South East Strategic Reservoir Option

Preliminary Environmental Information Report

# Chapter 18 - Climate resilience

Date: October 2025

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# 18 Climate resilience

## 18.1 Introduction

18.1.1 This chapter of the Preliminary Environmental Information (PEI) Report provides the preliminary assessment of likely significant effects on climate resilience from the construction and operation of the proposed SESRO Project (the Project, as detailed in Chapter 2: Project description).

18.1.2 Within this chapter, aspect-specific sections are included on:

- Legislation, policy and guidance (Section 18.2)
- Consultation, engagement and scoping (Section 18.3)
- Assessment methodology (Section 18.4)
- Study area (Section 18.5)
- Baseline conditions (Section 18.6)
- Project parameters, assumptions and limitations (Section 18.7)
- Embedded design mitigation and standard good practice (Section 18.8)
- Preliminary assessment of likely effects - CCR (Section 18.9)
- Preliminary assessment of likely effects - ICCI (Section 18.10), and
- Next steps (Section 18.11)

18.1.3 This chapter reports the following assessments:

- Climate Change Risk (CCR) assessment: which considers the effects of climate change on the construction and operation of the Project.
- In-combination Climate Change Impact (ICCI) assessment: which considers the potential for climate change to alter construction and operation related effects on environmental receptors.

18.1.4 This chapter should be read in conjunction with Chapter 2: Project description and aspect Chapters 5 – 17 and 19, in particular:

- Chapter 5: Water environment - which considers current and future flood risk and its implications for the Project during construction and operation and provides details of mitigation measures proposed in relation to flood risk.
- Chapter 12: Traffic and transport – which considers the risks related to potential frost and fog micro-climate effects.
- Chapter 19: Major accidents and disasters – which provides commentary on the legislation and regulatory context for project-wide risk management which also forms the basis of the CCR assessment.

18.1.5 This chapter is supported by the following figures and appendices:

- Figure 18.1: Study area and UK climate projections 2018 (UKCP18) probabilistic data grid squares
- Figure 18.2: Study area and UKCP18 regional data grid squares
- Appendix 18.1: Technical note on observed and projected climate data
- Appendix 18.2: Climate change risk assessment

- Appendix 18.3: In-combination Climate Change Impact Assessment

18.1.6 This PEI Report does not constitute a draft Environmental Statement (ES). Assessments reported within this PEI Report chapter are considered a reasonable 'worst case' as a precautionary approach has been taken where design, construction or baseline information is being developed. Nevertheless, the preliminary assessment is considered sufficiently robust to enable consultees to understand the likely significant environmental effects of the Project, based on current design information and understanding of the baseline environment. Gaps in information identified within the PEI Report will be considered and addressed as part of the assessment during the production of the ES, as noted in Section 18.11: Next steps.

18.1.7 Where initial likely significant effects are identified at this stage, these may ultimately be determined as not significant in the ES once data gaps are addressed and the design and mitigation are further developed. The ES will be submitted with the Development Consent Order (DCO) application and will provide the final assessment of likely significant effects; this will be informed by the ongoing Environmental Impact Assessment (EIA) process and ongoing consultation and engagement.

## 18.2 Legislation, policy and guidance

18.2.1 Table 18.1 lists the legislation, policy and guidance relevant to climate resilience for the Project and specifies where in the PEI Report information is provided in relation to these. A full policy compliance assessment will be presented within the Planning Statement as part of the DCO application.

18.2.2 National Policy Statements (NPS) form the principal policy for developments progressing through the Planning Act 2008 process. The NPS for Water Resources Infrastructure (NPSWRI) is the primary NPS for the Project. In addition, the Secretary of State must also have regard to any other matters which they think are both important and relevant to the decision and this could include regional and local planning policies.

18.2.3 The Project is located mainly within the Vale of White Horse District, with the exception of the far eastern extent on the eastern bank of the River Thames, which falls within the South Oxfordshire District. The Project is wholly within the county of Oxfordshire. The regional and local planning policies most relevant to the assessment within this chapter are included in Table 18.1.

Table 18.1 Relevant legislation, policy and guidance for climate resilience

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| **Legislation** | | |
| **Infrastructure Planning (Environmental Impact Assessment) Regulations 2017**<br>These regulations contain the requirements for the assessment of the effects of | The EIA has scoped in assessment of significant effects relating to climate change. | An assessment of the likely effects of climate change on the Project is included within Section 18.9: Preliminary assessment of likely effects - |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| certain public and private projects on the environment to ensure that the environmental impacts are thoroughly assessed and considered before development consent is granted.<br>Schedule 4 paragraph 5(f) requires developers to include information within Environmental Statements on the likely significant effects of the development on the environment resulting from the vulnerability of the project to climate change | | CCR of this chapter (CCR assessment). |
| Climate Change Act 2008<br>This Act makes it the duty of the Secretary of State to reduce net greenhouse gas emissions to avoid dangerous climate change and make provision about adaptation to climate change.<br>Section 56 commits the Secretary of State to assess the risks to the United Kingdom of the current and predicted impact of climate change. The Act legally requires HM Government to produce a 5 yearly Climate Change Risk Assessment (CCRA), with CCRA3 (2022) presenting the UK's most recent CCRA, and its adaptation plans to address those risk (the UK's third National Adaptation Programme (NAP3) (2023)). (2023)). | National-level risks identified in CCRA3 (2022) were referenced to inform the Project-specific CCR assessment where relevant. | The Project CCR assessment is presented in Section 18.9: Preliminary assessment of likely effects - CCR of this chapter. |
| National Policy Statement for Water Resources Infrastructure (NPSWRI) | | |
| NPSWRI Section 3.2:<br>Paragraphs 3.2.2, 3.7.4 – The effects of climate change must | The assessment has scoped in consideration for the likely significant effects to the Project | The assessment of the likely effects of climate change on the Project is included within |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| be considered at design, build and operational stages of the Project. | in relation to climate change risks (CCRs), and the likely significant effects of the Project in relation to in-combination climate change impacts (ICCIs). | Section 18.9: Preliminary assessment of likely effects - CCR and 18.10: Preliminary assessment of likely effects - ICCI of this chapter (CCR assessment and ICCI assessment). |
| NPSWRI Section 3.2: Paragraph 3.2.2 – The effects of climate change must be considered when planning the location of the Project and, where appropriate, decommissioning of projects. | The Applicant's approach to consideration of alternative sites is summarised in this PEI Report, drawing on information from Thames Water's Water Resources Management Plan 2024 (WRMP24).<br>Decommissioning has been scoped out of the EIA, as the Project is planned to be operated indefinitely. This was agreed via the Scoping Opinion prepared by PINS. | Chapter 3: Assessment of alternatives provides the rationale for selection of the Site.<br>The WRMP24 reports how Thames Water will secure long-term water supply to its customers, accounting for future trends including climate change (Thames Water, 2024a). To develop WRMP24, many supply-side options were considered, including different reservoir locations (Thames Water, 2024b). SESRO was adopted as a new water source within the final WRMP24, as informed by water resources modelling which accounted for climate change. |
| NPSWRI Section 3.7 and 4.7: Paragraphs 3.7.5, 4.7.18 – Consideration must be given to relevant policy in the National Planning Policy Framework (NPPF) and supporting guidance, including the latest UK planning practice guidance on climate change allowances, when identifying the range of potential effects of climate change and appropriate mitigation or adaptation measures. | The CCR assessment applies the NPPF and latest UK planning practice guidance on climate change to define the scope, covering the range of climate effects. This includes the application of climate change allowances in flood risk modelling (see Chapter 5: Water environment), and the design of appropriate climate adaptation measures for SESRO. | This table (Table 18.1) includes a summary of the relevant policy and guidance documents that have been considered in the development of the CCR assessment and identification of appropriate mitigation or adaptation measures. |
| NPSWRI Section 3.7 and 4.7: Paragraphs 3.7.5, 4.7.18 – The assessment of the effects of | The temporal context of the CCR and ICCI assessments align with the timescales | Temporal scope of the Project is as described in paragraph 18.4.12 of this chapter. |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| climate change on the Project should cover the estimated lifetime of the new infrastructure. | available for the appropriate climate projections data in the UK which have been utilised for this assessment. | Chapter 2: Project description states that the Project is planned to be operated indefinitely, with design life provided for certain components. |
| NPSWRI Section 3.7: Paragraphs 3.7.6 – Where water resources infrastructure includes safety critical elements (SCE), the applicant should apply the high emissions scenario at different probability levels. The use of credible maximum allowances (H++) emissions scenarios should also be applied where there is potential for extremely negative consequences under high impact scenarios. | The assessment of climate change effects has adopted the latest UK Climate Projections (UKCP18) to inform the CCR and ICCI assessments. | Table 18.4, within Section 18.6: Baseline conditions of this chapter, provides details on climate projection data used in the assessment.<br>The consideration of climate change effects on Project SCEs will be undertaken during the preparation of the Environmental Statement, and will align with the requirements of NPSWRI 3.7.6. |
| NPSWRI Section 3.7 and 4.7: Paragraphs 3.7.7, 4.7.18 – The applicant should consider the potential effects of climate change and any adaptation measures, drawing on the following sources of information:<br>• latest UK Climate Change Risk Assessment,<br>• the latest set of UK Climate Projections,<br>• consultation with statutory bodies. | The EIA has scoped in the effects of climate change (projected changes in temperature, dry periods, precipitation, flooding and extreme events). | The assessment of the likely significant effects of climate change on the Project has been included within Section 18.9: Preliminary assessment of likely effects - CCR of this chapter (CCR assessment).<br><br>The latest set of UK Climate Projections utilised in this assessment is described in Table 18.4 within Section 18.6: Baseline conditions of this chapter.<br><br>Section 18.3: Consultation, engagement and scoping provides an overview of engagement with key stakeholders as part of undertaking this assessment. |
| NPSWRI Section 3.7: Paragraph 3.7.7 – Any adaptation measures must themselves also be assessed and should set out how and | The assessment includes adaptation measures embedded within the design to address CCRs. Any additional mitigation measures identified | Section 18.8: Embedded design mitigation and standard good practice describes the embedded design mitigation and standard good practice. |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| where such measures are proposed to be secured. | in response to ICCI would be captured through the ICCI assessment process, with consideration of their effectiveness and significance aligned with EIA methodologies. | |
| Other national policy | | |
| MHCLG National Planning Policy Framework (2024). This document sets out the government's planning policies for England and how these are expected to be applied. Section 14, paragraph 163 outlines the need to mitigate and adapt to climate change and should be considered in preparing and assessing planning applications, taking into account the full range of potential climate change effects. | The Climate resilience assessments address the policy with respect to supporting the adaptation of the Project to climate change through iterative assessment and design. They consider the appropriate range of potential climate change impacts, first scoping the range of climate hazards and then assessing CCRs, and the likely significant effects of the Project in relation to ICCIs. | Section 18.4: Assessment methodology of this chapter describes the approach to identifying the relevant range of likely significant effects of climate change on the Project. Paragraph 18.4.6 of this chapter provides a summary of the relevant range of climate change hazards associated with this Project. |
| MHCLG National Planning Policy Framework (2024), Section 14, paragraph 164 outlines that new developments should be planned in a way to avoid increased vulnerability to the range of effects arising from climate change. It also outlines that when new developments are brought forward in areas which are vulnerable, risks should be managed through suitable adaptation measures. | The CCR assessment methodology considers the likelihood of a climate hazard resulting in realised risk to the Project and the vulnerability of the component being assessed. The assessment includes information on design measures that reduce vulnerability to a range of climate-related risks. These include risks to Project infrastructure as well as potential effects on environmental receptors, as identified through the CCR and ICCI assessments. | An assessment of the likely effects of climate change on the Project is included within Section 18.9: Preliminary assessment of likely effects - CCR of this chapter (CCR assessment). As set out in Section 18.4: Assessment methodology of this chapter Section 18.8: Embedded design mitigation and standard good practice also includes information on embedded design mitigation measures aimed at reducing vulnerability to a range of climate-related risks. |
| MHCLG Climate Change Planning Practice Guidance (2019) Advises how to design suitable mitigation and adaptation measures in the | Where feasible, the assessment accommodates the policy aspirations listed when identifying mitigation measures for the CCRs. | Section 18.8: Embedded design mitigation and standard good practice includes information on the mitigation measures identified. |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| planning process to address the impacts of climate change.<br>The guidance outlines that climate change adaptation should be designed to consider the following factors:<br>• Look for opportunities to integrate adaptation and mitigation approaches for 'win-win' solutions,<br>• Be aware of and avoid the risk of maladaptation,<br>• Identify no or low cost responses that deliver other benefits,<br>• Build in flexibility to allow future adaptation if it is needed,<br>• Consider potential vulnerability of a development to climate change risk over its whole lifetime. | | |
| Regional and local policy | | |
| Vale of White Horse District Council Local Plan 2031 Part 1<br>Sets out the spatial strategy and strategic policies for the district to deliver sustainable development.<br>Core Policy 37: Design and Local Distinctiveness - All proposals for new development should require high quality design that is resilient to climate change by taking into account landform, layout, building orientation, massing and landscaping to mitigate water run-off and flood risks. | Where feasible, the assessment accommodates the policy aspirations listed when designing mitigation measures for the identified CCRs. | Section18.8: Embedded design mitigation and standard good practice includes information on the mitigation measures identified. |
| Vale of White Horse District Council Local Plan 2031 Part 1<br>Core Policy 40: Sustainable Design and Construction - New developments should | Where feasible, the assessment accommodates the policy aspirations listed when designing mitigation measures for the identified CCRs. | Section18.8: Embedded design mitigation and standard good practice includes information on the mitigation measures identified. |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| incorporate climate change adaptation and design measures to combat the effects of changing weather patterns in all new development (e.g. cool building materials, green roof and walls, flood resistant materials, natural ventilation, building positioning). | | |
| South Oxfordshire Local Plan (2035)<br>Sets out the future for development in South Oxfordshire up to 2035.<br>Policy DES8: Promoting Sustainable Design - All new development should be designed to improve resilience to the anticipated effects of climate change (including increasing temperatures and wind speeds, heavy rainfall and snowfall events and the need for water conservation and storage) incorporating adaptation measures that address issues. | The CCR assessment outlines how the Project has been designed to be resilient to the effects of climate change. | Section 18.4: Assessment methodology of this chapter describes the approach to identifying the relevant range of likely significant effects of climate change on the Project.<br>Section18.8: Embedded design mitigation and standard good practice also includes information on the mitigation measures identified. |
| South Oxfordshire and Vale of White Horse District Councils, Emerging Joint Local Plan 2041<br>The Emerging Local Plan will guide the kinds of new housing and jobs needed and where they should go, informing planning application decisions for the two districts. It contains developing planning policies that help address the climate emergency, restore nature, and meet the needs of residents.<br>Policy CE1: Sustainable design and construction - All new development should be designed to improve resilience to the range of anticipated | The CCR assessment considers how resilient the Project is to climate change and any residual risks. | Section 18.4: Assessment methodology of this chapter describes the approach to identifying the relevant range of likely significant effects of climate change on the Project.<br>Section 18.8: Embedded design mitigation and standard good practice includes information on the mitigation measures identified.<br>Chapter 5: Water environment of this PEI Report provides details of mitigation measures proposed in relation to flood risk during construction and operation. |

