

Agenda Item	7
Report No	CCC/15/26

The Highland Council

Committee: Climate Change

Date: 12 August 2026

Report Title: Fourth Climate Change Risk Assessment – Independent Assessment

Report By: Assistant Chief Executive - Place

1 Purpose/Executive Summary

- 1.1 This report provides an overview of the Fourth Climate Change Risk Assessment – Independent Assessment (CCRA4-IA), comprising the Technical Report and the companion report, A Well-Adapted UK, published in May 2026. Together, these reports provide the latest independent assessment of climate risks and opportunities facing the UK and identify priorities for strengthening climate adaptation and resilience.
- 1.2 The report summarises the key findings from both publications, highlights their relevance to Highland Council, and considers the implications for the Council's climate adaptation and resilience activities.

2 Recommendations

- 2.1 Members are asked to:-
 - i. **Note** the findings of the Technical Report and A Well-Adapted UK summarised in this report and the associated appendices;
 - ii. **Note** the implications of these reports for Highland Council's climate adaptation and resilience activities; and
 - iii. **Agree to recommend** to the Council that the findings of the Technical Report and A Well-Adapted UK be used to inform the continued development of the Council-wide Climate Change Adaptation Action Plan and related adaptation activity, where relevant and appropriate.

3 Implications

- 3.1 **Resource** – There are no immediate financial implications arising directly from this report. The findings of the Fourth Climate Change Risk Assessment reinforce the strategic direction approved by Council in March 2026, recognising that climate adaptation and community resilience require a coordinated, programme-led approach embedded across Council services rather than being delivered through a single service area. The Highland Climate Change Risk and Opportunity Assessment and the Council-wide Climate Change Adaptation Action Plan will provide the framework for prioritising adaptation activity and informing future investment decisions. Any additional resources required to deliver specific actions will be considered through the Council's normal governance, business planning and budget processes.
- 3.2 **Legal** - The Climate Change (Scotland) Act 2009 places duties on public bodies to act in the way best calculated to help deliver adaptation to climate change.
- 3.3 **Risk** - This report does not create any direct risks for the Council. However, the findings highlight the increasing risks that climate change poses to communities, infrastructure, public services, natural systems and the wider economy. The Highland Climate Change Risk & Opportunity Assessment has identified a range of climate-related risks affecting the Council, and the development of the Council's Climate Change Adaptation Action Plan will support a more coordinated approach to managing these risks over time.
- 3.4 **Health and Safety (risks arising from changes to plant, equipment, process, or people)** - There are no direct health and safety implications arising from this report. However, the impacts of climate change have the potential to affect public health, community wellbeing, infrastructure and service delivery, reinforcing the importance of adaptation planning and resilience building.
- 3.5 **Gaelic** - There are no Gaelic implications arising from this report.

4 Impacts

- 4.1 In Highland, all policies, strategies or service changes are subject to an integrated screening for impact for Equalities, Poverty and Human Rights, Children's Rights and Wellbeing, Climate Change, Islands and Mainland Rural Communities, and Data Protection. Where identified as required, a full impact assessment will be undertaken.
- 4.2 Considering impacts is a core part of the decision-making process and needs to inform the decision-making process. When taking any decision, Members must give due regard to the findings of any assessment.
- 4.3 This is an information report and therefore an impact assessment is not required.

5 Background

- 5.1 Under the Climate Change Act 2008, the UK Government is required to undertake a Climate Change Risk Assessment (CCRA) every five years. These statutory assessments evaluate the risks and opportunities that climate change presents to the UK and help inform the development of national adaptation policies and programmes.

- 5.2 In May 2026, the Fourth Climate Change Risk Assessment - Independent Assessment (CCRA4-IA) was published by the Climate Change Committee (CCC).

The CCRA4-IA comprises a Met Office-led Technical Report and the CCC's companion report, A Well-Adapted UK. Together, these reports combine the latest evidence on climate risks facing the UK with advice on the actions needed to improve climate resilience and inform the UK's Fourth Climate Change Risk Assessment (CCRA4). Executive summaries of both reports are provided within **Appendices 1 and 2**.

- 5.3 The Technical Report provides a comprehensive assessment of climate risks and opportunities across five themes: Health and Wellbeing; Built Environment; Land, Nature, and Food; Infrastructure; and Economy.

These themes broadly align with those used within the Highland Climate Change Risk and Opportunity Assessment (HCCROA). Across the UK, 41 risks and 2 opportunities were assessed from the present day through to the 2080s.

The assessment considers both the magnitude of climate risks and the urgency of adaptation action. New categories of 'Very High magnitude' and 'Critical action needed' have been added to reflect increasing levels of risk and urgency.

- 5.4 'A Well-Adapted UK' examines climate risks, adaptation actions and enabling measures across 14 key systems, including health, infrastructure, land, food, public services and the economy. The report is structured around setting adaptation ambitions, identifying priority actions, enabling delivery and evaluating progress, providing a framework for adaptation planning, implementation and accountability across the UK.

6 Key findings

- 6.1 The Technical Report identifies a number of significant findings:-

- **Climate change is already causing significant impacts across the UK.** Further climate change is inevitable and will result in additional impacts across all sectors. The severity of future impacts will vary between nations and regions and will depend, in part, on future global greenhouse gas emissions.
- **Several key aspects of climate change are accelerating.** Increases in extreme heat, heavy rainfall and sea-level rise are contributing to increasingly frequent and severe weather events. The report notes that temperatures exceeded 40°C in the UK for the first time during the July 2022 heatwave, contributing to widespread disruption, wildfires and almost 3,000 deaths in England across five heat episodes that summer.
- **Climate risks are now greater than those identified in the previous assessment** (CCRA3-IA, published in 2021). This reflects accelerating climate change, increasing exposure and vulnerability, and limited progress in adapting to climate change.

