

Meeting:	Combined Executive Member Decision Session
Meeting date:	06/10/2026
Report of:	Director of City Development
Portfolio of:	Executive Member for Environment and Climate Emergency

Decision Report: York and North Yorkshire Climate Change Adaptation Study

Subject of Report

1. This report provides an overview of the study's aims and summary findings and invites the Executive Member for Environment and Climate Emergency to endorse the study so it can be used as an evidence base to inform City of York Council (CYC) policy and practice.

Benefits and Challenges

2. Adopting the evidence base and collaborating with our regional partners and communities to address the risks and vulnerabilities highlighted will ensure the council works towards its stated climate and environmental goals.
3. If the study is not formerly endorsed, the insights and findings will not form part of the council's evidence base and there is a risk that action on climate change adaptation is not evidence-led, nor delivered at the pace and scale required to address climate risks.

Policy Basis for Decision

4. Understanding climate risks is the first step in being able to effectively manage them. The Council Plan sets clear ambitions to achieve Net zero carbon by 2030 and to become climate ready. Climate risks have a direct bearing on affordability, the

environment, equalities and health.

5. York and North Yorkshire Combined Authority (YNYCA) and its constituent authorities aspire to be at the forefront of tackling climate change, both in terms of emissions reduction and building climate resilience through effective climate adaptation.

Financial Strategy Implications

6. There are no financial strategy implications arising directly from the recommendations within this report.

Recommendation and Reasons

7. The Executive Member for Environment and Climate Emergency is recommended to:
 - i. Support Option 1 and formerly endorse the York and North Yorkshire Climate Change Risk and Opportunities Assessment (CCROA) so it can be used as an evidence base to inform council policy and practice.

Reason: Endorsement of the study will ensure that council policy and practice continue to be evidence-led. It will underpin robust and informed decision-making and ensure the council's resources are directed and prioritised to areas and issues that deliver greatest impact.

Background

8. On behalf of the York and North Yorkshire (YNY) region, YNYCA commissioned the preparation of an Adaptation Study (attached at Annex 1) designed to better understand climate risks and opportunities across the region and to assess the area's vulnerability and preparedness.
9. The study provides a basis of understanding for the development of a regional climate adaptation strategy and will guide how YNYCA supports local authorities and organisations to adapt to climate change.
10. The Study includes four primary sections:

- i. A climate risk and opportunity assessment (CCROA) for City of York Council (CYC) and North Yorkshire Council (NYC) jurisdictions, including protected landscape authorities.
 - ii. An assessment of climate-related vulnerabilities within the region
 - iii. Development of adaptation pathways.
 - iv. A cost-benefit analysis to understand the costs of action relative to inaction.
11. The study was supported by CYC, NYC, the protected landscape authorities and the Northeast and Yorkshire Net Zero Hub. It is intended to build on, and link to, more specific and localised risk assessments and adaptation plans, such as the 'Climate Ready York' evidence base, approved by members in 2023.
12. This new regional-level assessment provides an opportunity to further update CYC's understanding of climate risks, opportunities and vulnerabilities as part of the 2026 York Climate Change Action Plan refresh process and the planned update of York's Climate Change Strategy in 2027.

Study overview

13. The study highlights the extent to which the changing climate already impacts the region, citing examples such as the 2015 Boxing Day floods in York, 2023 winter rainfall (wettest winter since 1872), Storm Daragh and flooding in Knaresborough 2024, and droughts and wildfires in 2025. It asserts that extreme weather events are increasing in frequency and magnitude, with projections showing this is set to continue under all plausible global warming scenarios.