| Legislation, policy or guidance description | Relevance to assessment | Where in the PEI Report is information provided to address this |
|---|---|---|
| effects of climate change. It outlines that new developments must reduce the risk of flooding, complete an overheating assessment, design buildings in line with the building's hierarchy. | | |
| Guidance | | |
| **Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020)** provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process. | The assessment methodology has been developed in alignment with this guidance framework. | The assessment methodology is outlined in Section 18.4: Assessment methodology of this chapter. |
| **Oxfordshire County Council (2024) Current and future climate risk and vulnerability and health impacts assessment in Oxfordshire** provides an overview of the current and future risks posed by climate-related hazards within Oxfordshire. | This report is a relevant source of information that informed the development of the Project CCR assessment. | The Project CCR assessment is presented in Section 18.9: Preliminary assessment of likely effects - CCR of this chapter. |
| **Oxfordshire County Council (2025) Climate Change Adaptation Route Map for Oxfordshire 2025-2030** outlines a series of adaptation actions that can be implemented across Oxfordshire. | This report is a key document for setting the wider Oxfordshire level context relating to identification and implementation of adaptation measures for this Project. | Section 18.8: Embedded design mitigation and standard good practice includes information on the mitigation measures identified. |
| **Thames Water (2024) Climate Change Adaptation Report** outlines the ways in which Thames Water is at risk from the changing climate, and how these risks are being managed. | This report is a useful source for understanding how Thames Water's existing assets are at-risk from the impacts of climate change, to inform the CCR assessment. | The Project CCR assessment is presented in Section 18.9: Preliminary assessment of likely effects - CCR of this chapter. |

## 18.3 Consultation, engagement and scoping

18.3.1 Feedback from consultation and engagement is used to define the assessment approach and to ensure that appropriate baseline information is used. Feedback is also used to drive the design of the Project to avoid, prevent and reduce any likely significant environmental effects. In particular, feedback from key stakeholders has informed the Project's proposed mitigation measures. Specific mitigation measures relevant to the Climate resilience assessments are summarised in Section 18.8: Embedded design mitigation and standard good practice of this chapter. Engagement is ongoing and will continue to inform the EIA and design process.

### Scoping Opinion

18.3.2 The EIA Scoping Report (Thames Water, 2024c) was issued to the Planning Inspectorate (PINS) on 28 August 2024. PINS provided its EIA Scoping Opinion (The Planning Inspectorate, 2024) on 8 October 2024, which included feedback from consultation bodies that it formally consulted.

18.3.3 Table 18.2 captures the key Scoping Opinion comments received from PINS and other key comments received from consultation bodies relevant to the Climate resilience assessment, along with the Applicant's response to these at this stage of the assessment. Key activities to inform the final assessment that will be undertaken between the PEI Report and ES are covered in Section 18.11: Next steps. The full consultee comments on the EIA Scoping Report and responses to these will be provided in the ES.

Table 18.2 Key Scoping feedback for climate resilience

| Stakeholder | Scoping comment | Applicant response |
|---|---|---|
| Planning Inspectorate<br><br>Environment Agency | 3.11.1 & 3.11.3 '*The Applicant proposes to scope out this matter* [vulnerability to climate change – construction] *on the basis that projected changes over the short term would be minimal and controlled through appropriate construction mitigation and management plans. The Inspectorate considers that there is presently not sufficient evidence to support this and does not agree to scope this matter out. The ES should assess vulnerability to climate change during construction where significant effects are likely to occur.*'<br><br>'*Impacts during the construction phase are scoped out because changes over the short term are expected to [be] minimal and appropriate construction management plans would be in place. We do not support this approach and advise it should be scoped in. The construction* | The vulnerability of SESRO to climate change during construction has been assessed within the CCR assessment and reported within Section 18.9: Preliminary assessment of likely effects - CCR of this chapter.<br><br>The Flood Risk Assessment for the construction phase will consider the impacts of future climate change on peak flows. The CCR assessment will make use of the results of the Flood Risk Assessment to consider the climate change risks to the Project during construction. The approach to the assessment will be discussed and agreed with the EA. The results will be presented in the ES. |

| Stakeholder | Scoping comment | Applicant response |
| --- | --- | --- |
| | *phase will be considered 2030 to 2040. With respect to peak fluvial flows, this falls within the 2020's epoch. The 2020's epoch Central and Higher Central fluvial peak flow uplifts for the Gloucestershire and the Vale management catchment are 11% and 17% respectively. These are not insignificant changes in potential peak flows for watercourses within the developable area. The impact of climate change on peak flows during the construction phase should be scoped into the assessment. This would help to ensure that any construction compounds, materials, and temporary construction infrastructure are sensibly placed, and any potential impacts can be properly assessed.'* | |
| Planning Inspectorate | 3.11.2 *'The Applicant proposes to scope out this matter* [vulnerability to wind – operation] *on the basis that projected changes in wind speed would be relatively small and potential impacts can be addressed through the proposed design measures. On this basis, the Inspectorate agrees to scope this matter out.'* | Projected changes in wind speed during operation have been scoped out as agreed, on the basis that the projected changes in wind speed would be relatively small and potential impacts can be addressed through the proposed design measures. |
| Environment Agency | *'In combination assessment has also only been scoped in for operation but this environmental aspect should also be scoped in for construction.'* | The ICCI assessment covers the construction phase and is reported within Section 18.10: Preliminary assessment of likely effects - ICCI of this chapter. |
| Environment Agency<br><br>Oxfordshire County Council<br><br>Abingdon Town Council<br><br>Marcham Parish Council | The Environment Agency and Oxfordshire County Council both commented that projected changes in wind speed and microclimate effects (potential changes to local temperatures and winds) should be scoped into the operational period.<br><br>'[…] *as a reservoir ten times the size of the current Farmoor Reservoir Abingdon Town Council believes this [microclimate effects] should be scoped in'* | The assessment is aligned with the EIA Scoping Opinion:<br>1. To scope out the vulnerability of the Project to climate change due to projected changes in wind speed during operation. (Refer to PINS 3.11.2)<br>2. To scope out micro-climate effects (potential changes to local temperature and wind) on the basis that significant effects are unlikely.<br>3. To scope out micro-climate effects (frost and fog) during |

| Stakeholder | Scoping comment | Applicant response |
|---|---|---|
| | *'The effects of microclimate changes owing to the presence and influence of a large water body on receptors and local ecosystems should be thoroughly investigated, given the number of existing houses to the north and elsewhere, plus the proposed numbers of housing referred to the emerging Local Plan.'* | construction on the basis that significant effects are unlikely.<br>The potential microclimate effects related to frost and fog during operation are considered in Chapter 12: Traffic and transport. |

### Non-statutory public consultation

18.3.4 Non-statutory public consultation on the emerging proposals for the Project was undertaken with stakeholders and local communities in Summer 2024. Formal responses to this non-statutory consultation feedback have been provided within the 'Statement of Response' (Thames Water, 2025). Any feedback relevant to the Climate resilience assessment has been taken into account where appropriate.

### Ongoing engagement

18.3.5 This section summarises the ongoing technical engagement for climate resilience with key stakeholders since EIA scoping. To date, direct engagement with stakeholders for climate resilience has not taken place.

18.3.6 The Water environment aspect technical engagement includes climate change, see Table 18.3 (and Table 5.3) which provides a summary of the ongoing technical engagement for climate resilience, including the issues raised and outcomes for the assessment.