- **The assessment considered 41 risks and 2 opportunities across the UK.** Around two thirds of the assessed risks are categorised as having High or Very High magnitude impacts by the 2030s. By the 2050s, under a scenario of approximately 2°C of global warming, almost one-third of assessed risks are categorised as having Very High magnitude impacts. Within the assessment, Very High magnitude risks are those with impacts at a scale that could result in billions of pounds of economic damage each year, thousands of deaths annually, or significant losses to biodiversity.
- **Overseas climate change impacts present increasing risks to the UK.** Climate-related disruption to global supply chains, food systems, international trade and access to key resources can have significant consequences for UK communities, businesses and the wider economy. The report highlights that climate impacts overseas can contribute to higher food prices and shortages of some products through disruption to imported food and raw ingredients.
- **Current and planned adaptation measures are not keeping pace with climate change.** Unlike the previous assessment, no risks were assessed as requiring only current levels of adaptation activity.
- **Nearly two-thirds of risks are assessed as needing increased adaptation action to manage potential impacts from climate change.** Nineteen risks are categorised as More Action Needed, while a further eight are categorised as requiring Critical Action Needed, the highest urgency category in the assessment. The Critical Action Needed risks include risks to:-
 - people from heat;
 - buildings and communities from heat;
 - buildings and communities from flooding;
 - UK macroeconomic performance and stability;
 - physical assets of UK businesses;
 - financial institutions and the financial system;
 - infrastructure service delivery from interdependencies; and
 - food security
- **Understanding of climate risks has improved since the previous assessment.** However, almost one third of assessed risks require Critical Investigation to improve understanding of longer-term impacts and adaptation requirements. Despite these uncertainties, the assessment concludes that there is sufficient evidence to justify increased adaptation action in the near term across most sectors.

6.2 Climate trends and future climate risks

The Technical Report highlights a number of important climate trends that are expected to shape future climate risks across the UK:-

- **The UK climate is changing rapidly.** The UK has warmed by approximately 0.25 °C per decade since the 1980s and is warming faster than the global average. Significant impacts are already being experienced from extreme heat, heavy rainfall and rising sea levels.
- **Human driven climate change is resulting in warmer, wetter winters and hotter, drier summers.** Further climate changes and extreme weather events are inevitable, although the scale and magnitude of future impacts will depend on future global emissions.
- **Multiple climate hazards can occur simultaneously or in close succession, amplifying climate impacts.** The assessment highlights growing risks from compound events, including heat and drought, extreme rainfall and flooding, and storms affecting interconnected infrastructure systems. Climate projections indicate an increase in intense rainfall events, potentially increasing flash flood risk, while combinations of strong winds and heavy rainfall could increase damage to infrastructure and communities. Compound coastal and river flooding is also expected to become more significant in some areas.
- **The potential for further changes, associated with earth system tipping points cannot be ruled out.** These include accelerated sea-level rise resulting from more rapid loss of ice from the continental ice sheets, and major changes in the circulation of the Atlantic Ocean which, if triggered, would have a major impact on UK weather patterns and climate risks. While the likelihood and timing of these impacts remain uncertain, the risks increase as global temperatures rise.
- **There is increasing evidence that climate change is already having significant impacts across the UK.** Many studies have now directly linked changes in the severity and frequency of extreme weather events to warming caused by greenhouse gases, with impacts evident on people, infrastructure and nature.

6.3 Summary of Risk Assessment results

The figure below summarises the adaptation urgency of the climate risks assessed within the Technical Report. It demonstrates that many risks require increased adaptation action, including some where further investigation is also needed.



The Table below highlights risks and opportunities categorised as requiring Critical Investigation overall and assessed as More Action Needed (MAN) during at least one assessment period up to the 2050s.

Risk Code	Risk Name	Years Rated MAN
BE6	Risks to cultural heritage and landscapes	Present, 2030
BE8	Risks to local resilience planning and emergency service response capabilities	Present, 2030
N4	Risks to soil ecosystems	Present, 2030
I5	Risks to road transport systems	Present, 2030
E3	Risks to domestic and international supply chains and resource inputs of UK businesses	Present
E4	Risks to productivity and availability of labour in the UK	Present, 2030
E6	Risks to public finances	Present, 2030
E7	Risk to household finances	Present
E8	Opportunities to UK businesses and financial institutions from delivering adaptation goods and services	Present, 2030

6.4 Headline findings from ‘A Well Adapted UK’ report

6.4.1 Future Climate Risks and Planning Assumptions

A Well-Adapted UK concludes that climate change is undermining the UK's security and prosperity. Serious climate impacts are already being experienced, and further climate change is inevitable. By the middle of the century, the UK's climate is expected to be significantly more extreme than today. The report highlights that hotter heatwaves could result in up to 92% of existing homes overheating, peak river flows could increase by up to 45%, and water supply shortfalls could exceed five billion litres per day. Without effective adaptation and continued global emissions reductions, some climate risks may exceed the UK's capacity to manage them effectively.

The report notes that current emissions pathways point towards approximately 2°C of global warming by 2050. At this level of warming, climate risks will be substantially greater than those experienced today. Higher warming outcomes, including up to 4°C of global warming by 2100, remain plausible and should be considered when planning long-lived assets and infrastructure. A 4°C world would pose fundamental challenges to society, with climate extremes becoming increasingly severe and widespread.

