18. Climate Change – Climate Change Resilience

18.1 Introduction

18.1.1 This chapter presents the preliminary assessment of the likely significant effects with respect to the Climate Change Resilience (CCR) of the Project.

18.1.2 The preliminary assessment is based on information obtained to date. It should be read in conjunction with the Project description provided in **Chapter 2: The Project** and with respect to relevant parts of the following chapters:

- **Chapter 5: Biodiversity;**
- **Chapter 7: Water Environment;**
- **Chapter 8: Landscape and Visual; and**
- **Chapter 16: Major Accidents and Disasters**.

18.1.3 This chapter describes:

- the legislation, policy and technical guidance that has informed the assessment (**Section 18.2**);
- consultation and engagement that has been undertaken to date and how comments from consultees relating to CCR have been addressed (**Section 18.3**);
- the methods used for baseline data gathering (**Section 18.4** and **Section 18.5**);
- the current and future baseline (**Section 18.6**);
- embedded environmental measures relevant to climate change (**Section 18.7**);
- the scope of the assessment for CCR (**Section 18.8**);
- the methodology applied for the assessment (**Section 18.9**);
- the preliminary assessment of CCR effects (**Section 18.10**);
- the preliminary assessment of cumulative effects (**Section 18.11**);
- a summary of the preliminary significance conclusions (**Section 18.12**); and
- an outline of further work to be undertaken for the Environmental Statement (ES) (**Section 18.13**).

Limitations and assumptions

18.1.4 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of likely significant effects will be reported in the ES. The PEIR has been produced to fulfil the Applicant's

consultation duties and enable consultees to develop an informed view of the likely significant effects of the Project.

18.2 Relevant legislation, planning policy and technical guidance

18.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to the CCR assessment. Further information on policies relevant to the Project is provided in **Chapter 4: Legislation and Policy Overview**.

Legislation

18.2.2 A summary of the legislation relevant to the CCR assessment is given in **Table 18.1**.

Table 18.1 Legislation relevant to the CCR assessment

Legislation	Legislative context
Climate Change Act 2008[1]	The Act sets out the reporting requirements of the UK Government to produce a UK Climate Change Risk Assessment (CCRA), published every five years, which is the mechanism for gathering and presenting evidence to help understand climate change risks to the UK. The Third CCRA was published in January 2022[2] and draws from the latest evidence prepared by the Adaptation Committee presented in the Independent Assessment of UK Climate Risk 2021.[3]
The Environment Act 2021[4]	The Environment Act (passed in November 2021) translates aspects of the government's "A Green Future: Our 25 Year Plan to Improve the Environment"[5] into legislation. This Plan sets out how the UK

[1] UK Government (2008). Climate Change Act 2008. (online) Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents (Accessed 13 June 2022).
[2] HM Government (2022). UK Climate Change Risk Assessment 2022. (online) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf (Accessed 13 June 2022).
[3] Betts, R.A. and Brown, K, (2021). Introduction. In: *T*he Third UK Climate Change Risk Assessment Technical Report (Betts, R.A.,Haward, A.B. and Pearson, K.V.(eds.)) (Online). Prepared for the Climate Change Committee, London. Available at: https://www.ukclimaterisk.org/wp-content/uploads/2021/06/Technical-Report-The-Third-Climate-Change-Risk-Assessment.pdf (Accessed: 13 June 2022).
[4] UK Government (2021). Environment Act 2021. (Online) Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted. (Accessed 01 July 2022).
[5] HM Government (2021). A Green Future: Our 25 Year Plan to Improve the Environment (Online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf (Accessed: 13 June 2022).

Legislation	Legislative context
	Government will tackle the effects of climate change, by ensuring all policies, programmes and investment decisions take into account the possible extent of climate change this century.

Planning policy

18.2.3 A summary of the national and local planning policy relevant to the CCR assessment in **Table 18.2**.

Table 18.2 Planning policy relevant to the CCR assessment

Policy	Policy context
National planning policy	
National Planning Policy Framework (NPPF)[6]	The NPPF sets out in paragraph 153 that Local Plans: "*should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply and changes to biodiversity and landscape, and the risk of overheating from rising temperatures*". Paragraph 154 states that: "*New developments should be planned for in ways that:* *a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure"*.

[6] Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework (Online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed 13 June 2022).

Policy	Policy context
	Paragraph 157 also states that: *"in determining planning applications, local planning authorities should expect new development to:* *a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable"*.
Overarching National Policy Statement for Energy (EN-1)[7]	EN-1 sets out the national policy for energy infrastructure and aims to speed up the transition to a low carbon economy to help realise the UK's climate change commitments. Section 4.8 sets out the requirement for the ES to include: *"how the proposal will take account of the projected impacts of climate change".* Paragraph 4.8.6 states that *"the IPC should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections available."* Applicants should apply as a minimum, the emissions scenario that the Independent Committee on Climate Change suggests the world is currently most closely following – and the 10%, 50% and 90% estimate ranges, representing the low, central and high level of projected changes, respectively. Any adaptation measures should be based on the latest set of UK Climate Projections, the Government's latest UK Climate Change Risk Assessment and in consultation with the Environment Agency.
Draft overarching National Policy Statement for energy (Draft EN-1)	The 2021 Draft EN-1 includes the same principles relating to the CCR assessment as EN-1. It also goes further, seeking nature-based solutions, refers to the EA's Climate Change Allowances in Flood Risk Assessments and highlights the need to demonstrate climate resilience which is built-in to projects from conception.

[7] Department of Energy and Climate Change, (2011). Overarching National Policy Statement for Energy (EN-1) (Online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf (Accessed 13 June 2022)

Policy	Policy context
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)[8]	EN-4 states applicants should in particular set out how the proposal would be resilient to: • Increased risk of flooding; • Effects of rising sea levels and increased risk of storm surge; • Higher temperatures; • Increased risk of earth movement or subsidence from increased risk of flooding and drought; and • Any other increased risks identified in the applicant's assessment. The CCR measures will form part of the ES.
Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)[9]	The 2021 Draft EN-4 includes the same principles relating to the CCR assessment as EN-4.
United Nations Framework Convention of Climate Change (UNFCCC) Paris Agreement[10]	The UNFCCC is one of the major international bodies responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, of which one of the aims is stated as:

[8] Department of Business Energy & Industrial Strategy (2011). Overarching National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). (Online). Accessible at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37049/1941-nps-gas-supply-oil-en4.pdf (Accessed November 2021)
[9] Department of Business Energy & Industrial Strategy, (2021). Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). (Online). Accessible at: Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (publishing.service.gov.uk) (Accessed July 2022)
[10] UNFCCC (2015). *Paris Agreement* (Online). Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed 13 June 2022).

Policy	Policy context
	"(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production" (Article 2(1)).
UNFCCC Glasgow Climate Pact[11]	The Glasgow Pact emphasised the urgency of the scaling up of climate action and support to reduce the vulnerability to climate change by enhancing adaptive capacity and strengthening resilience.
Local planning policy	
Greater Manchester Infrastructure Framework 2040[12]	The Greater Manchester Combined Authority (GMCA) recognise the importance of infrastructure and its continued growth despite environmental and climate change. *Key Challenge 11* Resilience refers to ensuring the security of supply of essential infrastructure, for example energy, throughout each day against challenges including those associated with 'shocks' e.g. flooding.
GMCA Joint Local Development Plan (LDP) 'Places for Everyone', draft 2021[13]	The joint LDP is currently undergoing examination where one of the aims of the draft LDP is to ensure Greater Manchester's capacity to function is maintained, of which a significant challenge is the ability to respond to future impacts from climate change. *Policy JP-S 4* Resilience includes key measures as follows:

[11] UNFCCC (2021). *Glasgow Climate Pact* (Online). Available at: https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf (Accessed 13 June 2022).
[12] Greater Manchester Combined Authority (2020). Greater Manchester Infrastructure Framework 2040. (Online) Accessible at: https://www.greatermanchester-ca.gov.uk/media/1715/greater-manchester-infrastructure-framework-2040.pdf (Accessed 13 June 2022).
[13] Greater Manchester Combined Authority Joint Local Development Plan Publication Plan (Online). Accessible at: https://www.greatermanchester-ca.gov.uk/media/4838/places-for-everyone.pdf (Accessed 13 June 2022).

