.9.10 As the lifetime of the Proposed Development is expected to be 35 years (with decommissioning in 2067), in adopting RCP8.5 the CCRA assessment has considered a scenario that reflects the potential change in climate resulting from the highest predicted level of global warming (>4 degree increase in global average temperatures) in the time horizon of 2060-2079 to assess the most severe impacts of climate change over the lifetime of the Proposed Development.

Future Baseline

- 11.9.11 **Table 11-22** shows projected changes in temperature (expected to increase) and rainfall (expected to increase in winter and decrease in summer), with the 50% probability level for the lifetime of the Proposed Development.

Table 11-22: Projected Changes in Climate Variables, Relative to 1981-2000 Baseline

Climate Variable	2030-2049	2040-2059	2050-2069	2060-2079
Mean Annual Temperature (°C)	+1.3	+1.7	+2.2	+2.7
Mean Winter Temperature (°C)	+1.2	+1.6	+2.0	+2.3
Mean Summer Temperature (°C)	+1.5	+2.1	+2.6	+3.2
Mean Winter Precipitation (%)	+4	+7	+8	+10
Mean Summer Precipitation (%)	-7	-13	-15	-19

- 11.9.12 The projected changes indicate increasingly erratic weather patterns that are likely to lead to greater numbers of extreme weather events that may affect the Proposed Development.
- 11.9.13 This includes heatwaves, droughts, and increases in localised intense precipitation events, with some climate models predicting an increase in frequency and intensity of winter storms. Increase in the frequency and intensity of these extremes can put further pressure on resources and increase the risk posed to infrastructure and public health and safety.
- 11.9.14 Winds associated with major storm events can be some of the most damaging and disruptive events for the UK, with implications for property, power networks, road and rail transport and aviation. Calm periods with little wind, particularly over prolonged periods, can affect air quality whilst winds from a particular direction can be a critical factor in the spread of particulates. Both cases are also examples where the combination of factors such as wind, temperature and precipitation can exacerbate their impacts (e.g., air quality issues tend to be worse under conditions of light winds and higher temperatures; pathogen spread can require wind, temperature and precipitation conditions to be favourable)⁵¹.
- 11.9.15 Annual mean wind speed in the UK shows a downward trend from 1969 to 2024, and there have been fewer occurrences of high maximum gust speeds in the last two decades, relative to the 1980s and 1990s⁵².
- 11.9.16 The UK Climate Change Risk Assessment 2022 lists the following climate change risks for energy infrastructure:
- I1: Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures (Very high potential costs)
 - I2: Risks to infrastructure services from river, surface water and groundwater flooding failures (High to Very high potential costs)
- 11.9.17 The following climate hazards are considered in the CCRA assessment:
- Flooding (pluvial and fluvial);
 - Extreme weather events (wind and storms);

⁵¹ Met Office (2019) *UKCP18 Factsheet: Wind*. Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind_march21.pdf

⁵² Met Office (2025) *International Journal of Climatology; State of the UK Climate 2024*. Available at: <https://rmets.onlinelibrary.wiley.com/doi/10.1002/joc.70010>

- Heatwaves;
- Drought and reduced summer rainfall;
- Chronic temperature increase;
- Increased precipitation; and
- Subsidence or ground movement (due to flooding and/or drought events).

11.10 Environmental Measures

- 11.10.1 This section describes details of the CCRA environmental measures which have been included within the design of the Proposed Development (as presented in Chapter 4). These measures are an inherent part of the design of the Proposed Development and have been included to increase the climate resilience of the Proposed Development.
- 11.10.2 Note that the numbering of the environmental measures is referenced in the assessment of Potential Effects in **Table 11-23**, **Table 11-25** and **Table 11-27**.

Construction

- 11.10.3 The environmental measures included within the design of the Proposed Development, during the construction phase, include:
- C. 1. Contractors will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms, flooding.
 - C. 2. Contractors will receive EA flood alerts and plan works accordingly, protecting workers and resources from flooding.
 - C. 3. Site staff will be provided with appropriate PPE and undertake works in accordance with a approved Risk Assessment Method Statement
 - C. 4. Health and Safety Manager will be responsible for the monitoring and controlling of health and safety compliance and related rules and regulations on-site. Health and safety plans and a Risk Assessment Method Statement will be developed for on-site activities and will be required to account for potential heat impacts on workers and equipment.
 - C. 5. Air conditioning in cabs of powered machinery to protect operators.
- 11.10.4 The environmental measures include the objectives of management plans to be adhered to during the construction of the Proposed Development; to achieve

positive effects and/or avoid or reduce adverse effects, such as the use of the following plans:

- oCEMP;
- Construction Method Statement to be submitted as part of the DCO; and
- oPMP

Operation and Maintenance

11.10.5 The environmental measures included within the design of the Proposed Development, during the operation and maintenance phase, include:

- O. 1. All structures will be designed to relevant standards and specifications.
- O. 2. Maintenance and servicing will include the inspection, repair, adjustment, altering, removal, reconstruction, refurbishment replacement or improvement of equipment to ensure the continued effective operation of the Proposed Development.
- O. 3. Foundation materials (grade, mix) will be selected considering ground properties.
- O. 4. Water management and other habitat management activities set out in the Habitat Mitigation and Compensation Strategy, and Habitat Management and Monitoring Plan will help maintain water levels during periods of drought, and protect habitats during extreme weather events.
- O. 5. Swales and other SuDS features reduce flood risk in high rainfall events.
- O. 6. Contractors will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms, flooding.
- O. 7. Contractors will receive EA flood alerts and plan works accordingly, protecting workers and resources from flooding.
- O. 8. Site staff will be provided with appropriate PPE and undertake works in accordance with a approved Risk Assessment Method Statement.
- O. 9. Health and Safety Manager will be responsible for the monitoring and controlling of health and safety compliance and related rules and regulations on-site. Health and safety plans and a Risk Assessment Method Statement will developed for on-site activities and will be required to account for potential heat impacts on workers.

O. 10. Operation to follow wind turbine fire protection guidelines to reduce risk of fires from all causes, and minimise damage in the event of fire⁵³.

11.10.6 The environmental measures include the objectives of management plans to be adhered to during the operation and maintenance of the Proposed Development; to achieve positive effects and/or avoid or reduce adverse effects, such as the use of the following plans:

- Outline Operational Environmental Management Plan (oOEMP); and
- oPMP measures (as part of the construction oPMP).

Decommissioning

11.10.7 The environmental measures included within the design of the Proposed Development during the decommissioning.

11.10.8 Decommissioning phase will be the same as for the construction phase (see 11.10.3).

11.10.9 The environmental measures include the objectives of management plans to be adhered to during the decommissioning phase of the Proposed Development; to achieve positive effects and/or avoid or reduce adverse effects, such as the use of the following plans:

- Decommissioning Management Plan, including criteria for Peat Management

11.11 Potential Effects Scoped Out

11.11.1 No effects have been scoped out of the Preliminary Environmental Assessment for CCRA.

11.12 Preliminary Environmental Assessment

11.12.1 The Preliminary Environmental Assessment details the effects that are considered to be likely significant including providing details of how and why such a conclusion has been reached.

11.12.2 This is a preliminary assessment of Likely Significant Effects with the environmental measures in place, but without additional mitigation.

⁵³ See, for example https://cfpa-e.eu/app/uploads/2022/05/CFPA_E_Guideline_No_22_2022_F.pdf

Receptors and Receptor Sensitivity

- 11.12.3 The receptor for the assessment of CCRA is the Proposed Development itself, including all infrastructure, assets, and workers on-site during operation and maintenance. The sensitivity of the receptor does not require definition in following the assessment approach in line with UK industry (ISEP) guidance.
- 11.12.4 The key receptors identified for inclusion in the CCRA assessment are set out below. Each has been identified as being in some way vulnerable to the effects of future climate change hazards:

Construction

- Construction staff and workers;
- Construction equipment, machinery and materials; and
- Construction site access roads and compounds;

Operation and maintenance

- Infrastructure (Turbines, Onsite Cabling, Substation, Foundations, Bradford West Cable Corridor);
- Habitats and biodiversity;
- Site access (entrance roads); and
- Site staff (maintenance workers).

Decommissioning

- Decommissioning staff and workers;
- Decommissioning equipment, machinery and materials; and
- Decommissioning site access roads and compounds;

Preliminary Assessment

- 11.12.5 This section defines the effect on the Proposed Development, taking account of the sensitivity of the receptors and the likely preliminary impact of change from the construction, operation and maintenance and decommissioning of the Proposed Development.
- 11.12.6 A number of potential impacts of climate change on the receptors have been identified. The results are detailed in **Table 11-23**, **Table 11-25** and **Table 11-27** below and include the environmental measures set out in **Section 11.10** above. It

should be noted that not all receptors are judged to be directly susceptible to all climate hazards and therefore only relevant receptors are assessed for each specific climate hazard.