6.4.2 Key Climate Hazards

The report identifies three key hazards expected to drive many future impacts:-

- **Intensifying heat:** heatwaves are expected to become more frequent, longer lasting and more severe, increasing risks to health, communities, infrastructure and agricultural production.
- **Growing flood risk:** heavier rainfall, stronger storms and rising sea levels are expected to increase flood risk and damage to property and infrastructure. Peak river flows could increase by up to 45%, while sea levels around the UK could be 20–45cm higher than today.
- **Rising drought and wildfire risk:** drier summers and longer wildfire seasons are expected to increase risks to communities, ecosystems and infrastructure. The number of days with conditions suitable for serious wildfires could double.

6.4.3 Vulnerability and Interconnected Risks

The report highlights that climate impacts do not affect all groups equally. Vulnerability to climate risks varies considerably across the UK, with some communities and population groups more exposed or less able to adapt than others.

The report further notes that climate impacts overseas can increasingly affect the UK through food systems, supply chains and international markets. Around 40% of food consumed in the UK is imported, increasing exposure to climate impacts occurring elsewhere.

The outlook for climate risks is considered worse than it was five years ago. Many risks are expected to increase to dangerous levels under currently projected climate change, while interconnected risks can amplify impacts across multiple sectors.

6.4.4 Adaptation Cannot Wait

A central conclusion of the report is that adaptation cannot wait. The report states that damage from climate change is already occurring, that proven and cost-effective adaptation measures are available now, and that taking action today is cheaper than taking action tomorrow. The report concludes that impacts can be significantly reduced through adaptation action implemented at sufficient scale and pace.

6.4.5 Priority Adaptation Challenges, Targets and Recommendations for Government

The report identifies eight priority adaptation challenges, supported by a series of adaptation targets and recommendations for government to help accelerate delivery:-

1. Protecting people from heat

Proposed target: By 2050, excess heat-related mortality should be no greater, and ideally lower, than today's annual average.

Recommendations: Invest in cooling for key public services, set maximum temperature regulations for workplaces, and accelerate the uptake of cooling measures for vulnerable groups.

2. Managing flood risk

Proposed target: By 2050, the total number of residential properties impacted by flooding in the UK from all sources should remain no greater than today's level

Recommendations: Increase investment in long-term flood risk management and ensure new development does not increase future flood and climate risks.

3. Avoiding water shortages

Proposed target: By 2040, water supply should be resilient to a 1 in 500-year drought.

Recommendations: Maintain a strong regulatory focus on drought resilience and ensure new development is drought sensitive.

4. Supporting nature to adapt

Proposed target: By 2030, 30% of land should be protected for nature and by 2050 should be in good condition.

Recommendations: Invest in climate-resilient nature restoration and ensure nature protection regulation supports adaptation to future climate conditions.

5. Keeping farming viable

Proposed target: From now through to 2050, domestic food production as a share of food consumed should be sustainably maintained at 60% at least.

Recommendation: Support the viability of farming under climate change.

6. Understanding the risks to food security

Proposed target: From now through to 2050, the impact of climate-related food price inflation on household budgets should be minimised.

Recommendations: Improve information on climate risks within the food system and explore government-led adaptation measures.

7. Maintaining access to insurance

Proposed target: From now through to 2050, the UK insurance protection gap should not grow due to climate change.

Recommendation: Provide clarity on the future of flood reinsurance arrangements.

8. Adapting infrastructure to avoid cascading disruption

Proposed target: From now through to 2050, critical infrastructure systems should continue to deliver reliable services and recover quickly from any disruption.

Recommendation: Establish a more structured approach to managing infrastructure interdependencies.

6.4.6 Delivering Adaptation

Delivering effective adaptation will require action across society. The report highlights important roles for households, businesses, government and the wider public sector in improving resilience to climate change. It emphasises the need for government to create an enabling policy environment through incentives, regulation, standards and information, alongside public investment in measures that deliver wider public benefits, such as flood protection, nature restoration and resilient public services.

The report also highlights the importance of supporting communities, businesses and vulnerable households to adapt to increasing climate risks.

6.4.7 Recommendations to build a better national adaptation framework

The report recommends four steps to establish an effective adaptation framework:-

1. Establish meaningful adaptation objectives, supported by targets, and assign ownership.
2. Create delivery plans, backed with the necessary resources to deliver the objectives.
3. Monitor delivery progress against targets.
4. Improve tools, methods, information, and skills on adaptation.

7 Implications for Highland Council

- 7.1 The findings of the Technical Report and A Well-Adapted UK reinforce the strategic direction approved by Council in March 2026 through the Climate Change, Energy and Community Resilience Strategic Paper. They reinforce the Council's recognition that climate adaptation, infrastructure planning, natural systems and community resilience are closely interconnected and require a coordinated approach.
- 7.2 The national assessment identifies increasing risks associated with flooding, extreme weather, heat, drought, ecosystem degradation, food security and infrastructure interdependencies. These findings are broadly consistent with the climate risks identified through the Highland Climate Change Risk and Opportunity Assessment and the strategic direction set out within the Council's Climate Change Adaptation Strategy, Regional Coastal Change Adaptation Plan and Flood Risk Management Plans.
- 7.3 For Highland, the findings reinforce the need to continue strengthening resilience across infrastructure networks, communities, public services and natural systems, particularly given the region's extensive coastline, dispersed population and reliance on interconnected infrastructure systems. This is consistent with the Council's focus on infrastructure resilience, community resilience, coastal change adaptation and long-term climate risk management.