Table 18.3 Key ongoing engagement for climate resilience

| Stakeholder | Topics | Outcome |
|---|---|---|
| Environment Agency/ Oxfordshire County Council/ Vale of White Horse District Council – Flood Risk Technical Liaison Group (TLG) | Ongoing discussion regarding climate change allowances for flood risk assessment | Ongoing |

## 18.4 Assessment methodology

18.4.1 This section outlines the methodology followed to assess the likely significant effects to the Project in relation to climate change risks (CCRs), and the likely significant effects of the Project in relation to in-combination climate impacts (ICCIs) including:

- Effects scoped in to the assessment
- Study area
- Criteria for determining likely significant effects
- Assessment of cumulative effects

18.4.2 Any further data collection or site surveys, studies, modelling, or additional assessments that are still to be undertaken to inform the ES are set out in Section 18.11: Next steps.

18.4.3 The project-wide approach to the assessment methodology is set out in Chapter 4: Approach to environmental assessment. The assessment methodology followed for the Climate resilience aspect enables an evaluation of whether the Project is suitably managing the effects associated with a changing climate. The method was shaped by the approach set out in the EIA Scoping Report (Thames Water, 2024c) and informed by the Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020).

### Scope of the assessment

18.4.4 The scope of the assessment has been informed by the EIA Scoping process, including the EIA Scoping Report (Thames Water, 2024) and Scoping Opinion (The Planning Inspectorate, 2024), combined with subsequent changes to the Project design and an enhanced understanding of the baseline environment.

18.4.5 Matters that have been scoped out of the Climate resilience assessment are documented within Appendix 4.1: Matters scoped out of the EIA, along with justification for this scoping approach. In summary, matters scoped out are:

- Construction effects of micro-climate – potential changes to frost and fog
- Construction and operational effects of vulnerability to climate change – projected changes in wind speed
- Construction and operation effects of micro-climate – potential changes to local temperatures, and winds

18.4.6 Effects that are scoped in for the Climate resilience assessments relevant to the **construction phase** are:

- **Climate change risks (CCRs)**: the effects of climate change on the construction of the Project.
  - The effects of climate change are those associated with projected changes in temperature, dry periods, precipitation, flooding and extreme events. Together these are referred to as ‘climate change hazards’.
  - The construction of the Project covers, but is not limited to, the working areas, compounds, the workforce, plant and machinery and any partially constructed infrastructure or temporary works. Within the first stage of the CCR assessment, each of these aspects of the Project (e.g. working areas, workforce) are examined, creating a list of Project ‘components’.
  - The effect of the Project on flood risk during construction is addressed within Chapter 5: Water environment.
- **In-combination climate change impacts (ICCIs)**: how climate-related changes have the potential to alter construction-related impacts on environmental receptors.

18.4.7 For clarity, while the magnitude of climate change impacts during the construction phase is anticipated to be smaller compared to the longer-term changes during operation, the Planning Inspectorate has emphasised in its Scoping Opinion that potential climate change effects during construction must also be considered.

18.4.8 Effects that are scoped in for the Climate resilience assessments relevant to the **operation phase** are:

- **CCRs:** the effects of climate change on the operation of the Project.
  - The effects of climate change during operation phase are those associated with projected changes in temperature, dry periods, precipitation, flooding and extreme events. Together these are referred to as 'climate change hazards'.
  - The operation of the Project covers, but is not limited to, the reservoir and embankments, pumping station, conveyance tunnels, other channels and pipelines, Thames to Southern Transfer (T2ST) water treatment works (WTW), access roads, public access areas and public education and recreation facilities, landscaping/habitats and the workforce. Within the first stage of the CCR assessment, each of these aspects of the Project (e.g. embankments, tunnels) are examined, creating a list of Project 'components'.
  - The effect of the Project on flood risk during operation is addressed within Chapter 5: Water environment.
- **ICCIs**: how climate-related changes have the potential to alter operation-related impacts on environmental receptors.

18.4.9 The potential local micro-climate changes to frost and fog as a result of the Project is to be explored in relation to traffic accidents in the Traffic and transport assessment at the request of highways consultees. This is reported in Chapter 12: Traffic and transport.

### Study area

18.4.10 The receptor for the CCR assessment encompasses the full breadth of the Project, including but not limited to the construction and operation of surface and below-ground infrastructure, buildings, landscaping/habitats and the workforce. As such, the approach to defining the study area for the CCR assessment aligns with that taken for defining the draft Order limits for the Project. It also includes any additional land that may be temporarily required to facilitate construction activities. The draft Order limits are illustrated in Figure 1.2: Draft Order limits of the PEI Report.

18.4.11 The receptors covered in the ICCI assessment are the environmental receptors that could be affected by the Project, as defined within each aspect chapter. Therefore, the study area of ICCI assessment will align with that adopted by each aspect.

#### *Temporal scope*

18.4.12 The temporal context of the CCR and ICCI assessments aligns with the climate projections for the UK presented in paragraphs 18.4.13 and 18.4.18which inform the assessments during construction and operation phases.

## Methodology

### *Baseline*

#### Data collection

18.4.13 Baseline data collection has been undertaken to obtain information over the study area. The baseline for climate resilience is informed by available climate observations, using data from the sources set out in Section 18.6: Baseline conditions.

18.4.14 The ICCI assessment also draws on environmental baseline data collated for other aspects, to consider how climate change may exacerbate effects across all other environmental aspects.

#### Site surveys

18.4.15 Baseline data collection for the Climate resilience assessments is desk-based, as site surveys are not necessary. As such, no surveys specific to the Climate resilience assessments have informed the PEI Report.

#### Future baseline

18.4.16 The future baseline of the Climate resilience assessments considers the impacts of climate change over future time periods.

18.4.17 Projected climate variables for selected time periods are obtained from the Met Office's UK Climate Projections 2018, UKCP18 (Met Office, 2018), which are the most recent and comprehensive climate change projections for the UK. The UKCP18 data is provided in spatially gridded squares; the Climate resilience assessments uses data from the grid squares which cover the draft Order limits.

18.4.18 Representative Concentration Pathways (RCPs) are climate change scenarios based on future atmospheric greenhouse gases concentrations that cause radiative forcing. For example, RCP8.5 (the highest scenario available from UKCP18) is the scenario associated with a radiative forcing of 8.5 watts per square metre ($W\ m^{-2}$). RCP8.5 represents a future climate in which the global mean temperature is projected to exceed 4 degrees (°C) by 2100 when compared to the pre-industrial period.

18.4.19 In line with guidance from the Institute of Environmental Management and Assessment (IEMA, 2020), the high-emissions scenario RCP8.5 has been applied to assess potential future changes in key climate variables within the draft Order limits.

18.4.20 Two of the UKCP18 products are used to inform the future baseline conditions, as summarised in Table 18.4. Climate variable data is primarily presented for the 50th percentile values, supported by the $10^{th}$ and $90^{th}$ percentile values to represent climate model uncertainty. Further information on climate projection data is provided in Appendix 18.1: Technical note on observed and projected climate data.

Table 18.4 Future climate change data sources used to inform future baseline conditions.

| Source | Description | Purpose |
|---|---|---|
| UKCP18 Probabilistic Projections | Future monthly/seasonal/annual | The UKCP18 Probabilistic Projection data provide headline climate change trends for various emissions scenarios, including RCP8.5. Given the |

| Source | Description | Purpose |
|---|---|---|
| | climate change factors derived from 3,000 model samples. | large number of model samples, the Probabilistic Projections are useful for showing a wider range of uncertainty than other UKCP18 products. |
| UKCP18 Regional Projections | Future climate change data provided in daily and monthly timeseries format. Derived from a 12-member ensemble of climate simulations. | The UKCP18 Regional Projection data provides temporally and spatially coherent future climate projections for the RCP8.5 emissions scenario. The timeseries format enables greater analysis than is possible with the Probabilistic Projections; for example, the frequency and duration of climate events can be identified, as well as the annual average exceedance of set thresholds (e.g. number of days with a maximum temperature above 35°C). |
| UK Climate Risk Indicators (UK-CRI) | Future climate change data provided summarised for 30-year timeslices. Produced as part of the UK Climate Resilience Programme, this data is derived from UKCP18 Regional Projections, and based on the change from HadUK-Grid observed data (1981-2010). Note this baseline period is different to that used for other climate datasets, due to data availability. | The UK Climate Risk Indicators (UK-CRI) provide sector-relevant indicator data. Two indicators were adopted in the future baseline as follows:<br>• Heat stress: to consider the climate change and extreme heat impact to the health and safety of workers and visitors<br>• Wildfire: to consider the impact of climate change to site-wide wildfire risk (when weather conditions are favourable for wildfire to spread or intensify were there an ignition). |

18.4.21 Climate data have been accessed for two future time periods to inform the future baseline with respect to climate resilience:

- Near-future climate scenario data for the time horizon 2021-2040 covering the expected construction phase.
- Longer-term future climate scenario data covering the expected operational phase. Data is available for the time horizons including 2061-2080 (UKCP18 Regional Projections) and 2080-2099 (UKCP18 Probabilistic Projections).

18.4.22 Where UKCP18 Probabilistic Projection data is used, data is extracted for the grid square that includes the draft Order limits (centred on E 437500, N 187500 – presented in Figure 18.1: Study area and UKCP18 probabilistic data grid squares). The UKCP18 Regional Projection data is extracted for the four 12-kilometre (km) grid squares that encompass the SESRO draft Order limits (see Figure 18.2: Study area and UKCP18 regional data grid squares). The four grid square values have been averaged for each climate variable.

18.4.23 The ICCI assessment has been informed by the future baseline conditions established by other environmental aspects, ensuring consistency across assessments. Where relevant, climate change projections were incorporated to evaluate how future conditions may alter the significance of identified effects.

18.4.24 In addition, the future baseline for the ICCI assessment includes any relevant other developments expected to be operational prior to, or during, the construction and operation of the Project. Refer to Chapter 20: Cumulative effects for the methodology used to prepare the list of other developments relevant to the future baseline.

### *Criteria for the assessment of significance*

### Climate change risks (CCR)

18.4.25 The CCR assessment adopts a structured, five-stage process to identify, evaluate, and mitigate the potential effects of climate change on the Project. This methodology ensures that climate risks are comprehensively assessed and effectively managed. The method aligns with the approach set out in IEMA (2020). The five stages to undertaking the CCR assessment are:

- Stage 1: Identify climate change risks facing the Project
- Stage 2: Evaluate the consequence of each climate change risk
- Stage 3: Assess the likelihood of each climate change risk's occurrence
- Stage 4: Determine the significance of effect resulting from the climate change risk
- Stage 5: Identify additional mitigation for any likely significant adverse effects and reassess

18.4.26 The following sub-sections outline the five CCR assessment stages in more detail.

#### Stage 1: Identify climate change risks facing the Project

18.4.27 The first stage involves identifying the ways in which climate change could affect temperature, dry periods, precipitation, flooding and extreme events (together referred to as 'climate change hazards') to which the geographic location of the Project is exposed.

18.4.28 Additionally, a process of defining the Project in terms of components exposed to the climate change hazards is undertaken. Engagement with engineering and design leads helped to confirm the Project components.

18.4.29 Each climate change hazard is screened against each project component to identify potential climate change risks. Climate change risks are defined using a 'source-pathway-receptor-effect' approach. Climate change hazards are considered to be the source of risks, and project components are the receptors. Collaboration with technical specialists across the construction, design and engineering teams identified each risk pathway (i.e. the way in which a climate change hazard could affect a receptor, such as a failure mechanism) and effects (the resultant impact to the Project). This engagement also covered how climate resilience mitigation has been embedded within design, in accordance with relevant codes and standards, along with standard good practice. The identified mitigation informed the initial assessment of climate change risks' consequence and/or likelihood ratings.