Policy	Policy context
	• Ensuring developments make appropriate provision for response and evacuation in the case of emergency or disaster. • Locating critical infrastructure and vulnerable uses away from locations at a high risk of acute shocks. • Increasing the size, spread, quality and interconnectedness of the green infrastructure network.
Trafford District Council Local Plan: Core Strategy, 2012[14]	The Core Strategy highlights that climate risk and vulnerability are at the centre of the planning system. *Strategic Objective 7* Secure sustainable development includes the use of new technologies to combat and adapt to climate change to minimise impact of all new development on the environment.
Cheshire West and Chester Adopted Development Plan, Part One: Strategic Policies 2015[15]	The overall vision for the Development Plan includes positive adaptation to climate change through *Strategic Objective 14* to mitigate and adapt to the effects of climate change by addressing flood risk/water management and supporting the development of new buildings and infrastructure that are resilient, resistant and adapted to the effects of climate change. *Policy ENV 6* High quality design and construction states that "*Development should, where appropriate, mitigate and adapt to the predicted effects of climate change*".

[14] Trafford Council, (2012). Trafford Local Plan Core Strategy (Online). Available at: https://www.trafford.gov.uk/planning/strategic-planning/docs/core-strategy-adopted-final.pdf (Accessed 13 June 2022).
[15] Cheshire West and Chester Council (2015). The Local Plan (Part 1) Strategic Policies. (Online) Available at: http://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/adopted_cwac_lp/lp_1_adopted?tab=files (Accessed 13 June 2022).

Policy	Policy context
Cheshire East Council Local Plan Strategy 2010 - 2030[16]	*Strategic Priority 3* of Cheshire East is to reduce the impact on climate change by avoiding development in land that may be at risk from the effects of climate change. The following policies are of particular relevance: *Policy SD 2* Sustainable Development Principles, which states that development is expected to use appropriate design and construction to create developments that are resilient to climate change. *Policy SE 1* Design which states that design should encourage climate change adaptation features in spaces and detailed design.
Warrington Borough Council Adopted Core Strategy 2014[17]	Warrington Council's strategy vision of the town includes *Strategic Objective W6* to ensure development is energy efficient, safe and resilient to climate change. *Policy CS 1* Overall Spatial Strategy – Delivering sustainable development specifies that development must have regard to the need to address the causes of climate change and be resilient to these effects.
Halton Borough Council Core Strategy 2013[18]	Identifies the challenge to implement adaptation measures to deal with the threat of climate change. This is reflected in *Strategic Objective 9*, which highlights the need to ensure the Borough is resilient to the adverse effects of climate change. *Policy CS19* Sustainable Development and Climate Change encourages development to incorporate climate change resilience measures.

[16] Cheshire East Council (2017). Local Plan Strategy 2010-2030. (Online) Available at: https://www.cheshireeast.gov.uk/planning/spatial-planning/cheshire_east_local_plan/local-plan-strategy/local_plan_strategy.aspx (Accessed 13 June 2022).
[17] Warrington Borough Council (2014). Local Plan Core Strategy, (Online). Available at: https://www.warrington.gov.uk/sites/default/files/2019-08/local_plan_core_strategy_adopted_2014.pdf (Accessed 13 June 2022).
[18] Halton Borough Council (2013). Halton's Local Plan Core Strategy April 2013, (Online). Available at: https://www3.halton.gov.uk/Documents/planning/planning%20policy/CoreStrategy.pdf (Accessed 13 June 2022).

Policy	Policy context
St Helens Council Core Strategy 2012[19]	St Helen's Core Strategy embeds resilience into *Strategic Objective 2.2* to minimise the impact of climate change on development.

Technical guidance

18.2.4 A summary of the technical guidance for CCR assessment is given in **Table 18.3**.

Table 18.3 Technical guidance relevant to the CCR assessment

Technical Guidance Document	Context
UKCP18 projections[20]	UK Climate Projections 2018 (UKCP18) has been produced by the Met Office and provides the latest set of climate change projections for the UK. It includes projections of how climate variables could change in the coming decades, as well as forecasts for sea level rise. UKCP18 projections are used in the CCR assessment (see **Section 18.6** and **Section 18.10**).
UKCP18 technical notes including: **1. Science Overview Report**[21]	The UKCP18 Climate Projections were issued with a suite of accompanying scientific reports. The Overview Report and the Land Projections report give a summary of the anticipated climate change trends found within the projection data, evaluating the projection pathways, and provide direction on the use of the data in terms of the nature and degree of consistency

[19] St Helens Council (2012). St Helens Core Strategy 2012, (Online). Available at: https://www.sthelens.gov.uk/planning-building-control/planning-policy/core-strategy/ (Accessed 13 June 2022).
[20] Defra/Met Office (2018). UK Climate Projections 2018. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/ (Accessed 13 June 2022).
[21] Lowe, J. A. et al. (2019). UKCP18 Science Overview Report (Online). Available at: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf (Accessed 13 June 2022).

Technical Guidance Document	Context
2. **UKCP18 Land projections: Science Report**[22] 3. **UKCP18 Factsheets**[23]	within the modelling results. The Factsheets are available as a short qualitative overview of the UKCP18 results for the climate parameters.
ISO14091 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment[24]	This international standard provides guidelines on approaches to assessing climate change-related risks. It highlights the role of risk assessments in improving climate change adaptation planning and informing climate change adaptation activities from their implementation through to monitoring.
European Commission Notice – Technical guidance on the climate proofing of infrastructure in the period 2021 - 2027[25]	This note gives technical guidance on the climate proofing of infrastructure, which includes the adaptation to climate change (climate resilience). The note contains guidance on the methodology of assessments, include the role within Environmental Impact Assessments (EIAs). The methodology for the CCR assessment detailed in **Section 18.9** draws from principles within this guidance.
Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation[26]	This IEMA guidance provides a framework for the effective consideration of CCR and adaptation in the EIA process.

[22] Murphy, J. M. et al. (2019). UKCP18 Land Projections: Science Report (Online). Available at: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Land-report.pdf (Accessed 13 June 2022).
[23] Met Office. UKCP18 Factsheets. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/data/factsheets (Accessed 13 June 2022)
[24] ISO (2021). ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment. Available at: https://www.iso.org/standard/68508.html (Accessed 13 June 2022)
[25] Commission Notice – Technical guidance on the climate proofing of infrastructure in the period 2021 – 2017 (2021). *Official Journal C 373 1-92.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021XC0916(03) (Accessed 13 June 2022).
[26] IEMA (2020). IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 (Accessed 13 June 2022).

Technical Guidance Document	Context
UK Climate Risk Independent Assessment 2021[3] and UK Climate Change Risk Assessment 2022[2]	The UK Government Third CCRA fulfils the requirement under the Climate Change Act 2008[1] for the UK Government to produce a five-yearly assessment of the risks for the UK of the current and predicted impacts of climate change. The CCRA highlights key climate risks that have been used to inform the assessment within this chapter.
Environment Agency Guidance Flood Risk Assessments: Climate Change Allowances	The supporting Environment Agency planning practice guidance, "Flood risk assessments: climate change allowances"[27], contains guidance on how to make allowances for climate change when preparing flood risk assessments to minimise vulnerability of Projects to flooding and coastal change. The allowances are for potential future increases in river flood flows, extreme rainfall intensity and sea level rise. The potential increases in these parameters should be taken in account for over the development's expected lifetime. It also provides guidance on sensitivity testing of these assessments.
Climate Change Adaptation Manual (NE751)[28]	Updated in 2020, this manual is designed to support practical and pragmatic decision-making on considering climate change adaptation for impacts on habitats, green infrastructure, geology and geomorphology, and access and recreation.

[27] Environment Agency (2021). Flood risk assessments: climate change allowances. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances (Accessed 13 June 2022).
[28] Natural England and RSPB (2019). Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate, 2nd Edition. (Online). Available at: http://publications.naturalengland.org.uk/publication/5679197848862720 (Accessed 13 June 2022).

18.3 Consultation and Engagement

Overview

18.3.1 The assessment has been informed by consultation responses and ongoing statutory and technical engagement. An overview of the approach to consultation is provided in **Section 3.4** of **Chapter 3: Approach to preparing the PEIR**.

Scoping Opinion

18.3.2 A Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 8 March 2022. A summary of the relevant responses received in the Scoping Opinion in relation to CCR and confirmation of how these have been addressed within the assessment to date is presented in **Table 18.4**.

18.3.3 The information provided in the PEIR is preliminary and not all of the Scoping Opinion comments have been addressed in full at this stage, however all comments will be addressed within the ES.