- 7.4 While the reports broadly reinforce the direction already being taken by the Council, they also underline the scale and urgency of the challenge. The Council's Climate Change Adaptation Strategy, together with the development of a coordinated Council-wide Climate Change Adaptation Action Plan, will play an increasingly important role in supporting risk-informed decision making, prioritisation and future investment planning. A central message from A Well-Adapted UK is that adaptation cannot wait. The report concludes that the impacts of climate change are already being experienced, that proven adaptation measures are available, and that the priority for all levels of government is now to accelerate delivery and implementation.
- 7.5 The reports also highlight the importance of coordinated action across organisations, sectors and communities. This is consistent with the collaborative approach being developed through Highland Adapts and partnership working across Highland.

8 Next Steps

- 8.1 The Technical Report and A Well-Adapted UK form the independent assessment used to inform the UK's Fourth Climate Change Risk Assessment (CCRA4), which is due to be published by the UK Government in January 2027. Following publication, the UK Government, Scottish Government, Welsh Government and Northern Ireland Executive will use the assessment to inform the development of future adaptation policies, programmes and investment priorities
- 8.2 In the meantime, work to develop a coordinated Council-wide Climate Change Adaptation Action Plan will continue across Council services, informed by the Highland Climate Change Risk and Opportunity Assessment, the findings of the Technical Report and A Well-Adapted UK, and other relevant evidence.

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Date:	13 July 2026
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Background Papers:	Climate Change Adaptation Strategy Report – August 25 Climate Change, Energy & Community Resilience Report
Appendices:	Appendix 1 – Technical Report Executive Summary Appendix 2 – 'A Well Adapted UK' Executive Summary



CCRA4-IA Technical Report Executive Summary



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Executive Summary

Headline findings

- **Climate change is causing serious impacts on the UK.** Climate change is already having significant negative impacts across the UK, and there will be further impacts in the future, although the severity will vary between nations. Around two thirds of the assessed risks have a High or Very High magnitude by the 2030s.
- **Several key aspects of climate change are accelerating, causing unprecedented extreme weather events and serious impacts.** Global warming has accelerated since the Third Climate Change Risk Assessment Technical Report, CCRA3-IA TR, in 2021. The increase in extreme events, such as UK heatwaves, and other impacts of climate change, such as sea level rise, are also accelerating. There have been numerous unprecedented extreme weather events leading to serious impacts. For example, the UK experienced temperatures of over 40 °C for the first time during the July 2022 heatwave; this led to wildfires and contributed to almost 3,000 deaths in England across five heat episodes that summer. As further climate change is inevitable, we will continue to experience previously unprecedented events. The magnitude of long-term impacts will depend on future global greenhouse gas emissions.
- **Climate risks to the UK are now higher than in CCRA3-IA TR.** The expert judgement of the majority of the report authors affirms that current and future impacts from climate risks are, overall, higher than at the time of the last assessment. This is based on new evidence of accelerating changes in climate, evidence of potential increases in exposure and/or vulnerability, and a lack of adaptation progress.
- **In the new study we assess 41 risks and 2 opportunities. By 2050, with global warming reaching 2 °C above pre-industrial levels, almost one third of the risks are assessed as being Very High magnitude.** A new category of 'Very High magnitude' has been added to the assessment to quantify impacts in the order of billions of pounds of economic damages per year, thousands of deaths per year, or the loss of species groups. The number of risks assessed to have Very High magnitude underlines the increasing level of risk faced. For example:
 - Risks to people from heat are already causing deaths in the UK, and this is projected to rise significantly in the future, increasing by several thousand people per year by the 2050s.
 - Flood risk to buildings and communities across the UK, despite significant public investment in flood defences, is expected to affect approximately 6.3 million properties in England, 45,000 in Northern Ireland, 400,000 in Scotland and 245,000 in Wales.
 - Risks to UK macroeconomic performance and stability, with even the most cautious estimates of Gross Domestic Product (GDP) losses, project damages that greatly exceed 1% of GDP.
 - Risks to the delivery of infrastructure services (such as road, rail, digital communications, and water) from interdependencies with other infrastructure systems, result in economic impacts potentially costing billions of pounds per year by the 2050s across the UK.
 - Risks to terrestrial and coastal ecosystems meaning that, for example, UK seabirds such as puffins, storm petrels, and Arctic skuas are possibly declining by up to 80% due to warming seas.
- **Many overseas climate change risks have important consequences for the UK.** Climate change impacts overseas are having damaging effects on the UK. For example, noticeably higher food prices and a lack of products on supermarket shelves are related to disruptions to imports of products and raw ingredients for processed foods. Many important international supply chains are sensitive to weather extremes and pose

risks to UK prosperity, including from disruption to the supply of essential minerals and semiconductors which are used in sectors including defence, telecommunications, the automotive industry and in medical technologies. These risks are expected to increase.