#### Stage 2: Evaluate the consequence of climate change risks

18.4.30 The approach used to assess the consequence of climate change risks considers how the risk could affect the Project, by causing disruption, and/or an adverse health and safety impact, and/or damage.

18.4.31 Table 18.5 provides further detail on the criteria for establishing the consequence of climate change risks across the construction and operation phases. Where the consequence of climate change risks is assessed using more than one category, the highest (greater consequence) rating is taken forward into the significance assessment.

Table 18.5 Criteria for establishing the consequence of climate change risks

| Consequence rating | Consequence category | | |
|---|---|---|---|
| | Disruption | Health and safety | Damage |
| Negligible | Disruption to site is negligible causing no disruption in function and usability. | Minor harm or near miss – no adverse human health effects or complaints. | Negligible damage to the Project's assets. |
| Low | Partial site-wide disruption/loss of function and usability lasting less than one day. | Lost time injury or medical treatment, short-term impact on people affected. | No permanent damage. Some restoration work required. |
| Moderate | Partial site-wide disruption/loss of function and usability lasting more than one day and less than one week, with limited disruption to regional water supplies. | Long-term injury or illness, prolonged hospitalisation or inability to work. | Widespread damage. Damage recoverable by maintenance and minor repair. Partial loss of local infrastructure. |
| High | Site-wide disruption/loss of function and usability lasting more than one week, with potential disruption to regional water supplies. | Multiple long-term injuries – emergency response. | Extensive damage requiring extensive repair. |
| Very high | Site-wide disruption/loss of function and usability that is permanent or irreversible and disruption to regional water supplies. | One or more fatalities – emergency response. | Permanent damage. Retreat and translocation of development. |

### Stage 3: Assess the likelihood of the climate change risk's occurrence

18.4.32 The third stage determines the likelihood of the climate change risk occurring and having a consequential impact to the Project. This is evaluated based on two factors:

- The likelihood of the climate change hazard occurring, informed by future climate scenario data sources.
- The likelihood of the hazard resulting in a realised risk to the Project, considering the vulnerability of the component being assessed, 'embedded mitigation' measures and 'standard good practice mitigation'.

18.4.33 Table 18.6 provides further detail on the criteria for assessing the risk likelihood. Reflecting the shorter duration of the Project construction phase compared to the operation phase, the two phases use different likelihood criteria.

Table 18.6 Criteria for assessing the likelihood of climate change risks resulting in a realised risk to the Project

| Likelihood rating | Description (probability and frequency of occurrence) – construction phase | Description (probability and frequency of occurrence) – operation phase |
|---|---|---|
| Very low | The risk is unlikely to occur during the construction phase of the Project. | The risk is unlikely to occur during the lifetime of the Project. |
| Low | The risk is only likely to occur once during the construction phase of the Project. | The risk is only likely to occur once during the lifetime of the Project. |
| Moderate | The risk occurs limited times during the construction phase of the Project e.g. approximately once every two to three years. | The risk occurs limited times during the lifetime of the Project e.g. approximately once every 15 years. |
| High | The risk occurs several times during the construction phase of the Project, e.g. approximately once every one to two years. | The risk occurs several times during the lifetime of the Project e.g. approximately once every five years. |
| Very high | The risk occurs multiple times during the construction phase of the Project, e.g. more than once a year. | The risk occurs multiple times during the lifetime of the Project e.g. approximately annually. |

### Stage 4: Determine the significance of effect resulting from the climate change risk

18.4.34 The fourth stage of the CCR assessment determines the significance of each climate risk to the Project. This is assessed by using professional judgement in combining the consequence of an identified climate change risk to the Project (Stage 2) and the likelihood of the risk occurring (Stage 3). The resultant effects may be either adverse or neutral, depending on the nature of the climate change risk. Table 18.7 shows how the consequence and likelihood of climate change risks are combined to deduce the risk score. Risks that are Moderate or Major are deemed to be significant.

Table 18.7 Risk matrix

| Consequence | Likelihood | | | | |
|---|---|---|---|---|---|
| | Very Low | Low | Moderate | High | Very High |
| **Negligible** | Negligible | Negligible | Negligible | Minor | Moderate |
| **Low** | Negligible | Negligible | Minor | Moderate | Moderate |
| **Moderate** | Negligible | Minor | Moderate | Moderate | Major |
| **High** | Minor | Moderate | Moderate | Major | Major |
| **Very High** | Minor | Moderate | Major | Major | Major |

### Stage 5: Identify additional mitigation for any likely significant adverse effects and reassess

18.4.35 For climate change effects assessed as being significant, the final stage is to identify any ‘additional mitigation’ that would be required to address any identified likely significant adverse effects. This is presented in Section 18.11 Next steps.

### In-combination climate change impacts (ICCIs)

18.4.36 The ICCI assessment examines how the projected changes in climate may influence the significance of the effects as a result of the Project on receptors in the surrounding environment, as outlined in relevant aspect chapters of the PEI Report. The evaluation considers the nature of effects, including the identified receptors and pathways, and assesses whether these could be affected by the projected climate change and associated hazards. If no potential effects are identified, the ICCI assessment is concluded.

18.4.37 The ICCI assessment adopts a structured, five-stage process to identify, evaluate and mitigate the potential effects of climate change on environmental receptors. This methodology ensures that both existing and future climate risks are comprehensively assessed and effectively managed. The process consists of the following three steps:

- Stage 1: Identify potential ICCIs
- Stage 2: Evaluate the likelihood of potential ICCIs
- Stage 3: Assess the consequence of potential ICCIs
- Stage 4: Determine the significance of ICCIs
- Stage 5: Identify additional mitigation for any likely significant adverse effects and reassess

#### Stage 1: Identify potential ICCIs

18.4.38 The first stage involves determining the likelihood of potential ICCIs occurring for each environmental aspect and screening out ICCIs that are deemed unlikely. This builds on the findings of individual environmental aspects, considering the effects already identified using their own assessment methodologies. It also accounts for embedded environmental measures and standard good practice proposed by the environmental aspects and engineering and design teams.

18.4.39 The screening process involves compiling a list of potential ICCIs based on initial assessments from other PEI Report aspects conducted using their respective methodologies; and literature review of the most recent scientific data, policies, and best practices related to these climate change hazards and their impacts on environmental receptors.

#### Stage 2: Evaluate the likelihood of potential ICCIs

18.4.40 The second stage evaluates the likelihood of each potential ICCI, based on two factors:

- The likelihood of the climate change hazard occurring, informed by future climate scenario data sources.
- The likelihood of the climate change hazard altering an effect already identified by a PEI Report aspect, considering 'embedded design mitigation' measures and 'standard good practice mitigation' strategies, and the sensitivity of receptors to climate-related changes.

#### Stage 3: Assess the consequence of potential ICCIs

18.4.41 The third stage determines the consequences of the likely ICCIs. This involves evaluating the scale, duration and time horizon of the potential impact, the sensitivity and adaptive capacity of the receptor, and whether the impact could trigger secondary or cascading effects, such as knock-on impacts on interconnected systems or additional stress on vulnerable receptors.

### Stage 4: Determine the significance of ICCIs

18.4.42 The overall significance of each ICCI is determined based on the criteria used for the aspect. The significance of ICCIs is assessed collaboratively by climate change specialists and competent experts from relevant other environmental aspects. This process involves a qualitative evaluation of the consequences and significance of potential ICCIs, mainly based on professional judgment.

18.4.43 There are two ways in which the ICCI assessment could result in significant effects:

- An effect that was previously not significant but could become significant as a result of climate change.
- If a climate change hazard could result in a change of significance category for an existing significant effect (e.g. an effect changes from Moderate to Major).

### Stage 5: Identify additional mitigation for any likely significant adverse effects and reassess

18.4.44 For ICCIs assessed as significant, the final step is to identify 'additional mitigation' or adaptation measures to reduce the risk or severity of the effect. This could involve modifying project design (e.g. increasing flood storage capacity), implementing operational strategies (e.g. adaptive water management during droughts), or enhancing natural buffers (e.g. wetland restoration for flood mitigation).

18.4.45 The ICCI assessment is presented in a tabular format. While this format provides a clear and consistent structure for identifying and considering climate change impacts across the assessment, the level of detail varies between aspects, reflecting differences in the availability of information at this stage. Aspect authors have applied the full methodology to different extents, selecting the steps most relevant and practicable to their current assessment.

## Assessment of cumulative effects

18.4.46 There are two types of cumulative effects assessed within the PEI Report; these are inter-project cumulative effects (effects with other developments) and intra-project cumulative effects (effects within the Project).

18.4.47 There are no inter-project cumulative effects as the climate change resilience impacts are specific to the Project and would not result in impacts to nearby developments. As such, no inter-project cumulative effects assessment has been completed for climate resilience. This aligns with an example rationale for scoping out inter-project cumulative effects provided in IEMA (2020).

18.4.48 For intra-project cumulative effects, the receptor for this assessment is the Project itself. Effects on the Project are also assessed in the Water environment aspect and the relevant climate related risks to the Project considered in this assessment incorporate findings from the Water environment assessment. This assessment also considers where there is a potential for a combined hazard (e.g. hot and dry events together) to cause an effect.

18.4.49 The ICCI assessment considers how climate change could alter the effects resulting from the Project as identified by other aspects. At this stage, the ICCI assessment has not undertaken a full assessment of cumulative effects, due to the high-level nature of both the ICCI and the Cumulative effects assessments at the PEI Report stage. A more detailed assessment of potential intra and inter-project cumulative effects will be undertaken and reported in the ES.

## 18.5 Study area

18.5.1 The study area for the Climate Change Resilience (CCR) assessment is the draft Order limits. The draft Order limits are shown in PEI Report Figure 1.2: Study area and UKCP18 regional data grid squares.

18.5.2 The In-Combination Climate Impacts (ICCI) assessment considers environmental receptors that may be affected by the Project, as identified in the individual aspect chapters. As such, the study areas for the ICCI assessment are consistent with the areas defined by each respective aspect.

## 18.6 Baseline conditions

18.6.1 To assess the significance of effects arising from the Project in relation to climate resilience, it is necessary to identify and understand the baseline environment within the study area. This provides a reference state against which any potential effects on climate resilience can be assessed.

18.6.2 This section outlines the existing and expected future baseline climate conditions in the study area.

### Existing baseline

18.6.3 Observed climate data for the period 1981–2000 has been obtained from the HadUK-Grid 25km gridded dataset (CEDA Archive, n.d.a), for the grid square that includes the draft Order limits (centred on E 437500, N 187500 – presented in Figure 18.1: Study area and UKCP18 probabilistic data grid squares). The observed climate variables from the HadUK-Grid 25km dataset are presented in Table 18.8.

Table 18.8 HadUK-Grid baseline observations (1980-2000) for temperature and precipitation climate indicators for the 25km grid square that contains the majority of the SESRO draft Order limits.

| Variable | Winter | Summer |
|---|---|---|
| Mean air temperature (°C) | 4.2 | 15.8 |
| Mean maximum air temperature (°C) | 7.2 | 20.9 |
| Mean minimum air temperature (°C) | 1.2 | 10.7 |
| Mean total seasonal precipitation (mm) | 186* | 143 |
| Note: * Autumn was wetter than winter with a mean total seasonal precipitation of 206mm | | |

18.6.4 Additional observed data has been extracted from the HadUK-Grid 12km gridded dataset (CEDA Archive, n.d.b), for the four 12km grid squares that encompass the SESRO draft Order limits (see Figure 18.2: Study area and UKCP18 regional data grid squares). The four grid square values have been averaged for each climate variable. The 12km gridded data are presented alongside the equivalent data for the future baseline periods in the Future baseline section of this chapter.