Table 18.4 Summary of EIA Scoping Opinion responses for Climate Change – CCR assessment

Consultee	Consideration	How addressed in this PEIR
Marine Management Organisation (MMO)	In relation to section 17.6 that states "*embedded mitigation to mitigate the vulnerability of the Project to climate change will be explored within future environmental reporting*" the MMO advises that the time frame for reporting needs to be finalised now and agreed upon. Identifying key areas to be impacted by river and coastal flooding and erosion is important and these areas need to be monitored for any triggers that might indicate need for mitigation.	The preliminary embedded mitigation within the design has been explored during this PEIR and will be reported in full within the ES. The CCR assessment identifies and considers the impact of river and coastal flooding and erosion on the Project, which will include allowances for climate change.
Natural England	The ES should identify how the development affects the ability of the natural environment (including habitats, species, and natural processes) to adapt to climate change, including its ability to provide adaptation for people. This should include impacts on the vulnerability or resilience of a natural feature (i.e. what's already there and affected) as well as impacts on how the environment can accommodate change for both nature and people, for example whether the development affects species ability to move and adapt. Nature-based solutions, such as providing green infrastructure on-site and in the surrounding area (e.g. to adapt to flooding, drought and heatwave events), habitat creation and peatland restoration, should be considered. The ES should set out the measures that will be adopted to address impacts.	The ICCI assessment, to be provided in **Chapter 19: Intra-project Effects** of the ES, will provide an assessment of the extent to which climate change exacerbates the effects of the development on the natural environment, and the efficacy of proposed mitigation. It will draw upon the available guidance and studies; nature-based solutions will be explored and integrated into the design, where feasible, the details of which will be reported in the ES.

Consultee	Consideration	How addressed in this PEIR
Natural England	The Natural England and RSPB Climate Change Adaptation Manual (2020) provides extensive information on climate change impacts and adaptation for the natural environment, plus adaptation focussed nature-based solutions for people. It includes the Landscape Scale Climate Change Assessment Method that can help assess impacts and vulnerabilities on natural environment features and identify adaptation actions. Natural England's Nature Networks Evidence Handbook (2020) also provides extensive information on planning and delivering nature networks for people and biodiversity.	The ICCI assessment will assess the extent to which climate change exacerbates the effects of the development on the natural environment, and the efficacy of proposed mitigation. It will draw upon the available guidance and studies, particularly the 2020 Natural England and RSPB Climate Change Adaptation Manual.[28]

Technical engagement

18.3.4 Technical engagement with consultees in relation to CCR is ongoing. Stakeholder engagement undertaken as part of the chapters cross referenced in **Section 18.1** have included issues raised around aspects of CCR, for example for **Chapter 7: Water Environment** and **Chapter 5: Biodiversity**. Resilience measures in response to the issues have been incorporated into this assessment.

Planned future engagement

18.3.5 Future planned engagement by other environmental topics may cover matters related to CCR which will be captured in the appropriate chapters and cross referenced will be included where appropriate. Therefore, there is currently no further stand-alone stakeholder engagement planned for the CCR assessment.

18.4 Study Area

Spatial scope

18.4.1 The Study Area for the CCR assessment is informed by the spatial extent of the Project. The desk-based study and the baseline information (see **Section 18.6**) reflect the spatial extent of the Preliminary Order Limits as defined in **Chapter 2: The Project**. The assessment considers the temporary and permanent assets associated with the Project within the Preliminary Order Limits. However, the resilience of the Project is also assessed by its interdependencies on external infrastructure beyond the spatial scope of the Project, for example, the resilience of the electricity network to ensure a consistent supply to operate the assets.

Temporal scope

18.4.2 The temporal scope of the CCR assessment is consistent with the period over which the Project would be carried out.

18.4.3 The construction period is anticipated to be over three years from 2024 to approximately 2028, with minimal expected climate change from the baseline.

18.4.4 The asset design life of the Project is 40 years, with an anticipated end of design life in 2068. This is considered within the 2070s climate period (2060 – 2079). More significant climate changes are anticipated by the end of the project design life and beyond.

18.4.5 Decommissioning activity will likely entail leaving the asset in-situ and making it safe. The timescales for this activity are currently not defined, as the operational life of the asset may be much longer than the design life, dependent on an ongoing repair and replace programme. The climate periods chosen, i.e. up to the 2070s, will inform decommissioning activities at this stage. It is likely that any decommissioning activities would be subject to an updated CCR assessment at this time.

18.5 Data gathering methodology

Desk study

18.5.1 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 18.5**.

Table 18.5 Data sources used to inform the CCR assessment

Source	Date	Summary
Met Office	9 December 2021	The Met Office collect data from climate stations around the UK for a number of climate parameters. Woodford was the climate station chosen as the most representative of the Project location, as shown in **Graphic 18.2**.[29]
Met Office	9 December 2021	UKCP18 for the 2030s, 2050s and 2070s have been obtained from the Met Office UKCP18 User Interface[30] and have been presented for the location of the Project.

18.5.2 **Table 18.3** details the data sources and technical guidance used in the desk study for the CCR assessment, including UKCP18 climate data.

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

18.5.4 RCP8.5 is a potential future pathway which is slow to transfer to a low-carbon energy provision. With progress toward achieving Nationally Determined Contributions, RCP8.5 is considered a possible, but conservative, emission scenario suitable for evaluating the climate resilience of long-lifetime projects. Data from UKCP18 for the RCP8.5 scenario has been obtained for the 2030s (2020-2039), 2050s (2040-2059), and 2070s (2060-2079) projections at the 10%, 50% and 90% probability level and has been used to determine the future baseline.

18.5.5 UKCP18 provides a range of different climate data available at different scales. For all climate variables, preference has been given to the UKCP18 probabilistic projections at 25km as these have more limited sampling of uncertainties and are therefore the preference for future risk assessments. The spatial scope of the data

[29] Met Office. (2021). UK Climate Averages – Woodford (Greater Manchester) (Online). Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcqrqyr80 (Accessed 9 December 2021)
[30] Met Office. (2021). UK Climate Projections User Interface. Available at: https://ukclimateprojections-ui.metoffice.gov.uk/ (Accessed 9 December 2021).

collection is for the north-west England administrative boundary, as shown in **Graphic 18.1** , which is an aggregated regional average created from the 25km probabilistic projections.[31]

Graphic 18.1 Administrative boundary used within UKCP18 data

18.5.6 For some climate variables (notably wind and snowfall), climate data is not available within the 25km probabilistic projections. Regional data (12km) is available which better represent local effects and therefore wind and snowfall data can be extracted. However, for the purposes of this assessment, qualitative literature has been utilised, due to the uncertainties mentioned above. Namely, the factsheets have provided this information.[23]

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

Survey work

18.5.7 No survey work is required to inform the CCR assessment. Survey work required for the chapters referenced in **Section 18.1,** which may inform the CCR assessment, are detailed in the respective chapters.

Data limitations

18.5.8 UKCP18 is the result of over seven years' work by the Met Office's Hadley Centre Climate Programme and over thirty years of work from other contributing organisations. UKCP18 provides the most up-to-date assessment of how the climate of the UK may change over the 21st Century. However, climate change, by its very nature, is associated with a range of assumptions and limitations.[32] For example, there is uncertainty in climate models regarding how global climatic trends will be reflected at the regional scale. The future baseline represents projections under one future scenario (RCP8.5) and cannot be treated as a prediction. Data for the 10%, 50% and 90% probability levels for the high emissions scenario (RCP8.5) have been used in the assessment to highlight uncertainty and ensure a conservative assessment of risk. The 10%, 50% and 90% probability levels correspond to the low, central and high changes in the probabilistic projections.[21] Leading climate change data from the UKCP18 programme has been used to explore trends and magnitude of change at the regional scale.

18.6 Overall baseline

Current baseline

18.6.1 The baseline for the CCR assessment is the current climatic conditions representative of the Preliminary Order Limits. Due to the size and scale of the Preliminary Order Limits, the current climate conditions are considered for the north-west of England, where the Project is located. They are used to provide context for the climate change impacts throughout the construction, operation and decommissioning of the Project.

18.6.2 The north-west has a wide range of climate variability, due to its topography and altitude, and this region contains both the coldest place and wettest place in England. Temperatures in this region are generally affected by altitude and proximity to the coast. The exposure of the region to westerly maritime air masses, in addition to the areas of high altitude, results in the region containing some of the wettest places in the UK.[33]

[32] Fung et al., (2018). UKCP18 Guidance: Caveats and Limitations (Online). Available at: https://wwwpre.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---caveats-and-limitations.pdf (Accessed 22 June 2022).
[33] Met Office (2016). North West England & Isle of Man: Climate (Online). Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/north-west-england--isle-of-man_-climate---met-office.pdf (Accessed 13 June 2022).