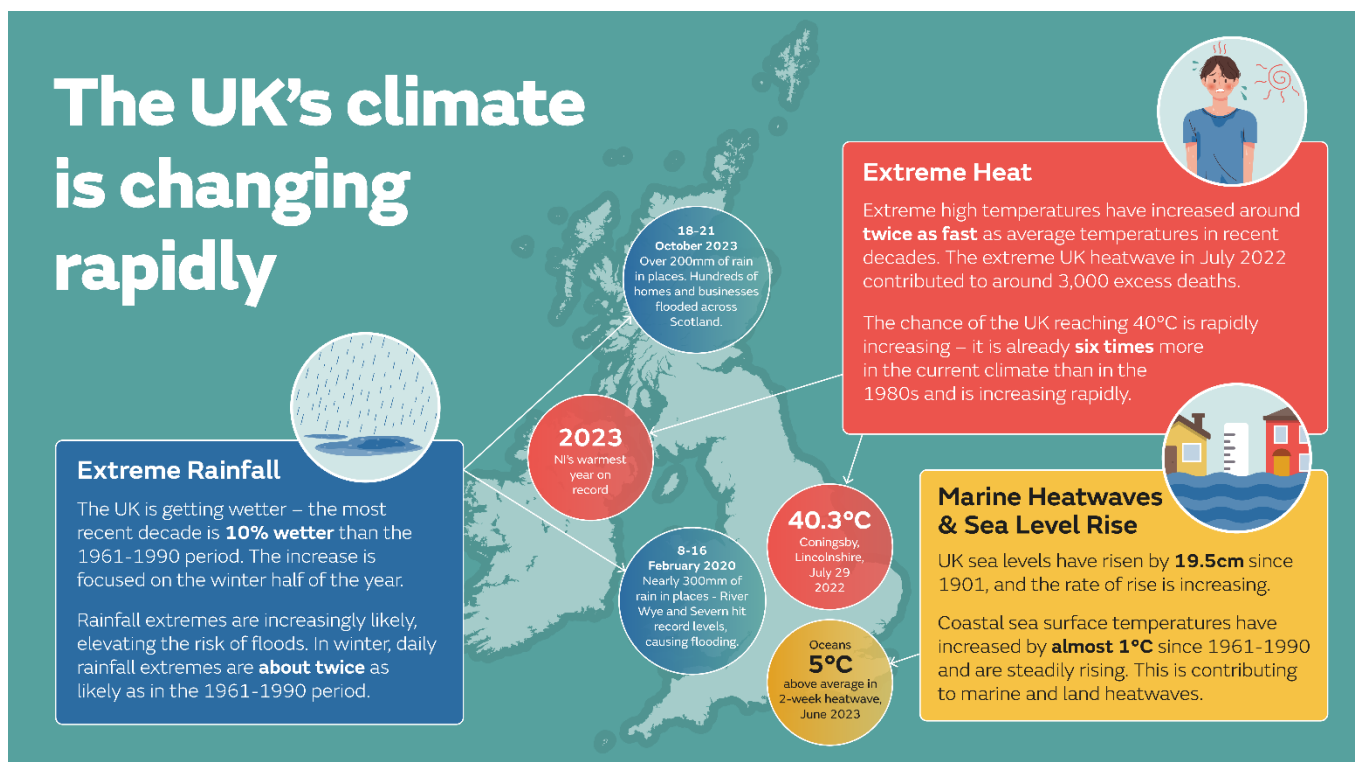
- **Current and planned adaptation measures are not sufficient to manage these risks or take advantage of new opportunities.** Adaptation plans do not significantly change the assessed magnitude for most risks and are not keeping pace with climate change. There is not enough evidence that current and planned adaptation measures are effective. Unlike in CCRA3-IA TR, none of the risks have been assessed as Sustain current action on adaptation at the UK level.
- **Nearly two thirds of the risks are assessed as needing increased adaptation action to manage potential impacts from climate change.** To increase the granularity of the current assessment, a 'Critical' category has been added to identify the highest urgency risks for adaptation action. The definitions of other adaptation action categories remain the same as in CCRA3-IA TR. In total, eight of the risks are in the new highest Critical action needed category, covering risks to: **people from heat, buildings, and communities from heat as well as flooding, the UK's macroeconomic performance and stability, physical assets of UK businesses (domestic and overseas), financial institutions and the financial system, delivery of infrastructure services from interdependencies within other infrastructure systems, and food security.** A further 19 risks are assessed as More action needed.
- **Almost one third of the risks require Critical investigation.** New scientific evidence has reduced uncertainty in many sectors, but there are significant evidence gaps or uncertainties that must be addressed before several potentially significant risks can be fully assessed. However, in the majority of cases these risks are accompanied by strong evidence of the need for increased adaptation in the near-term while the longer-term consequences of the risk are investigated.

Rapid changes in UK climate

The UK climate is changing rapidly and significant impacts are now caused by extremes of heat and rainfall, as well as from rising sea levels. The UK has warmed by around 0.25 °C per decade since the 1980s and is warming faster than the global average. In 2022, the UK experienced its first 40 °C day, virtually impossible without climate change. A 40 °C day has become four times more likely over the last three decades. Rainfall has also increased, with the most recent decade being 10% wetter than the 1961-1990 average, mostly due to increases in winter rainfall. UK sea levels have risen by more than 19 cm since 1901 and this rate of increase is accelerating, with two thirds of this rise in the last 30 years.

Figure ES1, below, shows a range of extreme weather and climate trends causing impacts to all parts of the UK. In many cases it is now possible to estimate how much human driven climate change has altered weather extremes. Examples are given in Figure ES1 and further down in Table ES1 (below).

Figure ES1: Infographic of examples of observed changes in UK climate.



Human driven climate change is causing warmer, wetter winters and hotter, drier summers in the UK. Further changes in climate and extreme weather events are inevitable, but the rate and magnitude of the changes will depend on future global emissions (Lowe et al., 2018). More extreme weather events will occur over all parts of the UK, but there will be some differences in rates of change at different locations. These future changes will require that we adapt. Further details regarding future climate extremes can be found in the State of the Climate Chapter.