18.6.5 The weather station at Radcliffe Meteorological Station in Oxford, located approximately 15km north-east from the centre of the draft Order limits, provides observed monthly long-term average climate data for the period 1981–2010. A summary of these values is provided in Appendix 18.1: Technical note on observed and projected climate data.

18.6.6 Observed heat stress and wildfire data are sourced from the Climate Risk Indicator tool (UK-CRI) published by the Climate Resilience Programme in August 2023. UK-CRI use observed data from the period 1981-2010. Observed data is from the HadUK-Grid observational dataset, and for windspeed and relative humidity is supplemented with ERA5 data (the fifth-generation atmospheric reanalysis of the global climate, developed by the European Centre for Medium-Range Weather Forecasts).

### Future baseline

18.6.7 As set out in Chapter 4: Approach to the environmental assessment, the preliminary assessment of effects considers the likely evolution of the baseline without the implementation of the Project. For climate-related variables, this future baseline is informed by projections of how climate conditions are expected to change over time based on current global climate trends.

18.6.8 The UK Met Office has developed future climate scenarios for the UK using its latest projections, known as the UK Climate Projections 2018 (UKCP18). These projections indicate overall trends of warmer temperatures, wetter winters, and hotter, drier summers (Met Office, 2018).

18.6.9 The climate projection data in this section is presented in a consistent format, with the 50th percentile primarily listed. This is supported by the 10th and 90th percentile values in brackets, to represent climate model uncertainty and a wider range of possible outcomes.

18.6.10 In line with IEMA guidance (IEMA, 2020), the high-emissions scenario RCP8.5 has been applied for the future projections presented in this section.

#### *Construction Phase*

18.6.11 Information on the future projected climate has been obtained from the UKCP18 Probabilistic Projections dataset for the 25km grid square that contains the majority of the draft Order limits (grid square centred on E 437500, N 187500, as presented in Figure 18.1: Study area and UKCP18 probabilistic data grid squares). The projected changes in temperatures and precipitation for the period 2019-2039, referred to as the '2030s', are summarised here, with tabulated data presented in Table 3.2 of Appendix 18.1: Technical note on observed and projected climate data. This represents the short-term changes aligned with expected construction phase of SESRO.

18.6.12 The projections indicate the following changes by the end of the 2030s compared to the baseline period (1981–2000):

- The **average summer daily temperature** is projected to increase by 1.4°C (range: +0.4°C to +2.4°C) from a baseline of 15.8°C.
- The **average winter daily temperature** is projected to increase by 0.9°C (range: +0.1°C to +1.7°C) from a baseline of 4.2°C.
- The **average summer daily maximum temperature** is projected to increase by 1.6°C (range: +0.2°C to +2.8°C) from a baseline of 20.9°C.
- The **average winter minimum temperature** is projected to increase by 0.9°C (range: 0°C to +1.8°C) from a baseline of 1.2°C.

- **Total winter precipitation** is projected to increase by 7% (range: -28% to +16%) from a baseline of 186mm. This is the total amount of rainfall falling during the months December, January and February.
- **Total summer precipitation** is projected to decrease by 6% (range: -4% to +20%) from a baseline of 143mm. This is the total amount of rainfall falling during the months June, July and August.
- The 10th to 90th percentile ranges indicate confidence in the direction of temperature changes, but less confidence with seasonal rainfall trends.

18.6.13 To further support the assessment of potential climate-related risks during the construction phase, additional climate projections from the UKCP18 Regional 12km grid dataset covering the draft Order limits have also been reviewed. Key climate indicators under the RCP8.5 scenario have been extracted for the period December 2020-November 2040 (referred to as the '2030s'), representing anticipated short-term changes aligned with the SESRO Project's construction timeline.

18.6.14 The projections based on the UKCP18 Regional (12km) data are summarised here, with tabulated data presented in Table 3.3 of Appendix 18.1: Technical note on observed and projected climate data. They indicate the following changes by the 2030s compared to the baseline period (1981–2000):

- The temperature on the **average annual hottest day** is projected to increase by 3.5°C to 33.1°C (range: 32.3°C to 34.4°C), from a baseline value of 29.6°C.
- **Heatwaves**, defined by the Met Office as three consecutive days with temperatures above 27°C for Oxfordshire, are anticipated to become more frequent. The average number of heatwaves per year is projected to increase from 0.8 events in the baseline period to 2.1 events (range: 1.5 to 3.3 events/per year). The model range presents confidence in this increasing trend.
- The **average annual wettest day** is projected to become wetter from 27.9-30.8 millimetres (mm) (50th percentile), representing a 10% rise. The 10–90th percentile range spans from 28.5-39.8mm.
- The average annual number of **heavy rainfall days**, defined as days with more than 20mm of rainfall, is projected to increase from 2.4 to 3.1 days per year (range: 2.6 to 3.6 days per year).
- The average annual number of **frost days** (nights with temperatures below 0°C) is projected to decrease from an observed baseline (1981-2000) of 49.3 days per year to 31.8 days per year by the 2030s (range: 26.6 to 40.1). The model range presents confidence in this decreasing trend.

18.6.15 Finally, UK Climate Risk Indicator (UK-CRI) data on heat stress and wildfire is summarised here. They indicate the following change by the 2030s (2021-2050), compared to the baseline period (1981-2010):

- Heat stress (Wet Bulb Globe Temperature (WBGT) in the shade > 25°C): the average annual number of days is projected to increase to 1.7 days/year, from 0.1 days/year in the baseline. The 10th–90th percentile range of the future projections spans from 1.0 days/year to 2.1 days/year. It is important to acknowledge that the heat stress data assumes there is shade, however it is anticipated that there will be work conducted in the sun, with some exposed areas of SESRO throughout the construction and operation phases.

- Wildfire risk (Met Office Fire Danger - 'Very High'): the average annual number of days is projected to be 22 more days per year than in the baseline period, increasing from 28.3 days/year to 50.3 days/year (range: 45.5 to 61.3 days/year).

*Operation Phase*

18.6.16 Climate data for the operational phase has been obtained from the UKCP18 Probabilistic Projections. To support the assessment of climate risks over the operational lifetime of the SESRO Project, projections of temperature and precipitation have been extracted for the latest available future time slice representing the anticipated end-of-operation period (December 2079 – November 2099, referred to as the '2090s'). These projections are summarised here, with data presented in Table 3.4 of Appendix 18.1: Technical note on observed and projected climate data.

18.6.17 By the end of the century (2090s), the following projected changes are anticipated under the RCP8.5 scenario compared to the 1981 – 2000 baseline:

- The **average summer daily temperature** is projected to increase by 5.9°C (range: +3°C to +8.8°C).
- The **average winter daily temperature** is projected to increase by 3.4°C (range: +1.4°C to +5.6°C).
- The **average summer daily maximum temperature** is projected to increase by 6.6°C (range: +2.9°C to +10.4°C).
- The **average winter daily minimum temperature** is projected to increase by 3.6°C (range: +1.3°C to +6.4°C).
- **Total winter precipitation** is projected to increase by 23% (range: -1% to +54%) from a baseline of 186mm.
- **Total summer precipitation** is projected to decrease by 41% (range: -71% to 0%) from a baseline of 143mm.

18.6.18 As with the construction phase, climate projections from the UKCP18 Regional 12km grid dataset have also been reviewed to support the assessment of potential climate-related risks. Key climate variables under the RCP8.5 scenario for the '2070s' period (December 2060 – November 2080, the latest available future time slice available) have been extracted and are summarised here.

18.6.19 By the 2070s, the following projected changes are anticipated under the RCP8.5 scenario compared to the 1981–2000 baseline:

- The temperature on the **average annual hottest day** is projected to increase from a baseline average of 29.6°C (1981–2000) to 37.8°C, marking an increase of 8.2°C. The projected range (10th to 90th percentiles) is 37°C to 39.5°C.
- **Heatwaves** are anticipated to become much more frequent. The average number of heatwaves per year is projected to jump from 0.8 events to 5.6 events (4.4 to 7.2 events/year).
- **The average annual wettest day** is projected to become 23% wetter by the 2070s, from an observed baseline of 27.9mm to 34.4mm (31.4 to 37.7mm).
- **Heavy rainfall days** are projected to become more frequent, from an average of 2.4 events/year in the baseline period to 3.6 events/year (3 to 4.2 days/year) by the 2070s.

- The average annual number of **frost days** is expected to decrease from an observed baseline (1981-2000) of 49.3 days per year, to 16.8 days per year by the 2070s (7.3 to 26.1 days per year). This represents an average decrease of 32.4 days per year.

18.6.20 Finally, UK Climate Risk Indicator (UK-CRI) data on heat stress and wildfire is summarised here. They indicate the following change by the 2080s (2071-2100), compared to the baseline period (1981-2010):

- Heat stress (Wet Bulb Globe Temperature (WBGT) in the shade > 25°C): the average annual number of days is projected to increase to 23.9 days/year, from 0.1 days/year in the baseline. The 10th–90th percentile range of the future projections spans from 12.5 days/year to 31.1 days/year.
- Wildfire risk (Met Office Fire Danger - 'Very High'): the average annual number of days is projected to be 75.9 more days per year than in the baseline period, increasing from 28.3 days/year to 104.2 days/year (range: 85.7 to 127.6 days/year).

*ICCI*

18.6.21 The other developments which will form part of the future baseline identified in Chapter 20: Cumulative effects have been reviewed and considered by the other environmental aspects within their assessments, and are then considered as part of the ICCI where appropriate. The future baseline considered by each aspect is set out in their respective chapters and where climate change may alter this it is discussed as part of the ICCI assessment.

## 18.7 Project parameters, assumptions and limitations

18.7.1 Chapter 2: Project description relies on the use of relevant parameters and assumptions to allow flexibility in the final design of the Project, in accordance with the Rochdale envelope approach (Planning Inspectorate, 2018). This preliminary assessment for the Climate resilience aspect uses the parameters and assumptions outlined in Chapter 2: Project description, and also those outlined in Chapter 5: Water environment Section 5.7, to ensure that the reasonable worst-case scenario is considered within this assessment.

### Assessment assumptions and limitations

18.7.2 This section identifies the aspect-specific assumptions and limitations made for the preliminary Climate resilience assessments including those related to the availability of data to inform the assessment and assumptions used in the methodology. The assessment of effects in this chapter is preliminary and will be revisited in the ES in light of data available at that time and the design taken forward for submission. Assessments reported within this PEI Report chapter are considered a reasonable 'worst case' as a precautionary approach has been taken where design, construction or baseline information is incomplete. Nevertheless, the preliminary assessment is considered sufficiently robust to enable consultees to understand the likely significant environmental effects of the Project, based on current design information and understanding of the baseline environment. Gaps in information identified within the PEI Report will be considered and addressed as part of the assessment during the production of the ES, as noted in Section 18.11: Next steps.