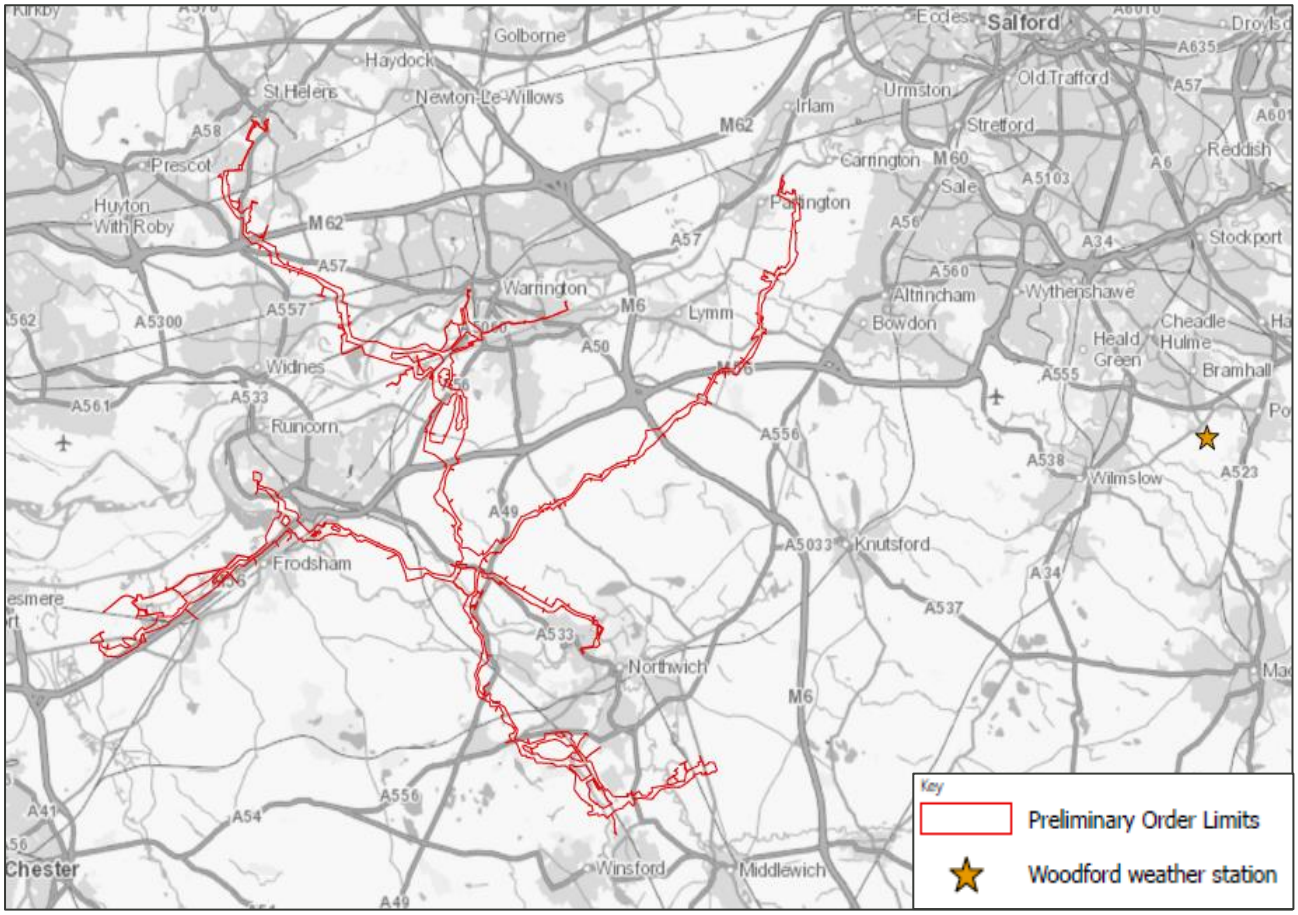
18.6.3 Key features of the climate that have defined the area over the last 30-year period (1981-2010)[33] [34] include:

- Temperatures in the coldest month of January have typically ranged from 0°C to 2 - 2.5°C along the coasts and in Merseyside. The warmest month is typically July with mean daily maximum temperatures of around 21°C in Cheshire. This varies for the upland areas which is typically around 17°C. Extreme temperatures have been experienced in the region in this period, which include a temperature of 34.5°C recorded in Knutsford, Cheshire in 1990 and a heatwave in July 2006 where 34.3°C was experienced in Crosby, Merseyside.
- Rainfall has been generally well-distributed throughout the year with a seasonal pattern. The total number of days with rainfall of 1mm or more ('wet days') can reach 50 – 60 days within winter, decreasing to 40 - 45 days in summer. Cheshire and Merseyside are typically drier with 35 - 40 days in winter and about 30 days in summer.
- The region is prone to widespread flooding, especially in winter and early spring. There have been a number of severe flooding events over this period.
- The occurrence of thunderstorms correlates with the heaviest falls of rain, often associated with summer thunderstorms. On the mainland, it is typical that there will be 8 - 12 thunderstorm days per year.
- The north-west region is also amongst the most exposed parts of the UK due to the coastal areas of the Atlantic and the large upland areas. Mean wind speeds and gusts are the strongest between December to February. Wind exposure can also be measured in the number of days gale force is reached; if wind reaches a mean speed of 34 knots or more over any ten consecutive minutes, this is classed as a gale day. On the mainland within the region, gales occur along the coast for around 5 – 10 days and less than 5 days in inland areas.

18.6.4 The current baseline uses the observable data available through the Met Office from the climate station at Woodford, Greater Manchester[29]. The Hawarden Airport climate station is also within range of the Project, however Woodford was chosen as it is within the administrative boundary of the UKCP18 data shown in **Graphic 18.1.** The location of the Woodford climate station is shown on **Graphic 18.2**.

[34] The data for the 30-year climate period 1991 – 2020 is now available from the Met Office however, due to UKCP18 presenting climate data against the baseline 1981 – 2000, the climate period 1981 – 2010 has been chosen to represent the climate baseline.

Graphic 18.2 Location of Woodford climate station



18.6.5 Key data from the 1981 – 2010 period is contained within **Table 18.6**[29]. It presents data from the nearest climate station, Woodford, in comparison with the wider district of north-west England and North Wales. This is contextualised against the national data for England.

Table 18.6 Baseline climate data 1981 - 2010

1981 - 2010	Nearest climate station: Woodford, England	Regional: north-west England and North Wales	National: England
Monthly average rainfall (mm)	72.25	109.87	70.82
Days of rainfall > 1mm (days)	151.72	166.70	133.01
Minimum annual average temperature (°C)	5.52	5.53	5.85

1981 - 2010	Nearest climate station: Woodford, England	Regional: north-west England and North Wales	National: England
Maximum annual average temperature (°C)	13.23	12.34	13.46
Maximum summer average temperature (°C)	20.23	19.09	20.94
Mean wind speed at 10m (knots)	7.52	9.46	8.44
Air frost (days)	44.80	51.72	49.70

Future baseline

18.6.6 The future baseline is used to set out general climatic conditions that would be experienced over the project lifetime based on the temporal scope detailed in **Section 18.4**.**Table 18.7** shows the projected changes in future climate variables across the chosen time periods.

Table 18.7 Future climate projections for the north-west of England from UKCP18

Climate variable		Time period and projected change[35]			Trend[36]
		2030s (2020 – 2039)	2050s (2040 – 2059)	2070s (2060 – 2079)	
Mean temperature change (Summer) (°C)	10%	0.2	0.6	1.2	↑
	50%	1.0	1.8	3.0	↑
	90%	1.8	3.2	4.9	↑
Mean temperature change (Winter) (°C)	10%	0.1	0.5	0.8	↑
	50%	0.9	1.6	2.4	↑
	90%	1.8	2.8	4.1	↑
Maximum temperature anomaly	10%	0.1	0.7	1.2	↑
	50%	1.2	2.2	3.2	↑

[35] UKCP18 science reports, key messages, maps and graphs uses a 20-year baseline period of 1981 – 2000 to present the projected change in climate variables.
[36] Trendline is indicative of direction of travel but is not indicative of magnitude of change or confidence in the trend. ↑ shows an increasing trend, ↓ shows a decreasing trend, ⇔ illustrates a minor change in direction of the trend.