Compound extremes, where impacts are amplified by multiple hazards occurring simultaneously or in close succession, are increasing. Hot, dry summers are expected to occur more frequently, reducing river flows and worsening drought impacts. At the same time, climate model projections show a sizeable increase in extreme compound summer rainfall events, with an increase in heavy rainfall occurring within a short time window,

potentially driving more flash flooding. Compound wind and rainfall extremes are projected to increase, driven by increased rainfall intensity and a strengthened jet stream. This could potentially cause more damage to infrastructure during winter storms. Compound flooding from storm surges and riverine flooding is likely to increase, leading to more damage in low lying coastal areas.

The potential for further changes, associated with earth system tipping points cannot be ruled out. These include abrupt or irreversible changes, such as major changes in the circulation of the Atlantic Ocean, which would have a major impact on UK extreme weather, or accelerated sea-level rise resulting from more rapid loss of ice from the continental ice sheets. The likelihood of these tipping points being triggered over the next few decades remains uncertain but will increase with the level of global warming. If triggered many of the impacts of tipping points won't be fully experienced for decades or even centuries.

There is increasing evidence that climate change is already having significant impacts. Increasing evidence highlights that changes in the types of extreme weather experienced by the UK are driving many types of impacts. Many studies have now directly linked the rising severity and frequency of weather extremes to warming caused by greenhouse gases (see Table ES1). Growing consequences of climate change are evident on people, infrastructure and nature.

Table ES1: Summary of recent attribution studies for UK climate hazards.

Event	Date	Description	Conclusions	Reference
Summer heatwave	June-August 2025	Hottest summer on record for UK mean temperature June-August.	The probability of summer 2025 temperatures has increased by around 70 times due to human induced climate change.	Logan et al. 2025: hctn_summer_2025_analysis_v1.1.pdf
Winter Storms	October 2023-March 2024	During the winter half-year of 2023/2024, western Europe experienced a series of damaging storms. These storms led to disruptions with exacerbated flood risks.	Observations and models indicate that average rainfall on stormy days increased by about 20% due to human induced climate change, or equivalently the 2023/2024 level has become ten times more likely.	Kew et al. 2024: Autumn and winter storm rainfall in the UK and Ireland was made about 20% heavier by human-caused climate change – World Weather Attribution
Wildfires	Summer 2022	Hot and dry conditions in summer 2022 saw a four-fold increase in wildfire occurrence compared to the previous year. The extreme heatwave in July saw fires across London and parts of England.	At least a 6-fold increase in the probability of Very High fire weather (conditions conducive to fire) in the UK due to human influence.	Burton et al 2025 Environ. Res. Lett. 20 044003 DOI 10.1088/1748-9326/adb764

Extreme heat	July 2022	On 19 July 2022, an exceptional heatwave affecting large parts of the UK peaked. It was the first time that temperatures of 40 °C have been observed in the UK.	At least 10 times more likely due to human induced climate change. The likelihood of 40 °C has been accelerating and we estimate a 50–50 chance of another exceedance in the next 12 years.	Zachariah et al. 2022: Without human-caused climate change temperatures of 40°C in the UK would have been extremely unlikely – World Weather Attribution Kay et al. 2025: https://doi.org/10.1002/wea.7741
Intense summer downpour	July 2021	On 4 July 2021, a band of high-intensity rain tracked across the city of Edinburgh, Scotland, releasing an intense downpour (‘cloudburst’) directly over Edinburgh Castle for about 15 min.	The probability of an event similar to that which occurred in July 2021 is estimated to be about 30% larger due to observed warming of the climate.	Tett et al. 2023 https://doi.org/10.1175/BAMS-D-22-0196.1
Wettest Day	October 2020	On October 3, 2020, the UK set a new record for the country's wettest day. The UK recorded 30.0 mm of rain, on average, across the entire UK and this was widely reported in the media at the time as enough rainwater to fill Loch Ness (7.6 cubic kilometres).	The record rainfall of the wettest day in year 2020 is estimated to have become about 2.5 times more likely because of human induced climate change.	Christidis et al. 2021 https://doi.org/10.1002/asl.1033

Box ES1 A robust methodology with innovations

This Technical Report is part of the package of information produced for the Climate Change Committee's (CCC) Fourth Climate Change Risk Assessment – Independent Assessment (CCRA4-IA) for the UK. The Technical Report was produced by a consortium of researchers led by the Met Office. It focuses on the physical risks and opportunities to the UK from current and future weather and climate hazards.

Since CCRA3-IA TR, the methodology has been updated reflecting learning and good practice worldwide. The updates provide an opportunity to better account for the changing nature of the risk profile as well as enhancing the ways in which the urgency of the findings can be communicated. These updates involved (1) defining a smaller but more understandable set of names and descriptions used to define the risks and opportunities, (2) extending the assessment of the overall impact or severity of the risk by adding a further Very High magnitude category and (3) updating the classification used to estimate the urgency scores from the estimated magnitude. In doing so, two new critical categories of action were added, namely Critical action needed and Critical investigation, both of which demand a level of urgency above the previous highest category of More action needed and Further Investigation. The existence of the new critical categories does not result in a downgrade in the urgency of the More action needed and Further investigation category from CCRA3-IA TR, which should be taken as seriously as in the previous assessment. Whilst the total number of risk and opportunities has reduced, the overall coverage of the risks is similar to that of CCRA3-IA TR. The urgency categories are summarised below.