Assumptions and limitations identified in relation to the preliminary Climate resilience assessments include:

- Climate models are used to produce climate change projections, which have informed the Climate resilience assessments. Such models can help consider possible future climate scenarios or outcomes, but no model that attempts to project the future can do so with certainty. Model uncertainties are associated with uncertainty over future greenhouse gas emission levels, the complexity of the climate system, natural climate variability, and modelling uncertainties.
- It is recognised that the design life of some key components is 120 years. These key components are: the dam; pumping station; river tunnel; reservoir tunnels and towers; Rail Siding and Materials Handling (RMSH) facility works, and concrete-containing components. Climate projections for the latest available time periods (2070s and 2090s) have been used to inform the Climate resilience assessments, considering a high emissions scenario. It has not been possible to consider climate projections beyond 2100 because the datasets in UKCP18 do not extend past the 21st century, and these datasets are considered the most appropriate for assessing climate change risks.
- There is uncertainty associated with the level and detail of project design information available at different stages in the Project life cycle. Where design information is not finalised, appropriate assumptions have been made based on industry benchmarks and professional judgement.
- Assessments made in relation to 'consequence' and 'likelihood' rely on professional judgement and evidence gathered through engagement with engineering and design teams.
- The CCR assessment should be read in conjunction with Chapter 5: Water environment and Appendix 5.4: Preliminary assessment of effects for water environment, which reports on the impact of the Project to cause a change in pluvial, fluvial or groundwater flooding. The CCR assessment assumes relevant climate change allowances, agreed with the Environment Agency, will be adopted in ongoing flood modelling scenarios that will be reported within the flood risk assessment at ES. These modelling scenarios inform project design that in turn influence the resilience of the Project to climate change, including buildings' Finished Floor Levels or the levels at which critical assets are located.
- Further information on reservoir safety in design, construction and operation is provided in Chapter 19: Major accidents and disasters and Appendix 19.3: Information to support assessment of risks. This ensures climate change risks related to the reservoir are effectively designed out, mitigated or managed throughout the Project lifetime.
- The potential microclimate impacts related to frost and fog are assessed in Chapter 12: Traffic and transport.

## 18.8 Embedded design mitigation and standard good practice

18.8.1 As described within Chapter 4: Approach to the environmental assessment, identified embedded design (primary) mitigation and standard good practice (tertiary) measures are assumed to be applied within this preliminary assessment to reduce the potential for environmental effects.

18.8.2 Embedded design mitigation identified for the Project at this stage are noted in Chapter 2: Project description. These, and standard good practice measures to be applied, are described in greater detail within Appendix 2.2: Draft commitments register.

18.8.3 Table 18.9 and Table 18.10 list the embedded design mitigation and standard good practice measures applicable to the preliminary Climate resilience assessment during construction and operation respectively, including the unique commitment IDs that relate to the Draft commitments register (where further detail on each can be referred to). The tables also state the purpose of each mitigation and the applicable securing mechanisms.

Table 18.9 Construction: Relevant embedded design mitigation and standard good practice measures, their purpose and the securing mechanisms

| Embedded design mitigation or standard good practice measure (unique commitment ID) | Purpose of mitigation measure | Indicative securing mechanism |
|---|---|---|
| Provide floodplain conveyance and compensation before construction of the reservoir and the intake/outfall structure (ED-01) | Reduces the potential impact of climate change from flooding through construction of floodplain storage areas before building the reservoir. This protects diversion channels from construction activities and allows habitats to develop. | Under the terms of the DCO, and Design Principles |
| Construction sequencing to mitigate flood risk (ED-03) | Reduces the potential impact of climate change and risk of on-site flooding by constructing the embankment toe drain and groundwater drain alongside the construction of the reservoir embankment. This would ensure mitigation is in place as construction progresses. | CoCP |
| Measures to address the risks of increased temperatures, including prolonged periods of hot weather and drought (ED-12) | Reduce the likelihood and consequence of potential climate risks to construction works and workers through protecting workers, materials, and structures from extreme weather, temperatures and flooding. | Under the terms of the DCO |
| Measures to reduce vulnerability to increased temperatures and drought during construction (ED-53) | Reduce the likelihood and consequence of potential climate risks to construction works and workers through protecting workers, materials, and structures from increased temperatures and drought. | CoCP |
| Measures to reduce vulnerability to flooding | Reduce the likelihood and consequence of potential climate risks to construction works and | CoCP |

| Embedded design mitigation or standard good practice measure (unique commitment ID) | Purpose of mitigation measure | Indicative securing mechanism |
|---|---|---|
| and rainfall during construction (ED-56) | workers through protecting workers, materials, and structures from flooding and rainfall. | |
| Standard good practice measures for works within or adjacent to waterbodies (SGP-03) | Reduces the potential impact of climate change and flooding to receptors by protecting the form and functioning of waterbodies. | CoCP |
| Managing construction works within flood zones (SGP-05) | Reduces the potential impact of climate change and flooding during construction by controlling runoff, protecting low areas, avoiding floodplains and safeguarding defences. | CoCP |
| Standard good practice measures to protect trees during construction (SGP-11) | Reduces the potential impact of climate change to trees during construction by following appropriate guidance and establishing protection of planting areas. | CoCP |
| Standard good practice measures for establishment of trees and other planting (SGP-12) | Reduces the potential impact of climate change of tree planting by following appropriate guidance and establishing protection of planting areas. | Under the terms of the DCO, and CoCP |
| Manage all soil resources during construction in accordance with standard good practice (SGP-15) | Reduces the potential impact of climate change on soil resources by carrying out all works in accordance with appropriate guidance. | CoCP |
| Pause earthworks during winter months if appropriate (SPG-32) | Reduces the potential impact of climate change of reservoir earthworks by pausing earthworks during the winter months dependent on weather conditions. | CoCP |
| Response measures during and after extreme weather events including the effects of climate change (SGP-38) | Reduces the potential impact of climate change during and after extreme weather events by inspecting assets, suspending works temporarily, and provision of response measures. | CoCP |

Table 18.10 Operation: Relevant embedded design mitigation and standard good practice measures, their purpose and the securing mechanisms

| Embedded design mitigation or standard good practice measure (unique commitment ID) | Purpose of mitigation measure | Indicative securing mechanism |
|---|---|---|
| Manage water quality at the SESRO intake (ED-02) | Reduces the potential impact of climate change on water quality by protecting and maintaining water quality and flows. | Under the terms of the DCO |
| Design of pumping station and T2ST Water Treatment Works backup generators (ED-09) | Reduces the potential impact of climate change on T2ST WTW generators by designing backup generators with sufficient capacity to power critical assets. | Under the terms of the DCO |
| Measures to address the risks of increased temperatures, including prolonged periods of hot weather and drought (ED-12) | Reduces the potential impact of climate change from increased summer temperatures during operation through preparing and implementing a severe weather management plan, shade provision, asset design to manage shrink-swell risk, and where appropriate, use of heat-tolerant materials. | Under the terms of the DCO |
| Measures to address the risks of increased precipitation, intense periods of rainfall and frequency and intensity of flooding (ED-13) | Reduces the potential impact of climate change from increased precipitation and flooding during operation through preparing and implementing a severe weather management plan, design and installation of erosion protection along with surface and groundwater drainage systems, maintaining critical access during flood events, and waterproof asset design to protect against water ingress. | Under the terms of the DCO |
| Measures for safe reservoir operation (ED-17) | The application of legislative requirements and international standards for the design, construction, operation, maintenance and inspection of the reservoir, means that risks, including those caused by climate change, are effectively designed out, mitigated or managed throughout the Project lifetime. | Requirement of existing legislation |
| Embankment protection systems (ED-18) | Reduces the potential impact of climate change on embankments by establishing protection systems against burrowing mammals. | Under the terms of the DCO |
| Drainage Strategy to align with national and local planning policy and guidance (ED-22) | Reduces the potential impact of climate change on localised surface water flooding, by designing drainage with an appropriate peak rainfall climate change allowance uplift, in line with Environment Agency requirements. | Under the terms of the DCO |
| Maintain water quality in the reservoir (ED-28) | Reduces the potential impact of climate change on algal blooms in the reservoir by | Under the terms of the DCO |

| Embedded design mitigation or standard good practice measure (unique commitment ID) | Purpose of mitigation measure | Indicative securing mechanism |
|---|---|---|
| | deploying mixing systems and monitoring water quality through sampling equipment installation. | |
| Scour protection on the River Thames (ED-30) | Reduces the potential impact of climate change associated with flooding to the River Thames bed and banks. | Under the terms of the DCO |
| Lining of key watercourses and surface water features and provision of substrate (ED-31) | Reduces the potential impact of climate change and increased drought on watercourses and surface water features, by reducing water loss. | Under the terms of the DCO |
| Management of aquatic INNS (ED-32) | Reduces the potential impact of climate change on the spreading of Invasive Non-Native Species (INNS), by providing recreational areas with inspection and cleaning facilities, and cleaning of pipework. | Under the terms of the DCO |
| Operation stage surface water management (ED-42) | Reduces the potential impact of climate change from heavy rainfall and pluvial flood risks across the operational site through the sustainable surface water management system. | Under the terms of the DCO |
| Asset design manages water table variability (ED-43) | Reduces the potential impact of climate change on groundwater recharge by designing to account for maximum groundwater levels. | Under the terms of the DCO |
| Emergency fire management system for Battery Energy Storage System (BESS) (ED-46) | Reduces the potential impact of climate change on fire water contamination from fluvial flood risk (considering climate change allowances) by appropriate siting and storage. | Under the terms of the DCO |
| Compliance with design standards (ED-54) | Reduces the potential impact of climate change by embedding climate resilient design principles into the planning and design of to various SESRO assets. | Under the terms of the DCO |
| Landscape-led design principles ensure masterplanning responds to landscape character, a sense of place and identity, ecological resilience and integration into the wider landscape setting (ED-58) | Reduces the potential impact of climate change to new habitats, by designing them to be diverse and ecologically resilient, that enables them to adapt and withstand extreme weather and climate conditions. | Design Principles |
| Design of Water Treatment Works to consider climate change (ED-61) | Reduces the potential impact of climate change on the T2ST Water Treatment Works by incorporating design measures such as climate change allowances for | Under the terms of the DCO |

| Embedded design mitigation or standard good practice measure (unique commitment ID) | Purpose of mitigation measure | Indicative securing mechanism |
|---|---|---|
| | drainage and strategic site selection in accordance with relevant guidance. | |
| Standard good practice measures for establishment of trees and other planting (SGP-12) | Reduces the potential impact of climate change of tree planting by following appropriate guidance and establishing protection of planting areas. | Under the terms of the DCO, and CoCP |
| Lightning strike risk assessment (SGP-39) | Will be used to inform lightning protection system design that will reduce the potential impact of climate change from storms to power supply. | Under the terms of the DCO |
| Management and maintenance of plants and habitats to ensure soil health and functions are sustained (SGP-42) | Reduces the potential impact of climate change to topsoil. | Under the terms of the DCO |

## 18.9 Preliminary assessment of likely effects – CCR

### Introduction

18.9.1 This section summarises the findings of the preliminary assessment of effects for CCR. The judgement of significance has been made assuming that embedded design mitigation and standard good practice mitigation relevant to CCR is applied (these are noted in Table 18.9 and Table 18.10 and provided in detail in 2.2: Draft commitments register). Nevertheless, the assessment assumes that additional mitigation is not yet applied, as the precise nature and extent of any additional mitigation measures is not confirmed at this stage in the EIA process. As a result, consideration of residual effects (those that remain after the implementation of *all* mitigation, including additional mitigation) has not been completed for the PEI report.