Construction Phase

11.12.7 **Table 11-23** sets of the climate risks on identified receptors, and corresponding mitigation measures for the construction phase.

Table 11-23: Climate Risks and Mitigation during Construction

Climate Variable	Receptor	Potential Impact	Environmental Measures
Flooding (pluvial and fluvial)	Construction staff and workers	Risk to life	C.1, C.2
	Construction equipment, machinery and materials	Damage or loss of equipment, machinery and materials	C.1, C.2
	Construction site access roads and compounds	Damage to access roads and construction compounds	C.1, C.2
Extreme weather events	Construction staff and workers	Increased potential for slips, trips and falls	C.1, C.2
	Construction equipment, machinery and materials	Damage or loss of equipment, machinery and materials	C.1, C.2
	Construction site access roads and compounds	Damage to access roads and construction compounds	C.1, C.2
Heatwaves and chronic temperature increase	Construction staff and workers	Increased heat stress/heat exhaustion for workers	C.1, C.3, C.4, C.5

11.12.8 **Table 11-24** details the assessment of climate risks identified in **Table 11-23** above. This table takes into account projections of future climate change in the period up

to 2080, environmental measures designed into the Proposed Development and assumptions around future detailed design measures.

Table 11-24: Climate Resilience Assessment - Construction

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
Flooding (pluvial and fluvial)	Construction staff and workers	Risk to life	Very low	Very large	Minor
	Construction equipment, machinery and materials	Damage or loss of equipment, machinery and materials	Low	Small	Negligible
	Construction site access roads and compounds	Damage to access roads and construction compounds	Low	Small	Negligible
Extreme weather events	Construction staff and workers	Increased potential for slips, trips and falls	Medium	Small	Minor
	Construction equipment, machinery and materials	Damage or loss of equipment, machinery and materials	Low	Small	Negligible
	Construction site access roads and compounds	Damage to access roads and construction compounds	Low	Small	Negligible
Heatwaves and chronic temperature increase	Construction staff and workers	Increased heat stress/heat exhaustion for workers	Medium	Small	Minor

11.12.9 All effects are either negligible or minor, and therefore are considered to be **not significant** (as per **Paragraph 11.8.59**).

Operational and maintenance Phase

11.12.10 **Table 11-25** sets of the climate risks on identified receptors, and corresponding mitigation measures for the operational and maintenance phase.

Table 11-25: Climate Risks and Mitigation during Operation and maintenance

Climate Variable	Receptor	Potential Impact	Environmental Measures
Flooding (pluvial and fluvial)	Site Staff	Risk to Life	O.5, O.6, O.7, O.8
Extreme weather events	Infrastructure	Damage to structures/components/equipment Reduction in operating performance	O.1, O.2
	Habitats and biodiversity	Damage to habitats	O.4
	Site Staff	Increased potential for slips, trips and falls	O.6
Heatwaves	Infrastructure	Overheating of electrical equipment Damage to components	O.1, O.2
	Site Staff	Risk of overheating to workers Increased heat stress/heat exhaustion for workers	O.6, O.8, O.9
	Site Access	Damage from expansion in extreme heat	O.1, O.2
	Habitats and biodiversity	Damage to plants and biodiversity and potential to affect growth rates of habitats	O.4

Climate Variable	Receptor	Potential Impact	Environmental Measures
Chronic temperature increase	Infrastructure	Higher electrical losses Higher rate of mechanical failures Overheating of electrical equipment	O.1, O.2
	Site Staff	Increased heat stress/ heat exhaustion for workers	O.6, O.8, O.9
	Habitats and biodiversity	Potential to affect growth & survival rates of habitats	O.4
Drought and reduced summer rainfall	Habitats and biodiversity	Potential to affect growth & survival rates of habitats	O.4
	Infrastructure	Deterioration of foundations due to decrease in ground moisture levels	O.3
	Infrastructure	Damage to components from wildfire	O.7
Increased precipitation	Infrastructure	Deterioration of foundations due to increase in ground moisture levels	O.1, O.2, O.3
		Damage to infrastructure from increased drying/wetting	
Subsidence or ground movement	Infrastructure	Damage to underground cables due to ground movements	O.1

11.12.11 Table 11-26 details the assessment of climate risks identified in Table 11-25 above, for the operational and maintenance phase.