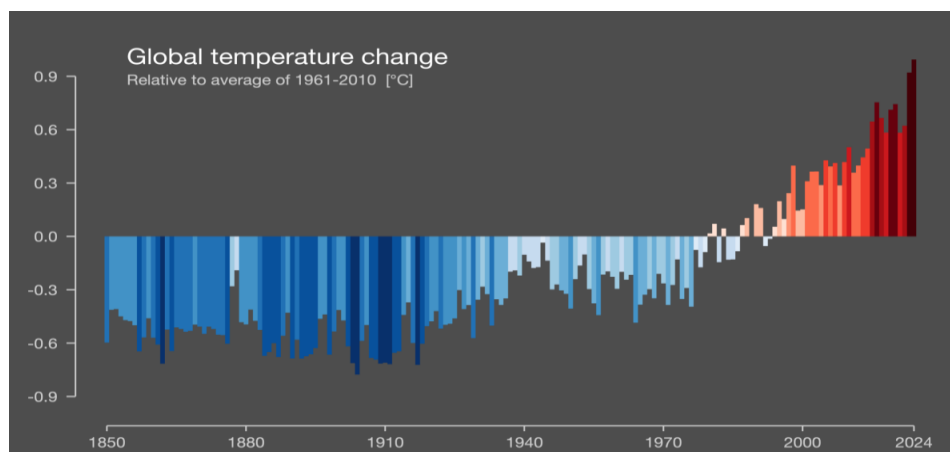


Figure 1: Accelerating global temperature increases.

14. It is predicted that the UK will experience the same weather as central-northern Spain by 2070, entailing hotter drier summers and warmer wetter winters. Figure 2 shows the predicted increase in the number of summer days, hot summer days and extreme summer days with increasing Global Warming Levels (GWL). By 2050, under a 2°C global warming scenario (currently the most plausible), the number of summer days in York reaching temperatures above 25°C will increase from 9 to 26 a year with summer rainfall decreasing by 7%.

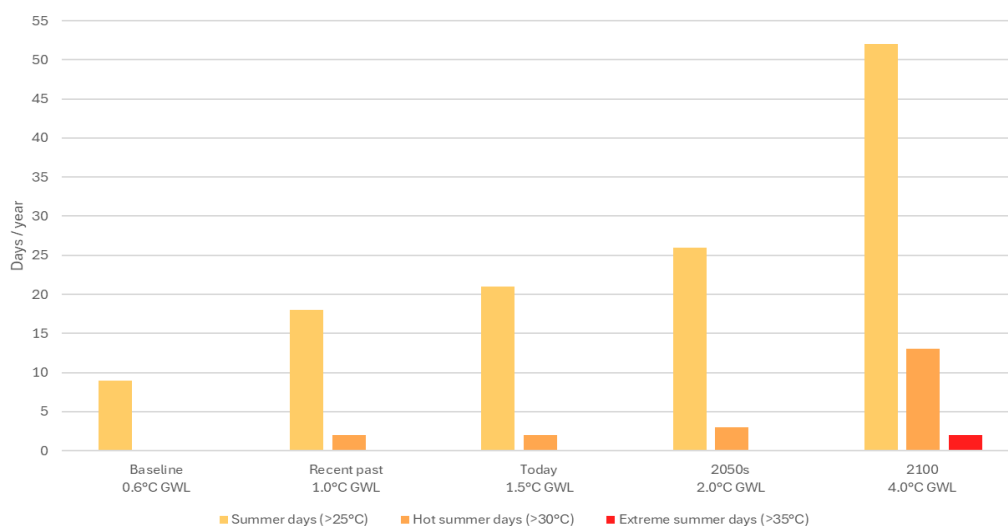


Figure 2: Predicted increase in the number of hot/summer days

Climate change risks and opportunities

15. The study evaluated 134 climate change impacts for the region, considering twenty-one positive and 113 negative effects. The risks were arranged by theme with twenty associated with business and industry, 25 health, communities and the built environment, 34 infrastructure, 34 natural environment including farming, fishing and forestry.
16. The scope of the CCROA focused specifically on impacts within the YNY region. The assessment did not examine in any depth the cascading global risks and their consequent impacts on the region as these are more likely to be managed at the national level.
17. The CCROA identified short-term priority risks, defined as the remainder of 2020s and the 2030s. Whilst no risks were rated

‘Severe’¹ within the 2°C warming scenario, 8% were rated ‘Major’². These include:

- Flooding (river, surface, and groundwater) and extreme rainfall – risks to business sites, people, communities and buildings and risks to wastewater and sewer infrastructure with overflow and release into water courses
- Extreme heat and wildfires – risks to health and wellbeing from high temperatures (especially for those with existing conditions) and risks wildfires and destruction of terrestrial habitats
- Drought and water security – risk of reduced public water availability due to drought conditions
- Climate induced pests and diseases – risks to terrestrial species and habitats from pests, pathogens, and invasive species, including viral and parasitic diseases
- Cascading – risks to transport and energy networks
- General changing climatic conditions – risks to business’s insurance, investment and finance requirements, risks to soils and associated eco-system services and risks to the integrity of cultural and historic collections from changing climatic conditions within buildings.