18.9.2 The full methodology for the CCR is presented in paragraphs 18.4.25 to 18.4.35, following a five-stage process. Assessments reported within this PEI Report chapter are considered a reasonable 'worst case' in line with the precautionary approach that has been taken. Where initial likely significant effects are identified at this stage, these may ultimately be determined as not significant in the ES once data gaps are addressed, and the design and mitigation are further developed. The next steps for the CCR assessment, including further exploration of relevant additional mitigation, are set out in Section 18.11: Next steps.

18.9.3 Appendix 18.2: Climate change risk assessment, sets out the preliminary assessment of climate change risks, receptor by receptor, for construction and operation phases respectively. The appendix is split into tables that list effects that are initially anticipated to be significant, and tables that list effects that are not anticipated to be significant. The tables identify the following for each effect:

- Receptor name and the Effect ID (a unique identifier for each effect)

- Climate change hazard or hazards that give rise to the risk, with reference to the climate hazard projections summarised in Appendix 18.1: Technical note on observed and projected climate data
- Relevant embedded mitigation and standard good practice mitigation (with unique Commitment ID, which relates to Appendix 2.2: Draft commitments register)
- A description of the potential climate risk (how the receptor(s) could be impacted by the climate hazard).
- The assessed consequence and likelihood of the risk, using the criteria presented in Table 18.5 and Table 18.6, and reporting the highest consequence rating (reasonable 'worst case') of the three categories presented in Table 18.5.
- Initial category of effect significance, including whether it is adverse, beneficial or neutral (taking account of embedded design mitigation and standard good practice mitigation). Risks that are rated as either 'moderate' or 'major' in accordance with the risk matrix in Table 18.7 are assessed to be significant adverse.
- Any additional mitigation (including monitoring) identified at this stage (with unique Additional Mitigation ID to enable cross reference to the measures noted in Section 18.11: Next steps).

### Summary of likely significant construction effects

18.9.4 No likely significant effects have been identified in the CCR assessment from the construction of the Project.

### Summary of likely non-significant construction effects

18.9.5 This section summarises the climate change risks related to the construction phase that are initially anticipated to lead to 'non-significant' effects through the preliminary assessment of CCR. The drivers of these risks are the projected changes in temperature and precipitation for the construction phase summarised in paragraphs 18.6.11 to 18.6.15. These are assessed to be non-significant with consideration of the key embedded design mitigation and standard good practice mitigation summarised in Table 18.9 are anticipated to reduce the likelihood and/or impacts of the risks. The full record of this CCR assessment is presented in Appendix 18.2: Climate change risk assessment, Table 1.2.

- The risk that newly created habitats are damaged by increased extreme rainfall frequency has been assessed to have a low consequence and low likelihood on the basis of standard good practice mitigation measures including appropriate species selection, adherence to relevant British Standards, and locating tree planting in areas with an appropriate depth of landscaping fill.
- The risk of disruption to construction activities such as earth movement caused by increased rainfall and winter recharge to groundwater are considered to be of moderate consequence (disruption), however, the likelihood is assessed to be low on the basis of embedded construction measures to reduce vulnerability to flooding and rainfall, and the application of good practice measures for working within or near waterbodies and managing surface and groundwater impacts during construction.
- Increased frequency and intensity of rainfall could increase the risk of compromising the integrity of the embankment across the site. However, with standard good practice measures to pause earthworks during winter months where appropriate and implement response measures during and after extreme weather events, the likelihood of this risk

is assessed to be low. Additional mitigation identified includes incorporating climate change allowances in excavation dewatering.

- Increased high temperatures, extreme rainfall, and drought conditions pose risks to construction sites, including damage to construction equipment, utility assets, access roads, plant and materials, and disruption to activities. Where the risks are assessed to be moderate, their likelihood is assessed to be low on the basis of embedded construction measures to reduce vulnerability to flooding, rainfall, and heat, and standard good practice such as response planning for extreme weather, response measures for managing impacts after extreme weather, and careful management of works near waterbodies.
- Increased high temperatures and heatwaves could result in overheating within temporary buildings presenting a risk to workforce health and productivity. Embedded measures to reduce vulnerability and manage workforce health and safety during heatwaves and drought during construction are expected to limit the consequences and likelihood of these effects.
- More frequent extreme weather events, including high temperatures and increased rainfall, could present risks to the construction workforce through occupational heat stress, unsafe site conditions, and work disruptions. With embedded measures to reduce vulnerability to flooding, rainfall, and heat, and standard good practice for working near waterbodies and responding to extreme weather, the likelihood of these risks is assessed to be low.
- Increased high temperatures, drought, and flooding pose risks to railway electrical power assets, including overheating of components, misalignment of buried ducting, and water ingress. These risks are mitigated through embedded design measures to reduce vulnerability to climate change, and response protocols for extreme weather events.
- Extreme heat and flooding pose risks of damage and disruption to railway infrastructure, potentially causing rail buckling and track-bed saturation. These risks are mitigated through embedded design measures that reduce vulnerability to temperature extremes, heavy rainfall, and flooding such that the likelihood is assessed to be low.
- Hotter summers, heatwaves, and drought present a risk of spontaneous grassland and woodland fires, potentially affecting all project components. These risks are mitigated through construction site fire management plans, including fire risk assessments, emergency procedures, safe fuel storage, and controls for hot work activities, as outlined in the draft Code of Construction Practice such that the likelihood of disruption and damage is assessed to be low.
- Increased drought conditions could lead to shrink-swell or subsidence, potentially damaging road surfaces. These risks are mitigated through the use of unbound and permeable surfaces for low-trafficked roads where practicable.

### Summary of likely significant operation effects

18.9.6 This section summarises the climate change risks related to the operation phase that are initially anticipated to lead to 'significant' effects through the preliminary assessment of CCR. The drivers of these risks are the projected changes in temperature and precipitation and related hazards for the operation phase summarised in paragraphs 18.6.16 to 18.6.20. There are no neutral or beneficial effects identified, only adverse. The full record of this CCR assessment is presented in Appendix 18.2: Climate change risk assessment, Table 1.1.

18.9.7 Significant adverse effects could result from the following climate change risks:

- The risk that future high temperatures lead to damage or operational stress to buildings and mechanical, electrical, instrumentation, control and automation (MEICA) components under increasingly extreme high temperatures, particularly affecting equipment such as valves and pumping systems. At the time of the assessment, it is understood that the standard design approach adopts future weather files representing a different future climate scenario than the one considered for the CCR assessment.
- Hotter summers, heatwaves, and prolonged dry conditions could increase the risk of spontaneous grassland and woodland fires in and around the site during its operational life. While fire safety measures are referenced in relation to buildings within the severe weather management plan, the CCR assessment has identified that additional mitigation will be required to ensure no significant effects related to wildfires.

### Summary of likely non-significant operation effects

18.9.8 This section summarises the climate change risks related to the operation phase that are initially anticipated to lead to 'non-significant' effects through the preliminary assessment of CCR. The drivers of these risks are the projected changes in temperature, precipitation and related hazards summarised in paragraphs 18.6.16 to 18.6.20. These are assessed to be non-significant with consideration of the key embedded design mitigation and standard good practice mitigation summarised in Table 18.10 which are anticipated to reduce the likelihood and/or impacts of the risks. The full record of this CCR assessment is presented in Appendix 18.2: Climate change risk assessment, Table 1.3.

- There is a risk of damage to electrical substations or communication kiosks related to increased precipitation and flooding, leading to equipment damage, outages, or failures due to water ingress. Elevated temperatures and extreme heat could cause overheating, reducing efficiency and lifespan of components, and risking cooling system malfunctions. With embedded design measures addressing both flooding and heat risks, the likelihood of this risk is assessed to be low.
- There are several climate change risks related to the reservoir embankments, arising from increased temperatures, drought, and intense precipitation. These conditions could lead to cracking, erosion, and instability of the landscape fill and may also damage trees and other vegetation, compromising slope stability and increasing the risk of erosion and uprooting. These risks have been assessed to have a potentially high consequence. However, on the basis of embedded design measures, including safe reservoir operation, embankment protection, and climate-adaptive measures, the likelihood is assessed to be low.
- There are several risks related to the floating islands being adversely affected by increased precipitation, flooding, and extreme heat, leading to overloading of buoyancy systems, nutrient leaching, vegetation stress, desiccation, and overheating of root zones. These impacts could affect plant health and ecosystem stability as well as the stability of the islands. However, on the basis of embedded design measures, including asset design that manages water table variability, the risks associated with flooding have been assessed to have a moderate consequence but a low likelihood. While no

specific embedded design measures are in place for the heat-related risks, the consequence is assessed to be low.

- There are several risks related to aquatic habitats being adversely affected by increased severe drought and increased temperatures, leading to reduced water levels in lagoons, thermal stress, algal blooms, and lower oxygen availability, impacting aquatic species. On the basis of embedded design measures, although no specific mitigation is included to manage the impact of low water levels, water quality in the reservoir is actively managed which helps to address heat-related impacts. These risks have therefore been assessed to have a moderate likelihood and a low consequence.
- There are several risks to visitors undertaking recreational activities arising from increased convective storms, drought, high temperatures, and fluvial flooding. These include health and safety risks to individuals participating in water sports, inaccessible slipways and exposed submerged hazards due to low reservoir levels, heat-related risks to visitors, and the potential for people to become stranded during flooding events. The consequence of these risks range from low to moderate. However, on the basis of embedded design measures including a severe weather management plan, safe reservoir operation, and design considerations for water level fluctuations, the risks have been assessed as having low likelihood.
- There are several risks related to reservoir operations and monitoring systems being adversely affected by increased drought, intense rainfall, flooding, and extreme heat, leading to changing water levels, sediment disturbance, structural damage, pipe degradation, and sensor overheating. These impacts may result in reduced water quality, data inaccuracies, and stress on infrastructure. On the basis of embedded design measures, including safe reservoir operation, water quality management, infrastructure resilience, these risks have been assessed to have a moderate consequence. However, their likelihood of occurrence is assessed to be low..
- There are several risks related to tunnels, associated infrastructure and pipelines being adversely affected by increased drought, intense rainfall, flooding, and seasonal groundwater recharge. These conditions may reduce groundwater support, increase hydraulic loading, and worsen shrink-swell of soil, leading to floodwater ingress, subsidence, and structural stress on tunnels and pipelines. On the basis of embedded design measures that manage water table variability and address flood-related impacts, these risks have been assessed to have a low likelihood and low to moderate consequence.
- There are several risks related to water quality in the reservoir being adversely affected by increased temperatures and seasonal shifts, leading to higher evaporation, reduced storage capacity, spread of invasive species, and changes in upstream land use that may affect abstracted water quality. The consequence of these risks ranges from moderate to low. However, on the basis of embedded design measures, including safe reservoir operation, aquatic invasive species management, and water quality controls at the intake, the assessed combination of likelihood and consequence (Table 18.7), leads to an overall risk rating of negligible or minor.
- There are several risks related to the intake/outfall and control building being adversely affected by increased drought, temperatures, intense rainfall, and flooding, leading to river levels falling below intake height, algal blooms, structural damage, equipment malfunction, access issues, ineffective discharge, intake screen blockages, and bank erosion. On the basis of embedded design measures, including safe reservoir operation, water quality management including automated maintenance of screens,

and infrastructure resilience to precipitation and flooding, these risks have been assessed to have a moderate to high likelihood; however, the consequence is considered negligible to moderate, and the assessed combination of likelihood and consequence (Table 18.7), leads to an overall risk rating of negligible or minor.