Table 11-26: Climate Resilience Assessment – Operation and maintenance

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
Flooding (pluvial and fluvial)	Site Staff	Risk to Life	Very Low	Very Large	Minor
Extreme weather events	Infrastructure	Damage to structures/ components/ equipment Reduction in operating performance	Medium	Small	Minor
	Habitats and biodiversity	Damage to habitats	Medium	Very Small	Negligible
	Site Staff	Increased potential for slips, trips and falls	Very Low	Small	Negligible
Heatwaves	Infrastructure	Overheating of electrical equipment Damage to components	Low	Small	Negligible
	Site Staff	Risk of overheating to workers Increased heat stress/ heat exhaustion for workers	Very Low	Small	Negligible
	Site Access	Damage from expansion in extreme heat	Very Low	Very Small	Negligible
	Habitats and biodiversity	Damage to plants and biodiversity and potential to	Low	Very Small	Negligible

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
		affect growth rates of habitats			
Chronic temperature increase	Infrastructure	Higher electrical losses Higher rate of mechanical failures Overheating of electrical equipment	Medium	Very Small	Negligible
	Site Staff	Increased heat stress/ heat exhaustion for workers	Very Low	Small	Negligible
	Habitats and biodiversity	Potential to affect growth & survival rates of habitats	Low	Small	Negligible
Drought and reduced summer rainfall	Habitats and biodiversity	Potential to affect growth & survival rates of habitats	Low	Small	Negligible
	Infrastructure	Deterioration of foundations due to decrease in ground moisture levels	Very Low	Small	Negligible
	Infrastructure	Damage to components from wildfire	Low	Small	Negligible
Increased precipitation	Infrastructure	Deterioration of foundations due to increase in ground moisture levels Damage to infrastructure from	Very Low	Small	Negligible

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
		increased drying/wetting			
Subsidence or ground movement	Infrastructure	Damage to underground cables due to ground movements	Very Low	Small	Negligible

11.12.12 All effects are either minor or negligible, and therefore are considered to be **not significant** (as per **Paragraph 11.8.59**).

Decommissioning Phase

11.12.13 **Table 11-27** sets of the climate risks on identified receptors, and corresponding mitigation measures for the decommissioning phase.

Table 11-27: Climate Risks and Mitigation during Decommissioning

Climate Variable	Receptor	Potential Impact	Environmental Measures
Flooding (pluvial and fluvial)	Decommissioning staff and workers	Risk to life	D.1, D.2, D.3
	Decommissioning equipment, machinery and materials	Damage or loss of equipment, machinery and materials	D.1, D.2
	Decommissioning site access roads and compounds	Damage to access roads and construction compounds	D.1, D.2
Extreme weather events	Decommissioning staff and workers	Increased potential for slips, trips and falls	D.1, D.2, D.3
	Decommissioning equipment, machinery and materials	Damage or loss of equipment, machinery and materials	D.1, D.2
	Decommissioning site access roads and compounds	Damage to access roads and construction compounds	D.1, D.2

Climate Variable	Receptor	Potential Impact	Environmental Measures
Heatwaves and chronic temperature increase	Decommissioning staff and workers	Increased heat stress/heat exhaustion for workers	D.1, D.3, D.4, D.5
Heatwaves	Infrastructure	Overheating of electrical equipment Damage to components	D.1, D.2
Chronic temperature increase	Infrastructure	Higher electrical losses Higher rate of mechanical failures Overheating of electrical equipment	D.1, D.2

11.12.14 Table 11-28 details the assessment of climate risks identified in Table 11-27 above, for the decommissioning phase.

Table 11-28: Climate Resilience Assessment – Decommissioning

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
Flooding (pluvial and fluvial)	Decommissioning staff and workers	Risk to life	Very low	Very Large	Minor
	Decommissioning equipment, machinery and materials	Damage or loss of equipment, machinery and materials	Low	Small	Negligible

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Significance
	Decommissioning site access roads and compounds	Damage to access roads and construction compounds	Very low	Small	Negligible
Extreme weather events	Decommissioning staff and workers	Increased potential for slips, trips and falls	Low	Small	Negligible
	Decommissioning equipment, machinery and materials	Damage or loss of equipment, machinery and materials	Low	Small	Negligible
	Decommissioning site access roads and compounds	Damage to access roads and construction compounds	Very low	Small	Negligible
Heatwaves and chronic temperature increase	Decommissioning staff and workers	Increased heat stress/heat exhaustion for workers	Medium	Small	Minor

11.12.16 All effects are either minor or negligible, and therefore are considered to be **not significant** (as per **Paragraph 11.8.59**).