Climate variable		Time period and projected change[35]			Trend[36]
(Summer) (°C)	90%	2.3	3.8	5.5	↑
Minimum temperature anomaly (Winter) (°C)	10%	-0.01	0.3	0.6	↑
	50%	0.8	1.5	2.3	↑
	90%	1.8	2.9	4.3	↑
Mean precipitation change (Winter) (%)	10%	-6	-5	-3	↑
	50%	4	7	13	↑
	90%	13	21	33	↑
Mean precipitation change (Summer) (%)	10%	-19	-32	-44	↓
	50%	-6	-15	-23	↓
	90%	8	0	-3	↓
1-day total winter precipitation (mm)	10%	40.7	42.0	43.3	↑
	50%	49.0	51.0	53.4	↑
	90%	60.2	63.1	67.3	↑
1-day total summer precipitation (mm)	10%	49.8	49.5	48.4	⇔ / ↓
	50%	64.2	65.3	66.6	⇔ / ↑
	90%	85.1	88.5	94.0	↑
5-day total winter precipitation (mm)	10%	84.2	85.6	86.6	↑
	50%	95.3	98.2	101.8	↑
	90%	110.4	115.9	123.9	↑
5-day total summer precipitation (mm)	10%	88.9	86.8	83.1	↓
	50%	100.4	100.9	102.1	⇔ / ↑
	90%	114.0	119.1	126.4	↑
Sea Level Rise Anomaly (m)	10%	0.05	0.13	0.23	↑
	50%	0.08	0.18	0.31	↑
	90%	0.10	0.23	0.42	↑

18.6.7 It is anticipated that there will be an **increase in mean temperatures** across all seasons but especially in the summer, for example average summer temperatures are expected to be 3°C higher than experienced during 1981-2000. The extremes are greater than the mean values, with extreme maximum temperatures increasing throughout the time periods. This is anticipated to lead to an **increased frequency**

and intensity of hot spells by the 2070s[37]. Hot spells are defined as maximum temperatures exceeding 30°C for two or more consecutive days.

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

18.6.9 There is a clear shift to drier summers across all time periods as shown by the **decrease in summer precipitation**. Despite this overall trend towards drier summers, new data from UKCP18 Local suggests future **increases in the intensity of heavy summer rainfall events**[37] and the likelihood of individual wet summers reduces only slightly[38]. This is reflected within the data for the 1-day and 5-day summer precipitation event data as it shows only slight changes across all time periods.

18.6.10 Sea level rise over the considered time periods is expected to affect tidal characteristics substantially, however there is no evidence for significant changes in future storm surges, although confidence in this is low. Extreme sea levels will increase as a result of the **rise in mean sea level**.[39]

18.6.11 Additionally, UKCP18 has found an increase in surface wind speeds over the UK for the second half of the 21st Century during the winter season, where more significant impacts of wind are experienced. It is anticipated that there will be an **increase in the frequency of storms**, however the increase in mean wind speeds is modest.[40]

18.6.12 The UKCP18 projections by the 2070s show a **significant decrease in falling and lying winter snow** of around 80-100% for the north-west of England in both local (2.2km) and regional (12km) projections.[41]

[37] Met Office (2018). UKCP18 Headline Findings (Online). Available from: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf (Accessed December 2021).
[38] Met Office (2018). UKCP18 Factsheet: Precipitation (Online). Available from: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-factsheet-precipitation.pdf (Accessed December 2021).
[39] Met Office (2018). UKCP18 Factsheet: Sea level rise and storm surge (Online). Available from: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf (Accessed December 2021).
[40]Met Office (2018). UKCP18 Factsheet: Wind (online). Available from: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind_march21.pdf (Accessed December 2021).
[41] Met Office (2108). UKCP18 Factsheet: Snow (online). Available from: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_factsheet_snow_jul-2021.pdf (Accessed December 2021).

18.7 Embedded environmental measures

18.7.1 As part of the project design process, a number of embedded environmental measures are proposed to reduce the potential for impacts on climate change vulnerability. These are preliminary and will be developed as detailed design progresses. **Table 18.8** outlines how these embedded measures have influenced the preliminary CCR assessment.

Table 18.8 Summary of embedded environmental measures

Embedded measures	Compliance mechanism
Construction phase	
The Contractor(s) will ensure that the relevant measures within the Code of Construction Practice (CoCP) (implemented by a Construction Environmental Management Plan (CEMP)) and health and safety procedures are implemented.	Development Consent Order (DCO) requirement
Construction activities will be planned through use of a Risk Assessment Method Statement (RAMS) alongside safety bulletins as part of the CoCP. The RAMS will put in place procedures in the case of extreme weather (high temperatures, extreme winds, flooding, wildfire risk). This may include altering the construction programme to delaying affected activities, changing shift patterns, Personal Protective Equipment (PPE) and toolbox talks.	CoCP secured via DCO requirement
The Flood Risk Assessment (FRA) will assess the flood risk from more frequent flooding events across the construction timeframe.	DCO requirement
A Drainage and Water Management Plan will summarise the key methods by which surface water and dewatered groundwater would be managed to avoid flood risk.	CoCP secured via DCO requirement
Operational phase	
All necessary embedded measures contained within the FRA will be incorporated into the Project such as the application of the Environment Agency's climate change allowancesError! Bookmark not defined. for flood risk and drainage design. For permanent above ground infrastructure (HAGIs and Block Valves). Where necessary, flood protection requirements for HAGIs	DCO requirement

Embedded measures	Compliance mechanism
and Block Valves will be defined in the FRA as part of the final design for the DCO application. An Outline Drainage Strategy will also be developed for all HAGIs and Block Valves for the DCO application.	
The design of the HAGIs/Block Valves will be subject to an FRA using the 1% AEP design standard for fluvial flooding, plus the Higher Central climate change allowance for the '2080s', as a minimum.	FRA
The design of the HAGIs/Block Valves will be subject to an FRA using the 1% AEP design standard for surface water flooding, plus the Higher Central climate change allowance for the '2070s', as a minimum.	FRA
The design of the HAGIs/Block Valves will be subject to an FRA using the 0.5% AEP design standard for fluvial flooding, plus the Higher Central climate change allowance up to 2095, as a minimum.	FRA

18.8 Scope of the assessment

Potential receptors

18.8.1 The receptors that are considered as part of the CCR assessment can be grouped into the following categories:

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

18.8.2 The principal receptors that have been identified as part of the CCR assessment as being potentially subject to effects are summarised in **Table 18.9**.

Table 18.9 CCR receptors subject to potential effects

Receptor	Reason for consideration
Building and infrastructure including temporary and permanent infrastructure and buildings considered individual Project assets, new and existing access roads, materials plant and equipment,	The CCR assessment considers the resilience of the Project as an amalgamation of its temporary and permanent assets. The resilience of the individual Project assets is essential to the resilience of the overall Project.

Receptor	Reason for consideration
drainage assets, third party assets where the Project is interdependent.	
Human health including site operatives during construction, operation and decommissioning of the Project.	The CCR assessment considers the effects of climate change on the Project and the resilience of the Project to these effects, including the health of the workforce required during the construction, operation and decommissioning activities of the Project.
Environmental including existing habitats and waterbodies, habitat creation and restoration areas.	The CCR assessment considers the natural environment that exists within the spatial extent of the Project as receptors that could be impacted by climate change. The Project assets include habitat creation and biodiversity planting areas as part of the operation, which are assessed in terms of their resilience to climate change to ensure their success.