- There are several risks related to the pumping station being adversely affected by increased convective storms, heatwaves, and flooding, leading to power loss and MEICA equipment downtime and poor thermal comfort for the workforce. These risks could have a moderate consequence, however, on the basis of embedded design measures, including backup power generation, thermal comfort provisions for manned areas, and infrastructure resilience to intense rainfall and flooding, their likelihood has been assessed to be low.
- There are several risks related to river tunnels and shafts being adversely affected by increased temperatures and pluvial flood, reduced conveyance capacity, structural stress, and operational disruption. These have been assessed to have low likelihood and low to moderate consequences, and hence non-significant effects. On the basis of management of aquatic INNS, this has been assessed to have a high consequence, however, the likelihood is assessed to be negligible.
- Risks related to sitewide landscape drainage can arise due to increased drought and rainfall, leading to vegetation dieback, ground shrinkage, topsoil erosion, silting of drainage features, elevated groundwater levels, and flooding. The embedded design measures include development of a comprehensive drainage strategy. These risks have been assessed to have low to moderate likelihood and low to moderate consequences, and overall risk ratings of minor or negligible.
- There are several risks related to the recreational lakes being adversely affected by increased temperatures, drought, and rainfall, leading to decline in water quality, reduced water levels, and erosion or overflow. On the basis of embedded design mitigation measures including lining of key watercourses and surface water features, measures to address increased precipitation and flooding, these have been assessed to have low to moderate likelihood and low to moderate consequences, and overall risk ratings of minor or negligible.
- There are several risks related to watercourse diversions and the water channel for the Wilts & Berks Canal being adversely affected by increased drought, rainfall, and temperatures, leading to erosion, sediment blockage, structural degradation, reduced flood storage capacity, and impacts on canal integrity and user comfort. On the basis of embedded design measures, including a drainage strategy aligned with national and local planning policy and provisions for managing increased precipitation and flooding, these risks have been assessed to have low to moderate likelihood and low to moderate consequence, and overall risk ratings of either minor or negligible.
- There are two risks related to parking facilities being at risk from increased rainfall, flooding, and high temperatures, leading to surface water accumulation, access disruption, vehicle damage, surface degradation, and user discomfort. Embedded design measures include the drainage strategy, aligned with national and local planning policy, and oil-water separators to manage potential spills. Both risks have been assessed to have a low consequence and moderate likelihood.
- There are several risks related to site-wide road access and related earthworks, being adversely affected by increased rainfall, higher river flows, drought, and soil moisture variability. These conditions may lead to fluvial flooding, erosion, surface rutting, shrink-swell, subsidence, and landslides, potentially disrupting operations and site

accessibility. On the basis of embedded design measures, including the drainage strategy and provisions for managing increased precipitation and flooding, these risks have been assessed to have a low to moderate likelihood and low to moderate consequence, and overall risk ratings of minor or negligible.

- There are several risks related to new habitats being adversely affected by increased drought conditions and high temperatures, leading to soil moisture deficits, erosion, and habitat heat stress. Although there is a moderate likelihood of these risks occurring, the consequence is assessed to be low.
- There is a risk that topsoil could be adversely affected by hotter summers, more frequent and/or extreme heatwaves, drought, and extreme rainfall, leading to soil degradation and accelerated erosion. On the basis of standard good practice measures related to the management and maintenance of plants and habitats to sustain soil health and function, this has been assessed to have a moderate likelihood of occurrence but a low consequence.
- There are two risks related to active travel routes being adversely affected by increased high temperatures and extreme rainfall, leading to surface wear, damage, and potential inaccessibility due to pluvial flooding. On the basis of embedded design measures including provisions for managing increased temperatures and measures to mitigate the effects of intense rainfall and flooding, both risks have been assessed to have a low consequence and moderate likelihood.
- There are several risks related to recreational facilities being adversely affected by increased extreme rainfall, flooding, high temperatures, and groundwater recharge, leading to water ingress, structural weakening, Mechanical, Electrical, and Plumbing (MEP) system failure, and poor thermal comfort. On the basis of embedded design measures, including surface water management during operation, a drainage strategy aligned with planning policy, and responses to intense rainfall and flooding, these risks have been assessed to have a low to moderate likelihood and low to moderate consequence, and overall risk ratings of minor or negligible.
- There are several risks related to site utilities, including overhead lines, power supply, renewable energy systems, and water supply, arising from increased extreme rainfall, flooding, drought, high temperatures, and storm events. These risks include damage to substations, inverters, cables, and pylons, reduced efficiency and lifespan of BESS and solar PV, thermal expansion and overheating of electrical components, water ingress causing short circuits and corrosion, and strain on water abstraction and treatment systems. Additional risks include contamination of emergency fire water storage and material stress in pipelines. On the basis of embedded design and good practice measures, including asset design to manage water table variability, drainage strategies, measures to address increased temperatures, drought, precipitation and flooding, and emergency fire management planning, these risks have been assessed to have a low to moderate likelihood, low to moderate consequence, and overall risk ratings of minor or negligible.
- There are several risks related to water treatment processes arising from increased convective storms, high rainfall, drought, and increased temperatures, including flooding that disrupts chemical delivery, reduced water volumes, algal blooms, reduced treatment efficiency, and chemical storage issues affecting water quality. Based on embedded design measures including temperature and drought resilience, reservoir water quality maintenance, and operational water quality monitoring with remedial

actions, these risks have been assessed to have a low to moderate likelihood, low to moderate consequence and overall risk ratings of minor or negligible.

- There is a risk related to site-wide conditions, which could be adversely affected by increased rainfall and winter groundwater recharge, which could affect areas surrounding embankments. On the basis of embedded design measures, including the groundwater drain and responses to increased precipitation and flooding, the risk has been assessed to have a low likelihood and moderate consequence.
- There are several risks identified to the operational workforce arising from increased rainfall, flooding, and high temperatures, including hazardous site conditions, access issues, thermal stress, and reduced productivity, all of which could compromise health and safety. On the basis of embedded design measures, including responses to intense rainfall and flooding and measures to address health and safety during prolonged hot weather and drought, these risks have been assessed to have a moderate likelihood and low consequence.
- At the T2ST WTW, climate-related risks have been identified, including elevated internal temperatures due to increased external heat, which may lead to health risks, thermal discomfort for personnel, and operational disruption from increased energy demand. Additionally, increased rainfall and pluvial flooding could result in water ingress and damage to ground-floor infrastructure, while elevated river flows may heighten fluvial flood risks, potentially causing mechanical failure and disruption to treatment processes. On the basis of embedded design mitigation where T2ST WTW drainage design accommodates climate change allowance, the site lies outside the post-SESRO floodplain, and flood storage areas are sized in accordance with Environment Agency guidance, these risks have been assessed to have moderate consequence and low likelihood.

## 18.10 Preliminary assessment of likely effects – ICCI

18.10.1 This section briefly summarises the findings of the preliminary assessment of effects related to in combination climate impacts. The judgement of significance of these effects has been made assuming that embedded design mitigation and standard good practice relevant to the aspect being assessed is applied (these are noted in the relevant Chapters and provided in the Draft commitments register in Appendix 2.2), as well as those relevant to climate change risks (noted in Table 18.9 and Table 18.10).

18.10.2 The full methodology for the ICCI is presented in paragraphs 18.4.36 to 18.4.45.

18.10.3 The full assessment is presented in Appendix 18.3: In-combination Climate Change Impact Assessment, which sets out the preliminary assessment of ICCI effects for each aspect, for both construction and operation phases. The appendix identifies the following for each aspect:

- Aspect name (e.g. Water environment)
- Resource/receptor type
- Climate change hazard or hazards that give rise to the potential ICCI effects
- A description of the potential ICCI effect, and its significance rating.

18.10.4 Based on the ICCI assessment and consideration of the embedded design measures and standard good practice mitigation already applied, there are no significant ICCI effects identified.

## 18.11 Next steps

18.11.1 As part of next steps, the Project is proactively developing the design, refining the construction approach and continuing to define the environmental baseline, in conjunction with ongoing consultation and engagement. These activities will inform the EIA process and provide a robust evidence base for the ES. The aim is that where initial likely significant effects are identified at this stage, these may ultimately be determined as not significant in the ES once data gaps are addressed, and the design and mitigation proposals are further developed. Effects that remain after the implementation of all mitigation are referred to as 'residual effects'. These effects are not reported in the PEI Report as additional mitigation is not assumed to be implemented at this stage of the assessment. The assessment of the significance of residual effects after all mitigation is applied is a key outcome of the EIA process and will be reported within the ES, which will be submitted with the DCO application.

18.11.2 The next steps anticipated to be undertaken in relation to the Climate resilience assessment prior to completion of the ES and submission of the DCO application are explained below.

### Further exploration of additional mitigation

18.11.3 A key aspect of the next steps is to further explore additional mitigation that may reduce adverse effects that the preliminary assessment has initially identified as likely to be significant. Additional mitigation that has been identified for the Climate resilience assessment is noted against relevant likely significant effects in Appendix 18.2: Climate change risk assessment. All additional mitigation that has been identified in relation to the Climate resilience assessment to date is listed below in Table 18.11 along with a description of what each measure entails. Each measure has a unique Additional Mitigation ID to enable cross reference between Appendix 18.2: Climate change risk assessment and Table 18.11. As noted previously above, the preliminary assessment presented in the PEI Report assumes that additional mitigation is not yet applied, as the precise nature and extent of any additional mitigation measures is not confirmed at this stage in the EIA process.

Table 18.11 Additional mitigation identified to date in relation to the Climate resilience assessment

| Additional mitigation ID | Additional mitigation name | Description of additional mitigation measure |
| --- | --- | --- |
| AM-44 | Enhanced design approach for buildings considering a pessimistic emissions scenario | Additional measures may be implemented to future proof buildings based on an enhanced design approach that considers a pessimistic climate emissions scenario. |

| Additional mitigation ID | Additional mitigation name | Description of additional mitigation measure |
|---|---|---|
| AM-47 | Measures to address the risk of wildfire | Develop the landscape (and habitat) design to reduce vulnerability to wildfire across the site. This could include the integration of fire breaks within the landscape design to help prevent the spread of fire toward at-risk infrastructure and nearby communities. In addition, the severe weather management plan could be expanded to include site-wide measures such as restrictions on disposable or non-electric BBQs, provision of electric BBQ points, and the installation of early warning systems (e.g. smoke or heat detection sensors with real-time alerts and communication protocols). These measures would support a proactive approach to wildfire risk management during operation. |

### Other next steps

18.11.4 Other steps that are continuing or are planned to be undertaken to support the Climate resilience assessment prior to completion of the ES and submission of the DCO application are noted below with an explanation of how these will inform the EIA process:

- Continued design development alongside the EIA process to embed design mitigation, further define standard good practice, adopt identified additional mitigation and identify (if required) further additional mitigation. These activities will inform the CCR assessment to be reported in the ES.
- Continued development of the ICCI assessment alongside aspect assessments, identifying additional mitigation (if required).
- Alongside the CCR assessment, the Project safety critical elements will be identified and confirmed. The climate change risks facing these elements will be evaluated using a high emissions scenario (RCP8.5) at low probability levels. This is in line with the National Policy Statement for Water Resources Infrastructure (Defra, 2025).

## References

It should be noted that the Institute of Environmental Management and Assessment (IEMA) has recently rebranded as the Institute of Sustainability and Environmental Professionals (ISEP). Guidance that was historically published by IEMA is still referenced under that institute name.


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