- Critical action needed: The combination of Very High magnitude risks (or foregone opportunities) together with a strong evidence base results in a call for critical new, stronger Government action.
- Critical investigation: The combination of Very High/High magnitude risks (or foregone opportunities) together with a poor evidence base calls for Government to prioritise action to reduce uncertainty. This category is ranked above More action needed because of the high potential to become Critical action needed once the evidence base is strengthened.
- More action needed: A combination of Very High/High magnitude risks (or foregone opportunities) in the 2080s or High/Medium magnitude risks/foregone opportunities from present day to the 2050s, and High/Medium confidence in the strong evidence base calls for new, stronger Government action.
- Further investigation: A combination of Very High/High magnitude risks (or foregone opportunities) in the 2080s or Medium/Low magnitude risks (or foregone opportunities) from the present day till the 2050s and a poor evidence base. More evidence is required to determine if more action is needed.
- Watching brief: A combination of Low magnitude risks (or foregone opportunities) and a poor evidence base. Both the level of risk and evidence in these areas should be kept under review.
- Sustain current action: A combination of Medium/Low magnitude risks (or foregone opportunities) and strong confidence in the evidence base. Current or planned levels of activity are appropriate.

Many risks interact, often in complex ways, which can amplify the magnitude of the impacts caused by weather and climate change. However, these interactions remain difficult to quantify and evidence on the magnitude of these interactions and their effects remains limited. Unlike previous assessments, some risks are 'imported' from outside the UK, e.g., food security and supply chains. These are now treated in the sector chapters.

Two scenarios of climate change are considered – a central case based on current policies for regulating global emissions of greenhouse gases and reaching global warming of 2 °C above pre-industrial levels by 2050, and a high case that could result from either higher emissions or a more sensitive climate response to those emissions, with global warming reaching up to 4 °C above pre-industrial levels by 2100. The CCRA4-IA TR prioritises the consideration of near-term climate risk such that Critical action needed and Critical investigation are only applied for the present day, 2030s and 2050s.

Climate risks affect all sectors across all parts of the UK

This assessment has considered both the magnitude of risks, and the urgency of action needed to address the risks using the method outlined in Box ES1. A set of **41 risks and 2 opportunities** have been identified, looking across all four nations, from present day to the 2080s. These risks have been structured as best as possible to align with UK government policy areas and were defined through engagement with government departments. Each risk has been assessed for each nation by leading experts in their respective fields, following a strict methodology that was designed in conjunction with the CCC to ensure a consistent approach to the assessment of risk and opportunities across five different sectors. The sectors covered are: Health and Wellbeing; Built Environment; Land, Nature, and Food; Infrastructure; and Economy. The results have been peer reviewed by a panel of experts and by an open process with the wider scientific and policy communities.

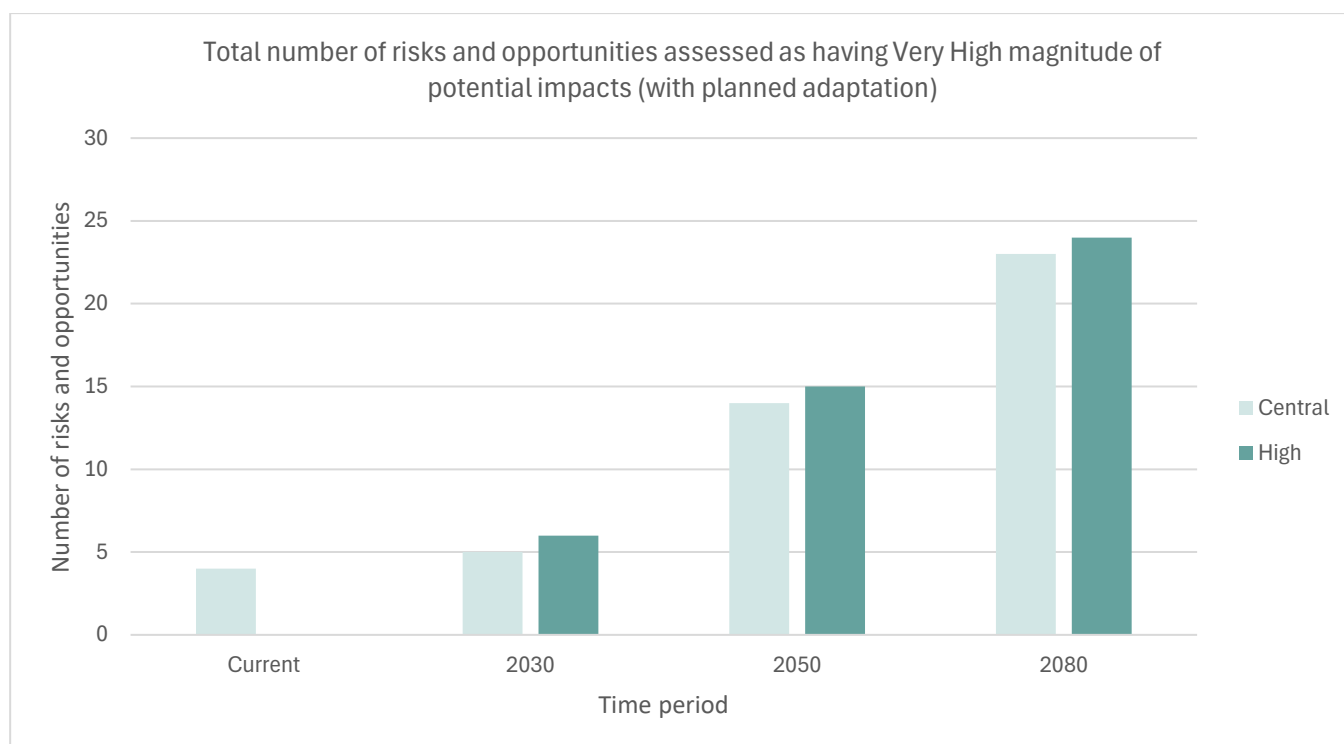
Magnitude of risk to the UK

The consequences of climate change are being felt across all parts of the UK. While there are some differences in risk magnitude between the four nations of the UK, climate change will have negative consequences in the future across all nations and for all sectors considered in the risk assessment.