Likely significant effects

18.8.3 The effects on CCR receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 18.10**.

Table 18.10 CCR receptors scoped in for further assessment

Climate Impact	Receptor	Likely significant effects	Phase
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells	Human health	Increased heat stress or heat exhaustion experienced by staff.	Construction, operation and decommissioning
	Building and infrastructure	Restriction of certain construction activities during hot weather, for example, the pouring of concrete in higher temperatures could reduce the strength and durability of the finished product, and the laying of asphalt could become difficult as it fails to maintain profile during compaction. This could cause programme delay and increased costs.	Construction and decommissioning

Climate Impact	Receptor	Likely significant effects	Phase
	Buildings and infrastructure	Overheating of Mechanical and Electrical (M&E) assets within the HAGIs/Block Valves, leading to a decrease in asset performance and/or requiring additional electricity demand for mechanical cooling units.	Operation
	Buildings and infrastructure	Increased rate of degradation of the access roads to HAGI/Block Valves, such as asphalt, increasing maintenance requirements for the road.	Operation
	The natural environment	Increased vegetation growth affecting above ground equipment and requiring increased maintenance requirements.	Operation
	Buildings and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as overheating of IT and telecommunications equipment leading to loss of HAGI/Block Valve monitoring telecommunications.	Operation
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased summer precipitation	Human health	Increased dust creation from construction activities, leading to impacts on the health of construction workers and the failure of machinery and equipment.	Construction and decommissioning
	Natural environment	Landscape and biodiversity planting could fail resulting in increased management and associated environmental costs e.g. water use.	Operation
	Buildings and infrastructure	Wildfires restricting access to HAGI/Block Valve or causing damage to the equipment.	Construction, operation and decommissioning
	Human health	Risk of wildfires affecting the operational and maintenance workforce.	Construction, operation and decommissioning

Climate Impact	Receptor	Likely significant effects	Phase
Decrease in summer precipitation, leading to drought conditions	Buildings and infrastructure	Drought conditions impacting water available through abstraction licenses to use during construction, e.g. for dust suppression and commissioning.	Construction and decommissioning
	Buildings and infrastructure	River erosion leading to exposure of pipelines and potential scour and damage.	Operation
Fluctuations in mean rainfall across the year, coupled with an increase in mean temperatures, resulting in changes to soil moisture	Buildings and infrastructure	Changes to soil moisture levels causing shrink swell within the soils, leading to deterioration of structure foundations of HAGI/Block Valve infrastructure.	Operation
	Buildings and infrastructure	Land instability causing movement of pipelines resulting in damage or failure.	Operation
Increase in precipitation resulting in tidal, fluvial or pluvial flooding	Human health	Wet weather leading to increased possibility of slips, trips and falls.	Construction, operation and decommissioning
	Building and infrastructure	Flooding of construction site access roads causing delays to construction programme.	Construction and decommissioning
	Building and infrastructure	Flooding of M&E equipment resulting in failure through flood damage and/or increased corrosion rate.	Operation
	Building and infrastructure	Increased surface water exceeding the capacity of attenuation and drainage, causing flooding across the site or elsewhere.	Construction and operation
	Buildings and infrastructure	Erosion of soils resulting in exposing or damage to the pipeline.	Operation
	Buildings and infrastructure	Access to the HAGIs/Block Valve or compound could be restricted due to flooding, restricting any emergency or routine maintenance works.	Operation and decommissioning

Climate Impact	Receptor	Likely significant effects	Phase
	Buildings and infrastructure	Increased pipeline buoyancy which can exert additional stress causing potential damage. Saline groundwater could also increase corrosion affecting asset integrity.	Operation
	The natural environment	Flooding in areas of proposed biodiversity and landscape planting resulting in failure and increased maintenance requirements.	Operation
	Buildings and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as flooding of electrical substations leading to loss of power to HAGIs/Block Valves.	Operation
Increased frequency and intensity of storm events	Building and infrastructure	There is an increased risk of disruption to construction work, such as cranes unable to operate in high winds.	Construction and decommissioning
	Buildings and infrastructure	Increased wind loading on HAGI/Block Valve infrastructure and security fencing leading to damage.	Operation
	Buildings and infrastructure	Lightning strikes on HAGI /Block Valve infrastructure, causing damage or failure.	Operation
	Buildings and infrastructure	Windblown debris causing damage to HAGI/Block Valve infrastructure.	Operation
	Buildings and infrastructure	Cascading failures due to interdependencies on third party assets could become affected by windblown debris, obstructing access to the HAGIs/Block Valves.	Operation

Elements scoped out of further assessment

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

18.9 Methodology for PEIR assessment

Introduction

18.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 3: Approach to preparing the PEIR**, and specifically in **Sections 3.7** to **3.10**. However, whilst this has informed the approach that has been used in this CCR assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this CCR assessment.

18.9.2 The EIA Scoping Report used a vulnerability assessment methodology to scope in the impacts which are likely to have significant effects. The vulnerability of the receptors was a function of their sensitivity and exposure to climate change trends. The CCR effects which were scoped in are contained within **Table 18.9** and this PEIR contains the risk assessment of these effects, taking into account the likelihood and magnitude of the consequences occurring from the impact. The assessment will conclude on the significance of any risk of future climatic conditions.

Assessment of effects and determining significance

Likelihood

18.9.3 The likelihood of the climate change impact on the receptor occurring takes into account the climate change trends (see **Section 18.6**) and the anticipated exposure of the receptor to the trend. An indicative scale used for assessing the likelihood of the climate change impact on the receptor is contained in **Table 18.11**.

Table 18.11 Indicative scale for assessing the likelihood of a climate change impact on the receptor

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

Consequence

18.9.4 The consequence if the climate change impact occurs is the magnitude of change felt by the receptor. The vulnerability of the receptor to the climate change impact is considered when assessing the consequence level by incorporating the sensitivity analysis considered during EIA Scoping. An indicative scale used for assessing the consequence of the climate change impact on the receptor is contained within **Table 18.12**.

Table 18.12 Indicative scale for assessing the consequence (magnitude of change) of a climate change impact on the receptor.

Consequence category	Consequence criteria
Catastrophic	The impact could lead to complete shutdown of operations, loss of the asset, or collapse. There could be single or multiple fatalities and significant harm to the environment with limited prospect of full recovery. Social implications could lead to community protests and high financial implications.
Major	The impact could lead to disruption to activities lasting more than 1 week. There could be major or multiple injuries which could be permanent. Environmental damage could be significant with recovery times over a year and non-compliance with regulations and consents. National and long-term social impacts could be endured. The impact would require extensive mitigation actions.
Moderate	The impact could lead to disruption to activities lasting more than 1 day but less than 1 week. There could be moderate environmental damage with wider effects and recovery of up to a year. Moderate cost and social implications which are localised yet long-term. This could lead to a serious injury requiring lost time. The impact would require emergency mitigation actions to be in place.
Minor	The impact could lead to disruption to activities lasting less than 1 day. There could be localised environmental impact within the site boundary, localised and temporary social or reputational impacts, and a minor cost implication. This could lead to a minor injury requiring medical treatment. The impact could be rectified through additional mitigation actions to be put in place.
Minimal	The impact could lead to disruption to an isolated section of activity with limited social, economic and environmental consequences. It could equate to a minor first aid case. The impact could be rectified through usual activity.

Significance of effects

18.9.5 The level of the risk of the climate change impacts on the Project is concluded in this risk assessment as a function of the likelihood and magnitude. This will identify any significant potential risks and where further mitigation and adaptation measures will be required, shown as significant effects within the matrix in **Table 18.13**.

Table 18.13 Significance of CCR effects

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

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

18.10 Preliminary assessment of CCR effects

18.10.1 A preliminary assessment of CCR effects has been undertaken for the construction, operation and decommissioning phases of the Project, as shown in **Table 18.14**, **Table 18.15** and **Table 18.16** respectively. For the identified climate change trends in **Section 18.6,** the potential climate change impacts are assessed for each receptor group considered in **Section 18.8**. Following the implementation of embedded environmental measures (see **Section 18.7**), an assessment of the likelihood and magnitude of the climate change impact is made using the methodology set out in **Section 18.9**, to conclude any likely significant effects.