18. Within the 2°C scenario, the proportion of climate risks rated ‘Major’ and ‘Severe’ increases from 8% to over 30% by the 2050s. Under the 2100s / 4.0°C GWL scenario it increases to 55% of all identified risks.

Risk score	2030s 1.5°C GWL		2050s 2.0°C GWL		2100s 4.0°C GWL	
	No. risks per category	%	No. risks per category	%	No. risks per category	%
[1] Negligible	15	13%	5	4%	1	1%
[2] Minor	39	35%	28	25%	13	12%
[3] Moderate	50	44%	45	40%	37	33%
[4] Major	9	8%	35	31%	43	38%
[5] Severe	0	0%	0	0%	19	17%

Table 1: Number of climate risks identified during the YNY climate change risk assessment and proportion in each risk rating category, split by climate change scenarios.

¹ Major risk: Major impact expected, from either high magnitude and moderate frequency events, or high frequency and moderate magnitude events.

² Severe risk: Severe impact expected, associated with a catastrophic consequence and almost certain probability of occurrence.

19. The full risk register shows the types of hazards expected, a description of the risks posed, the specific regions within YNY most affected, a risk rating under various GWLs / timescale scenarios and an overall risk score (attached at Annex 2).
20. Annex 2 also details the twenty-one opportunities arising from climate change under various GWL/timeframe scenarios, ranging from those within the tourism sector, changes in demand for goods and services, and diversification of the agricultural economy.

Vulnerability mapping

21. The study mapped climate vulnerability and exposure for the region to identify where exposed and susceptible populations, infrastructure and natural assets intersect with climate hazards. The approach identified vulnerability hotspots and priority areas for adaptation, with vulnerability partly determined by adaptive capacity. For example, some groups with reduced capacity to respond to or recover from hazards are disproportionately impacted, particularly when multiple sources of disadvantage coincide.
22. Certain groups were found to emerge as consistently more vulnerable to climate impacts, including those aged over 65, those with physical or mental health conditions and disabilities, children, lower income households, minority groups, homeless populations, and those in rural areas. In some cases, this is linked to a particular group or cohort's reduced adaptive capacity to mitigate climate change impacts.
23. The mapping showed flood risks extending beyond residential areas, affecting transport and energy infrastructure, with an increasing proportion of assets projected to fall into higher risk categories under all warming scenarios. This raises the potential for cascading impacts, including disruption to essential services, reduced connectivity, and wider economic consequences. Vulnerability to flooding is most pronounced towards the southern part of the region around Selby, whilst York's existing flood defences help reduce York's exposure to negative impacts.
24. Water security emerged as an additional and growing concern within the study, as recent weather events demonstrate regional water system vulnerability – with implications for households,

agriculture, eco-systems, and economic growth.

Adaptation Pathways

25. The study found that YNY authorities had made important progress in preparing for climate change, particularly in managing flood risk and restoring natural systems. Yet it also found that adaptation activity remains uneven across sectors and is not yet operating at the scale required to address future risks.
26. Adaptation across the region is characterised by a growing number of successful projects and partnerships, but these are often delivered through sector, and location-specific initiatives rather than a coherent regional framework.
27. Flood risk management and nature-based solutions have been successful in reducing vulnerabilities and strengthening resilience across many communities, but despite this progress, the study found that preparedness for several significant climate risks remains low – with limited action in relation to extreme heat, drought, transport and infrastructure resilience, business continuity, public health preparedness, business related financial risks and climate-driven pests and diseases.
28. The study recommends that the region should move beyond predominantly flood-focused approaches towards a broader, multi-hazard adaptation programme that addresses the full range of climate risks facing communities, businesses, and public services. Priority actions include strengthening governance and accountability, maintaining a regional climate risk register, developing a coordinated 'Adaptation Action Plan' and embedding adaptation considerations within planning, infrastructure, economic development, and public service delivery.
29. A range of identified adaptation actions arranged by sector is detailed in Annex 3. Each action has been allocated a timeframe, impact value, and cost band. Many of the actions are already underway or planned whilst others remain conditional on resources and capacity being identified.

Regional cost estimates

30. The study took a limited number of material risks forward for

economic impact analysis, to understand the potential scale of economic impact if no adaptation action was taken. A range of methodologies were used, reflecting the limited data available and the diverse nature of climate change impacts. The picture emerging was one of significant increases in economic costs, especially over longer-term time horizons.