11.12.17 Table 11-24, Table 11-26 and Table 11-28 show that there are no significant effects on the Proposed Development due to future climate change, and therefore no additional mitigation is required.

11.13 In-Combination Climate Change Impacts and Effects

Assessment Methodology and Significance Criteria

Study Area and Scope

- 11.13.1 In-combination climate change impacts are the combined impacts of the Proposed Development and potential climate change impacts on the receiving environment. In simple terms this means considering whether future climate change will reduce or worsen any of the Proposed Development's environmental effects, for example air quality, noise or soils.
- 11.13.2 The aim of the In-Combination Climate Change Impact (ICCI) is therefore to consider whether the effects on receptors considered throughout the ES (under the current conditions, without climate change) are likely to be different under an alternative future climate regime. In particular, consideration is given to whether the significance / degree of the effect remains the same or changes with future climate conditions.

Establishing Baseline Conditions

- 11.13.3 The baseline conditions for the ICCI assessment are the same as the baseline conditions for the CCRA assessment, outlined in **Section 11.9**.

Receptors and Receptor Sensitivity

- 11.13.4 In the ICCI assessment, sensitive receptors are determined by each chapter in the ES. The ICCI assessment is undertaken by individual technical disciplines in regard to the identified sensitive receptors in each assessment.

Identifying Likely Significant Effects

- 11.13.5 The significance of effects in the ICCI is determined as a function of the likelihood of future climate materially changing the significance of environmental effects identified for a receptor. Such a change may be adverse (greater environmental effect) or beneficial (a lesser environmental effect).

11.14 Assessment of Likely Significant In-Combination Effects

- 11.14.1 A summary of the in-combination effects of the Proposed Development is provided in **Table 11-30**.

Table 11-29: Review of Potential ICCI and Effects

Technical Aspect	Summary of Effects Identified in this PEIR	Consideration of ICCI	Any ICCI that alter the significance of effects? / Potential ICCI Effect
Biodiversity	The biodiversity assessment stated that it could not rule out significant effects for biodiversity.	Changes to future climate including higher winter and summer temperatures and a decrease in summer rainfall could impact on site habitats and species. The impacts of climate change on biodiversity have already been considered within the main CCRA assessment, and no significant effects were identified (see Table 11-24 and Table 11-26). The impacts of climate change on biodiversity will be further considered within the ES within the biodiversity Chapter.	No / Not Significant
Ornithology	The ornithology assessment has determined that there are preliminary likely significant effects from habitat loss and alteration, disturbance and displacement,	Changes to future climate are not considered to have an impact on disturbance and displacement effects of the Proposed Development. Impacts on habitat have already been considered within the	No / Not Significant

Technical Aspect	Summary of Effects Identified in this PEIR	Consideration of ICCI	Any ICCI that alter the significance of effects? / Potential ICCI Effect
	and death/injury through collision with turbines. The residual effects following mitigation will be determined during the ES.	main CCRA assessment, and no significant effects were identified (see Table 11-24 and Table 11-26)	
Hydrology, Hydrogeology, Geology and Peat	Significant effects cannot be ruled out for alteration of flow, peat stability and loss of peat/carbon loss. No significant effects for risk of flooding, erosion and potential pollution events were found.	Flood risk assessment already considers future climate change within the assessment of significance. Effects at the construction stage (for example peat loss and pollution events) will occur in the near-term, and therefore won't be impacted by future (long term) climate change. Peat instability may be exacerbated by future climate changes. This should be further assessed within the hydrology chapter at ES.	No / Significant effects cannot be ruled out for peat instability
Landscape and Visual	Likely significant effects on landscape character, visual amenity and residential amenity.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the landscape and visual assessment.	No / Not Significant

Technical Aspect	Summary of Effects Identified in this PEIR	Consideration of ICCI	Any ICCI that alter the significance of effects? / Potential ICCI Effect
Historic Environment	No likely significant effects were identified in the Historic Environment assessment upon setting. No residual likely significant effects on buried archaeological remains (lithic scatters) and the remains of Lower Good Grieve Farmstead in the Main Turbine site, with additional mitigation in place.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the Historic Environment assessment.	No / Not Significant
Transport and Access	No significant effects were identified in the Transport and Access assessment.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the Transport and Access assessment.	No / Not Significant
Noise and Vibration	No significant effects were identified for Noise and Vibration.	Changes to future climatic conditions may change the operational wind farm noise, but altering average wind speeds	No / Not Significant