Construction phase

Table 18.14 Preliminary assessment of CCR effects – construction phase

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Human health	Increased heat stress or heat exhaustion experienced by the construction workforce.	Embedded measure: The Contractor(s) will ensure that the relevant measures within the Code of Construction Practice (CoCP) (implemented by a Construction Environmental Management Plan (CEMP)) and health and safety procedures are implemented.	Unlikely	Minor	**Minor (NS)**
	Building and infrastructure	Restriction of certain construction activities during hot weather, for example, the pouring of concrete in higher temperatures could reduce the strength and durability of the finished product, and the laying of asphalt could become difficult as it fails to maintain profile during	Embedded measure: Construction activities will be planned through use of a Risk Assessment Method Statement (RAMS) alongside safety bulletins as part of the CoCP.	Very unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		compaction. This could cause programme delay and increased costs.				
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased summer precipitation.	Human health	Increased dust creation from construction activities, leading to impacts on the health of construction workers and the failure of machinery and equipment.	Embedded measure: The Contractor(s) will ensure that the relevant measures within the Code of Construction Practice (CoCP) (implemented by a Construction Environmental Management Plan (CEMP)) and health and safety procedures are implemented.	Unlikely	Minimal	**Negligible (NS)**
	Human health	Risk of wildfires affecting the construction workforce.	Embedded measure: Construction activities will be planned through use of a RAMS alongside safety bulletins as part of the CoCP.	Very unlikely	Moderate	**Minor (NS)**
Decrease in summer precipitation leading to drought conditions	Building and infrastructure	Drought conditions impacting water available through abstraction licenses to use during construction, e.g. for dust suppression and commissioning.	There will be limited requirements for abstraction during construction and some pre-commissioning water requirements, which will be specified at the detailed design stage. Any abstraction will depend on water availability and	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			consultation with key stakeholders, such as United Utilities and the Environment Agency. Specific requirements will be set out in a Drainage and Water Management Plan, subject to Local Planning Authority approval. Re-use of water will take place wherever possible e.g. treated runoff for use in activities such as dust suppression.			
Increase in precipitation resulting in tidal, fluvial or pluvial flooding.	Human health	Wet weather leading to increased possibility of slips, trips and falls.	Embedded measure: The Contractor(s) will ensure that the relevant measures within the Code of Construction Practice (CoCP) (implemented by a Construction Environmental Management Plan (CEMP)) and health and safety procedures are implemented.	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Building and infrastructure	Flooding of construction site access roads causing delays to construction programme.	The construction programme accounts for high precipitation events in which groundworks are restricted to outside of the winter months. This includes where construction access roads are liable to flood or there is no impermeable road surface to access the construction site. Embedded measure: The FRA will assess the flood risk from more frequent flooding events across the construction timeframe. Embedded measure: Construction activities will be planned through use of a RAMS alongside safety bulletins as part of the CoCP.	Unlikely	Minor	**Minor (NS)**
	Building and infrastructure	Water ingress to equipment or machinery related to construction activities or permanent assets in place during	The construction programme accounts for high precipitation events in which groundworks are restricted to outside of the winter months. This will reduce the	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		construction, leading to equipment failures or damage.	likelihood of encountering flooding of construction sites including of equipment. Weather warning systems will allow for mobile construction equipment to be moved to avoid flood damage in response to any potential flooding events.			
	Building and infrastructure	Overwhelming of the construction site drainage system causing flooding across the site.	Embedded measure: The FRA will assess the flood risk from more frequent flooding events across the construction timeframe. Embedded measure: Drainage and Water Management Plan will summarise the key methods by which surface water and dewatered groundwater will would be managed to avoid flood risk.	Possible	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased in frequency and intensity of storm events.	Building and infrastructure	There is an increased risk of disruption to construction work, such as cranes unable to operate in high winds.	Embedded measure: The Contractor(s) will ensure that the relevant measures within the Code of Construction Practice (CoCP) (implemented by a Construction Environmental Management Plan (CEMP)) and health and safety procedures are implemented.	Unlikely	Minimal	**Negligible (NS)**

Operational phase

Table 18.15 Preliminary assessment of CCR effects – operational phase

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Buildings and infrastructure	Overheating of M&E assets within the HAGI/Block Valves, leading to a decrease in asset performance and/or requiring additional electricity demand for mechanical cooling units.	The Basis of Design (BoD) sets out weather parameters, including temperature, to be used in the design of the assets that are inclusive of a range of tolerances which account for climate change. The assets will undergo routine monitoring and maintenance and, if considered to be required, the asset could be retrofitted with mechanical cooling, particularly the IT and communications equipment which are considered the most vulnerable. This incorporates adaptative capacity throughout the asset design life.	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Buildings and infrastructure	Increased rate of degradation of HAGI/Block Valves access road surface material, such as asphalt, increasing maintenance requirements for the road.	The material specification of the access roads will be to current design standards incorporating a range of tolerances accounting for climate change. The access roads will experience infrequent use associated with routine monitoring and maintenance and the routine inspections of the access roads will highlight increased degradation. Throughout the asset life, the material specification could accommodate increasing temperatures during maintenance or replacement of the road.	Unlikely	Minimal	**Negligible (NS)**
	Human health	Increased heat stress or heat exhaustion experienced by the operational and maintenance workforce.	Working procedures for operational and maintenance activities will be planned through use of a Risk Assessment Method Statement (RAMS) in line with Cadent's Management and Work Procedures, which	Unlikely	Minor	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			specify practices for hot weather. The RAMS will include mitigation for working in hot weather, including altering shift patterns. Weather warnings are issued to all workforce to help with adequate planning. As a result of climate change, works may be interrupted more frequently.			
	The natural environment	Increased vegetation growth affecting above ground equipment and requiring increased maintenance requirements.	The design of the HAGI compound and landscaping will include low-growing and low-maintenance native plant species close to the pipeline, with appropriate neutral zones where required. A Landscape Management Plan will indicate the frequency and requirements of landscape maintenance. Routine inspection will highlight where frequency of landscaping maintenance will need be revised throughout the asset life.	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Buildings and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as overheating of IT and telecommunications equipment leading to loss of HAGI monitoring telecommunications.	The monitoring and telecommunications system within the HAGI will operate with a back up. Due to the continuous recording of data, any loss of connection will be immediately identified.	Unlikely	Minimal	**Negligible (NS)**
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased summer precipitation.	The natural environment	Landscape and biodiversity planting could fail resulting in increased management and associated environmental costs e.g. water use.	The species seed mix used within the biodiversity planting will include a range of native species that are generalist species which are tolerant of broad environmental conditions. The diversity of species planted will help ensure that any gaps left by localised failures would be naturally colonised by other suitable species over the maintenance period. Shrubs and trees planted on the site will be drought tolerant native species,	Possible	Minimal	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			including trees with a low water demand, such as hawthorn. The maintenance strategy, set out in the Landscape Management Plan (LMP), will aid the success of establishment of planting by setting out measures such as watering in droughts. These mitigation measures will ensure a resilient mix of planting for the entire maintenance period.			
	Buildings and infrastructure	Wildfires restricting access to HAGI/ Block Valve or causing damage to the equipment.	The design of the compound will ensure that there are offset distances between the hydrogen equipment and any potential ignition sources. The HAGI/Block Valve equipment will be contained within compounds subject to vegetation management as part of the operational procedures and LMP. Other combustible materials will be segregated from the pipeline in line with legislative requirements. In	Very unlikely	Moderate	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			areas which may be increasingly susceptible to wildfires, such as moorland, heathland and forested areas, Cadent's working procedures for operational and maintenance activities which will set out procedures in the case of increased risk from wildfire.			
	Human health	Risk of wildfires affecting the operational and maintenance workforce.	Operational and maintenance activities will be planned through use of a Risk Assessment Method Statement (RAMS) which reflect any weather warnings to help with adequate planning, such as those for increased risk of wildfire. As a result of climate change, works may become interrupted more frequently or for prolonged periods.	Unlikely	Moderate	**Minor (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Fluctuations in mean rainfall across the year, coupled with an increase in mean temperatures, resulting in changes to soil moisture.	Buildings and infrastructure	Changes to soil moisture levels causing shrink swell within the soils, leading to deterioration of structure foundations of HAGI/Block Valve equipment.	The BoD sets out weather parameters for the design of the foundations that are inclusive of a range of tolerances which account for climate change. The civils design of the foundations and supports allow for some movement and the detailed design will conduct a stress analysis for the soil type and range of change anticipated with climate change.	Unlikely	Minimal	**Negligible (NS)**
	Buildings and infrastructure	Land instability causing movement of pipelines resulting in damage or failure.	The topography and soil type of the region in which the Project is situated are such that it is unlikely to be prone to land instability due to fluctuating soil moisture content, even with fluctuations due to climate change. The design of the pipeline takes into account some movement in soils and routine monitoring and maintenance over the asset life	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			will indicate where additional measures are required.			
Decrease in summer precipitation, leading to drought conditions.	Buildings and infrastructure	River erosion leading to exposure of pipelines and potential scour and damage.	The construction technique for the river crossings will be HDD which allows for the pipeline to have significant and sufficient ground cover below the riverbed, therefore it is very unlikely that the pipeline will become exposed during drought events.	Very unlikely	Minimal	**Negligible (NS)**
Increase in precipitation resulting in tidal, fluvial or pluvial flooding.	Human health	Wet weather leading to increased possibility of slips, trips and falls.	Operational and maintenance activities will be planned through use of a RAMS. The RAMS will include mitigation for working in wet weather, including delaying the activity. Weather warnings are issued to all workforce to help with adequate planning. As a result of climate change, works may become delayed or interrupted more frequently.	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Buildings and infrastructure	Flooding of M&E equipment within HAGIs/Block Valves resulting in failure through flood damage and/or increased corrosion rate.	Embedded measure: A preliminary Flood Risk Assessment (FRA) produced for the Project sets out how the assessment includes the Environment Agency's climate change allowances for peak river flow, peak rainfall intensity and for sea level allowances will be used to inform the design of the assets. Critical infrastructure will be designed so that the Finished Floor Level (FFL) is above an appropriate flood design level accounting for climate change. This will be developed as part of the FRA submitted with the DCO application.	Possible	Minor	**Minor (NS)**
	Buildings and infrastructure	Increased surface water exceeding the capacity of attenuation and drainage, causing	Embedded measure: A preliminary Flood Risk Assessment (FRA) produced for the Project sets out how the assessment includes the Environment Agency's climate	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		flooding across the site or elsewhere.	change allowances for peak river flow, peak rainfall intensity and for sea level allowances will be used to inform the drainage design**.** . .			
	Buildings and infrastructure	Erosion of soils resulting in exposing or damaging the pipeline.	The design of the pipeline is such that there is sufficient ground cover of the pipeline, therefore it is very unlikely that it would become exposed due to flood events. Routine monitoring and maintenance would highlight any erosion issues to allow for future maintenance planning, if required.	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
	Buildings and infrastructure	Access to the HAGI/Block Valves or compound could be restricted due to flooding, restricting any emergency or routine maintenance works.	Permanent development design has avoided areas of flood risk wherever possible. The permanent access roads to HAGIs/Block Valves will be assessed as part of the DCO FRA. Operational and maintenance activities will be planned and will undergo a RAMS. The RAMS will include mitigation for working in wet weather, including delaying the activity. Weather warnings are issued to all workforce to help with adequate planning. As a result of climate change, works may become interrupted more frequently.	Possible	Minimal	**Minor (NS)**
	Buildings and infrastructure	Increased pipeline buoyancy which can exert additional stress causing potential damage. Saline groundwater could also increase	In the event of prolonged groundwater flooding, the density of the soils covering the pipeline would counter any upward movement of the pipe owing to increased buoyancy. In soils, such as peat, where the	Unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		corrosion affecting asset integrity.	pipeline may require insulation, increasing buoyancy the design, will include engineering solutions, if required, to counter uplift effects such as ground anchors or concrete coating and will be informed by the FRA. Routine surveillance, monitoring and maintenance, such as monitoring of the pipe position and cathodic protection system, will indicate whether maintenance is required, which may increase with climate change effects on groundwater levels.			
	The natural environment	Flooding in areas of proposed biodiversity and landscape planting resulting in failure and increased maintenance requirements.	The proposed landscape and biodiversity planting, as part of the Landscape Mitigation Plan, will be placed in areas outside of the flood zones, or where this is not possible, will either be planted within an embankment or incorporate species which are tolerant of periodic inundation	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			and damp conditions. Embankment profiling will take into account water flows on slopes to ensure adequate drainage and long term stability for proposed planting.			
	Buildings and infrastructure	Risk of cascading failures due to interdependencies on third party assets such as flooding of electrical substations leading to loss of power to HAGIs.	The HAGIs will continue to operate in the event of failure of power supply due to the provision of battery power which will continue operations. Throughout the asset life, if climate change causes increasing interruption to the electricity supply, additional battery power could be installed to provide adaptive capacity.	Very unlikely	Minor	**Negligible (NS)**
Increased frequency and intensity of storm events.	Buildings and infrastructure	Increased wind loading on HAGI/Block Valve equipment and security fencing leading to damage.	The BoD sets out weather parameters, including wind, to design for the appropriate wind loading, including those associated with increasing major storms as a result of climate change. The buildings within the	Very unlikely	Minor	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			HAGIs are without large surface areas which would be susceptible to wind loading. RAMS and operational alerts will be in place to inform any planned maintenance following any storm events.			
	Buildings and infrastructure	Lightning strikes on HAGI/Block Valve equipment, causing damage or failure.	Lightning protection will be included in the design for the above ground equipment in the HAGI. Any increase in the frequency of lightning strikes as a result of climate change does not affect the efficacy of the lightning protection.	Very unlikely	Minimal	**Negligible (NS)**
	Buildings and infrastructure	Wind blown debris causing damage to HAGI/Block Valve equipment.	The above ground assets are ancillary equipment to the pipeline and therefore any direct damage from wind blown debris will be minimal to the continued operation of the pipeline. Any damage will be detected through the telecommunications system	Very unlikely	Minimal	**Negligible (NS)**