31. At the national level, the London School of Economics estimates that the total cost of climate change damages to the UK will increase from 1.1% of gross domestic product (GDP) at present to 3.3% by 2050 and 7.4% by 2100. Relative to 2024 UK GDP, this is equivalent to around £30 billion at present, £90 billion by 2050 and £200 billion by 2100.
32. Current estimates suggest that regional property damages from river flooding alone already average around £38 million per year. By the 2050s, this figure could rise to over £70 million annually under high emissions scenarios, with upper estimates exceeding £120 million. This represents a doubling of damages and a growing drag on the regional economy.
33. As the frequency and intensity of hot days rise, productivity losses will grow across multiple sectors, particularly those involving outdoor work or temperature-sensitive processes. By the 2050s, annual losses to economic output in York and North Yorkshire from extreme heat could reach approximately £35 million.
34. By the 2050s, agricultural costs, property flood costs, extreme heat impacts to productivity and wildfire impacts to natural habitats could result in cumulative damages of over £160 million per year. These costs relate to just four of the 113 risks identified during the risk assessment, indicating that total costs are likely to be significantly greater.
35. The study found that over the longer-term, there is a risk of more fundamental shifts in regional land use, with projections suggesting that arable farming in parts of eastern England could become unviable under high warming scenarios without significant investment in irrigation. At the same time, the region's food system is exposed to climate impacts, with rising costs of commodities driven by heat and water stress overseas. By mid-century these combined pressures could add tens of millions of pounds annually to the cost of food in the region, affecting both

farmers and consumers.

36. Water availability is highlighted as presenting a further emerging risk with national evidence showing that water scarcity can restrict commercial development by limiting new water connections.
37. The region's economy is also closely tied to the health of its natural environment. Climate change is projected to accelerate the degradation of natural systems, amplifying risks such as wildfire, biodiversity loss and declining soil and water quality. The North York Moors wildfire in 2025 caused tens of millions of pounds in damages, with the study projecting that events like this will become more frequent.
38. By contrast, many adaptation measures offer strong economic returns. Preventing new development in high-risk flood zones, for example, could reduce future damages at relatively low cost. Nature-based solutions such as natural flood management have been shown to provide protection at a fraction of the cost of post-event recovery, while also delivering wider environmental benefits.
39. Across all these areas, the study found a consistent conclusion that the costs of inaction are likely to be significantly greater than the cost of adaptation. Cost benefit modelling indicates that adaptation in YNY could yield significant net benefits, with a return of £1.5 for every £1 spent on integrated adaptive measures in urban areas and a £6.5 return for every £1 spent in rural catchments.

Next steps

40. During the later stages of the study, several upskilling workshops were held to disseminate the study's emerging key findings. Officers from a range of teams took part to encourage and support them to consider climate risks and opportunities as part of their service planning and project planning.
41. Recordings of these sessions continue to be shared with relevant teams, for example with the public health team who are currently in the process of populating the Local Authority Risk and Adaptation Tool (Heat Edition) toolkit to strengthen climate action in relation to health.

42. Emerging findings from the study have already helped the climate change team to screen council-led regeneration projects, ensuring they account for short and longer-term climate impacts and consider them during early project initiation and planning stages.
43. If formerly endorsed by the Executive Member, officers will utilise the evidence base to shape and inform ongoing council policy and practice. For example, the study will feed into the planned 2027 refresh of the York Climate Change Strategy and subsequent biennial refreshes of the Climate Change Action Plan.
44. Study findings will feed into the work currently underway to better understand the cost of past climate impacts, including extreme weather events, be these financial, environmental, and social. This work is being led by a University of York Policy Fellowship intern within the council's climate change team and is due to conclude in 2027.
45. YNYCA are exploring opportunities to develop a regional climate adaptation strategy, subject to the necessary resources and capacity being identified. This would directly address key recommendations within the study to strengthen regional governance, ensure climate action is more joined-up and further embed adaptation considerations within planning, infrastructure, economic development, and public service delivery.
46. To support the above, YNYA, CYC and NYC are currently participating, on a non-funded basis, in the European Union-led Pathways2Resilience² programme designed to strengthen regional capacity in relation to climate resilience planning.
47. YNYCA intends to publish the study on its website so that the evidence base can be utilised by partners from across the region. It will be supported by an accessible executive summary.