Technical Aspect	Summary of Effects Identified in this PEIR	Consideration of ICCI	Any ICCI that alter the significance of effects? / Potential ICCI Effect
		(positive or negative). However, the mitigation measure: “Targeted Mode Management for specific wind speeds and directions” ensures that any change would not impact the significance of the Operational wind farm noise.	
Air Quality	No significant effects are identified for air quality.	Air quality is anticipated to improve in the future. Future climate change is not considered to impact the significance findings of the air quality assessment	No / Not Significant
Socio-economics and Tourism	A significant beneficial increase in employment and GVA identified for development and construction for Calderdale. No other significant effects identified.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the socio-economics and tourism assessment.	No / Not Significant
Human Health	The human health assessment identified	Changes to future climatic conditions are not considered to have a direct impact	No / Not Significant

Technical Aspect	Summary of Effects Identified in this PEIR	Consideration of ICCI	Any ICCI that alter the significance of effects? / Potential ICCI Effect
	significant beneficial effects for employment, income and training, and wider societal infrastructure and resource	on the elements assessed within the human health assessment.	
Aviation and Radar	The Aviation and Radar chapter concludes there are no significant effects from the Proposed Development.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the aviation and radar assessment.	No / Not Significant
Major Accidents and Disaster	No significant effects were identified in the major accidents and disaster assessment.	Changes to future climatic conditions will increase the risk of surface and fluvial flooding, and may increase the risk of subsidence and unstable ground. The impact of future climate change on flood risk has been assessed within the major accidents and disaster risk assessment. Both flood and ground movements have already been evaluated within the CCRA, and determined to be not significant.	No / Not Significant

Technical Aspect	Summary of Effects Identified in this PEIR	Consideration of ICCI	Any ICCI that alter the significance of effects? / Potential ICCI Effect
Shadow Flicker	No significant effects were identified in the shadow flicker assessment.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the shadow flicker assessment.	No / Not Significant
Material and Waste	The Material and Waste assessment could not rule out significant effects during construction for construction phase materials and construction phase inert and non-hazardous waste, with a full assessment to be conducted at ES. No significant effects were identified during operation and maintenance or decommissioning.	Changes to future climatic conditions are not considered to have a significant effect upon the sensitive receptors within the material and waste assessment.	No / Not Significant

11.14.2 The ICCI assessment has found no likely significant in-combination climate change impacts.

11.15 Conclusions

11.15.1 The preliminary assessment of GHG effects has demonstrated that the Proposed Development will have a **significant beneficial effect** in relation to climate change as a result of the GHG emissions avoided by the Proposed Development, by its

displacement of sources of energy with higher GHG emissions, and its role in the transition to net zero, as shown in **Table 11-14**.

- 11.15.2 The preliminary CCRA assessment has found no likely significant effects of climate change on the Proposed Development, as shown in Table 11-24, Table 11-26 and Table 11-28.
- 11.15.3 The preliminary ICCI assessment has found **No Likely Significant** in-combination climate change impacts, as shown in **Table 11-29**.
- 11.15.4 In the ES, the GHG assessment, CCRA assessment and ICCI assessment will be updated with the latest design details.
- 11.15.5 **Table 11-30** presents a summary of the preliminary assessment of likely significant effects.

Table 11-30: Summary of Preliminary Assessment of Likely Significant Effects

Element	Preliminary assessment of Likely Significant Effects	Additional Mitigation	Residual Effect	Next Steps
Greenhouse Gas Assessment	Significant Beneficial	None required	Beneficial	The assessment will be further refined based on available data as part of the ES. In particular, peat related emissions calculations will be refined based on additional peat information and quantification, where relevant.
Climate Change Resilience and Adaptation Assessment	Not Significant	None required	None	The assessment will be further refined based on available data as part of the ES.
In-Combination Climate	Not Significant	None required	None	The assessment will be further refined based on available data as

Element	Preliminary assessment of Likely Significant Effects	Additional Mitigation	Residual Effect	Next Steps
Change Impacts				part of the ES, in particular for Ornithology.