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
			and planned maintenance will occur when safe to do so.			
	Buildings and infrastructure	Cascading failures due to interdependencies on third party assets such as the National Highways could become affected by wind blown debris, obstructing access to the HAGIs.	Operational and maintenance activities will be planned through use of a RAMS where the activity can be delayed in the event of a storm affecting the region. The details of the provision of any alternative accesses will be developed during the ES.	Unlikely	Minimal	**Negligible (NS)**

Decommissioning phase

Table 18.16 Preliminary assessment of CCR effects – decommissioning phase

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells.	Human health	Increased heat stress or heat exhaustion experienced by the construction workforce.	All decommissioning activities will be planned through use of a RAMS alongside issued safety bulletins such as alerts for upcoming hot spells. The RAMS will identify measures such as altering shift patterns to cooler times of the day, additional rest breaks and Personal Protective Equipment (PPE). All staff will undergo toolbox talks regarding working in hot weather.	Possible	Minor	Minor (NS)
	Building and infrastructure	Restriction of certain decommissioning activities during hot weather, for example, the pouring of concrete in higher	All decommissioning activities will be planned through use of a RAMS alongside issued safety bulletins. The RAMS will set out measures regarding working in hot weather, such as delaying the activity where possible.	Unlikely	Minor	Minor (NS)

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
		temperatures could reduce the strength and durability of the finished product, and the laying of asphalt could become difficult as it fails to maintain profile during compaction. This could cause programme delay and increased costs.				
Increased annual mean temperatures and frequency and intensity of hot spells, coupled with decreased	Human health	Increased dust creation from decommissioning activities, leading to impacts on the health of decommissioning workers and the failure of	All decommissioning activities will be planned through use of a RAMS alongside issued safety bulletins such as working in hot and dry conditions. The RAMS will identify measures such as dust management and dampening down, alongside appropriate PPE. All staff will undergo toolbox talks	Unlikely	Minor	Minor (NS)

				Residual risk and significance		
Climate trend	**Receptor**	**Potential climate change impact**	**Proposed procedures and/or measures**	**Likelihood of Impact**	**Consequence of Impact**	**Significance**
summer precipitation.		machinery and equipment.	regarding working in dry weather. Plant and machinery will be routinely inspected.			
	Human health	Risk of wildfires affecting the decommissioning workforce.	Decommissioning activities will be planned through use of a RAMS which reflect any weather warnings to help with adequate planning, such as those for increased risk of wildfire.	Unlikely	Moderate	Minor (NS)
Decrease in summer precipitation leading to drought conditions	Building and infrastructure	Drought conditions impacting water available through abstraction licenses to use during decommissioning activities, e.g. for dust suppression.	Any abstraction will depend on water availability and consultation with key stakeholders, such as United Utilities and the Environment Agency, has taken place and specific requirements will be set out in a decommissioning Drainage and Water Management Plan, subject to Local Planning Authority approval. Re-use of water will take place wherever possible e.g.	Unlikely	Minor	Minor (NS)

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

18.11 Preliminary assessment of cumulative (inter-project) effects

18.11.1 The CCR assessment is an assessment of the resilience of the Project to projected climate change. The resilience of the Project assets is unaffected by other developments.

18.12 Preliminary significance conclusions

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

18.13 Further work to be undertaken

18.13.1 The information provided in this PEIR is preliminary, the final assessment of likely significant effects will be reported in the ES. This section describes the further work to be undertaken to support the CCR and ICCI assessment presented in the ES.

Assessment

18.13.2 Literature review will continue to be undertaken to ensure a comprehensive CCR and ICCI assessment, assessing the likelihood and consequences of climate change impacts on the receptors.

18.13.3 Further flood risk modelling for the detailed assessment of flood risk and design development work is required to address flood risk issues identified at some locations and demonstrate policy compliant drainage strategies for all permanent infrastructure. The siting of permanent infrastructure and construction activities will also be subject to further review to remove locations from significant areas of flood risk, wherever possible.

18.13.4 The assessment of significance of effects will continue, especially for the ICCI assessment where further surveys and assessments as part of other topics will inform of the potential impacts and identify where incorporating environmental measures is required. This will be reported in the ES.

Environmental measures

18.13.5 As the design progresses, further environmental measures to improve the resilience of the Project will be explored and implemented with the design team, taking into account available literature and standards.

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