Consultation Analysis

48. Many organisations and over two hundred individual stakeholders contributed to the study over the course of 12 months. The study was overseen by a multi-agency steering group with

² <https://www.pathways2resilience.eu/>

representatives from YNYCA, CYC, NYC, protected landscape authorities, Yorkshire Water, Yorkshire and Humber Climate Commission, local resilience forum, and the University of Edinburgh Climate Change Institute. A comprehensive programme of stakeholder workshops and dissemination sessions ensured a wide range of different inputs was achieved.

49. CYC Corporate Scrutiny Committee approved the recommendation for the Executive Member to endorse the study at a meeting on 7 September 2026.

Options Analysis and Evidential Basis

50. The Executive Members is invited to consider three options:

- **Option 1:** Endorse the study, in line with the report's recommendation.
- **Option 2:** Endorse the study subject to specific additional comments / amendments.
- **Option 3:** Do not endorse the study.

51. Endorsement of the study will ensure that CYC policy and practice continue to be evidence-led. It will underpin robust and informed decision-making and ensure the council's resources are directed and prioritised to areas and issues that deliver greatest impact. Adopting the evidence base and collaborating with our regional partners to address the risks and vulnerabilities highlighted will ensure the council works towards its stated climate and environmental goals.

52. If the study is not formerly endorsed, the insights and findings will not form part of the council's evidence base and there is a risk that action on climate change adaptation is not evidence-led, nor delivered at the pace and scale required to address climate risks.

Organisational Impact and Implications

- **Financial:** There are no financial implications associated with this report
- **Human Resources (HR):** There are no HR implications associated with this report
- **Legal:** There are no legal implications associated with this report
- **Procurement:** There is no procurement implications associated with this report
- **Health and Wellbeing:** Ensuring CYC policy and practice is evidence-led and based on robust and timely data will support health and wellbeing objectives.
- **Environment and Climate action:** Ensuring CYC policy and practice is evidence-led and based on robust and timely data will support environment and climate action objectives.
- **Equalities and Human Rights:** Ensuring CYC policy and practice is evidence-led and based on robust and timely data will support equalities and human rights objectives.
- **Data Protection and Privacy:** There are no data protection and privacy implications arising from this report
- **Communications:** There are no communication implications arising from this report
- **Economy:** Ensuring CYC policy and practice is evidence-led and based on robust and timely data will support economic objectives.

Risks and Mitigations

53. If the study is not endorsed there is a risk that the value of this investment is not realised and that policy and practice does not benefit from robust evidence and insights contained within the study. As mitigation, officers will continue to draw on data and evidence contained within earlier climate risk studies to inform policy and practice.

Wards Impacted

54. All.

Contact details

For further information please contact the authors of this Decision Report.

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Date:	22/09/2026

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Report approved:	Yes
Date:	22/09/2026

Background papers

- A Climate Ready York report 2023
<https://democracy.york.gov.uk/ieListDocuments.aspx?CId=870&MIId=14371&Ver=4>
- York Climate Change Strategy (2022-2032)
<https://www.york.gov.uk/downloads/file/8948/york-climate-change-strategy-2022-to-2032>
- York Climate Change Action Plan 2022
https://democracy.york.gov.uk/documents/s179441/Annex%20A_York%20Climate%20Change%20Action%20Plan_2024.pdf
- Update of the Climate Change Action Plan 2024
https://democracy.york.gov.uk/documents/s179440/EMDS_Climate%20Action%20Plan_2024.pdf
- Corporate Scrutiny Committee report 7 September 2026
- <https://democracy.york.gov.uk/ieListDocuments.aspx?CId=1117&MIId=15631&Ver=4>

Annexes

- Annex 1 – YNY Adaptation Study (v7.0. 19 August 2026)
- Annex 2 – YNY Climate Change Risk Register
- Annex 3 – YNY Adaptation Pathway Framework

Abbreviations

- CCROA: Climate change risk and opportunity assessment
- CYC: City of York Council
- EMDS: Executive Member Decision Session
- GDP: Gross domestic product
- GWL: Global warming level
- LARA: Local Authority Risk and Adaptation
- NYC: North Yorkshire Council
- YNY: York and North Yorkshire
- YNYCA: York and North Yorkshire Combined Authority
- °C: Degree centigrade