The report finds that all four nations and all sectors have risks at the Very High magnitude (the highest level of potential impact) by the 2050s and a significant proportion of the resultant consequences will be felt much sooner. In this report we assess that 13 of the 41 risks (equivalent to around 32% of risks) and one of the opportunities (E8: Opportunities to UK businesses and financial institutions from delivering adaptation goods and services) are scored at the Very High magnitude in at least one nation by the 2050s, even after accounting for planned adaptation and in the central climate scenario. A total of 10 risks (around 24% of risks) and one of the opportunities have a Very high magnitude across all nations by the 2050s. When the higher climate scenario is considered, the risks increase, with some Very High magnitude impacts happening earlier (see Figure ES3).

The consequences of many climate hazards will be experienced even in the near-term. Of the 13 risks (equivalent to around 32% of risks) assessed as Very high magnitude in the 2050s, five risks (around 12% of all risks) will have reached this threshold by the 2030s with four risks assessed at this level in the present day. The timing of different magnitude levels, taken as the highest from any of the four nations and including planned adaptation is shown in Figure ES2 below.

Figure ES2. Bar chart showing number of risks and opportunities (taking the maximum score across all nations and the case with planned adaptation) in the Very High magnitude category for each time period. Blue bars show the number of risks and opportunities in the central warming scenario and orange shows the number in the high warming scenario.



Urgency of action

Urgency scores are summarised in Figures ES3 and ES4. When taken across the UK using the highest component score from any of the nations, eight risks (20% of risks) are now judged as Critical action needed (i.e. where there is established evidence of Very High risk magnitude combined with the need for critical new, stronger or different action planned), with a further 19 risks (46% of risks) identified as More action needed. This means that 66% of all risks considered require more action to manage the risk effectively. Additionally, there are 12 risks (29% of risks) requiring Critical investigation and two risks (5% of risks) requiring Further investigation. One opportunity is assessed as Critical investigation and another as Further investigation. In a significant shift from the previous assessment, Sustain current action or Watching brief is judged to be unsuitable for any risks or opportunities when viewed across the UK as a whole, although there are two risks (5% of risks) where at least one nation has a Sustain current action score. The overall UK urgency scoring for risks, taken as the maximum from all four nations, is summarised for each sector in Figure ES4. The urgency scores for the different nations of the UK are shown in more detail in Tables E3a-e.

It is useful to note that risks and opportunities within the economy chapter often integrate components from other chapters. This wider scope, whilst a real feature of the economy and finance system, means that the High and Very High magnitude thresholds (annual damages or forgone opportunities of £ hundreds of millions, and £ billions) are reached more easily than in other systems. The Technical Report identifies impacts in the order of billions of pounds of damages, or for risks considering the macroeconomy, in the order of 4-8% of UK GDP or tens of billions of pounds of damages by the 2080s. While the magnitudes are High in the context of the whole report, they are comparatively low in the context of the UK's macroeconomy and financial stability.

Figure ES3: Infographic of the urgency of responding to all risks impacting the UK.



Figure ES4: Urgency scores for the UK shown for each risk and opportunity.

Health and Wellbeing	Built Environment	Land, Nature, and Food	Infrastructure	Economy
H1: Risks to people from heat	BE1: Risks to buildings and communities from heat	N1: Risks to terrestrial and coastal ecosystems	I1: Risks to the delivery of infrastructure services from interdependencies with other infrastructure systems	E1: Risks to UK macroeconomic performance and stability
H2: Risks to people from extreme weather, excluding heat	BE2: Risks to buildings and communities from flooding	N2: Risks to freshwater ecosystems	I2: Risks to electricity generation	E2: Risks to domestic and overseas physical assets of UK businesses
H3: Risks to people from changes in air quality	BE3: Risks to buildings and communities from coastal change	N3: Risks to marine ecosystems	I3: Risks to electricity transmission and distribution systems	E3: Risks to domestic and international supply chains and resource inputs of UK businesses
H4: Risks to people from climate-sensitive infectious diseases	BE4: Risks to buildings and communities, excluding from heat, flooding and coastal change	N4: Risks to soil ecosystems	I4: Risks to fuel supply systems	E4: Risks to the productivity and availability of labour in the UK
H5: Risk to food safety and nutrition	BE5: Risks to indoor environmental quality	N5: Risks to natural carbon stores and sequestration	I5: Risks to road transport systems	E5: Risks to the financial institutions and the financial system
H6: Risks to health and social care delivery	BE6: Risks to cultural heritage and landscapes	N6: Risks to agriculture	I6: Risks to rail transport systems	E6: Risks to public finances
	BE7: Risks to facilities delivering public services, excluding health and social care	N7: Risks to fisheries and aquaculture	I7: Risks to aviation and maritime transport systems	E7: Risks to household finances
	BE8: Risks to local resilience planning and emergency service response capabilities	N8: Risks to forestry	I8: Risks to digital and communications systems	E8: Opportunities to UK businesses and financial institutions from delivering adaptation goods and services
	BE9: Risks to households from changing energy demand	N9: Opportunities for agriculture, forestry, fisheries and aquaculture	I9: Risks to water supply and wastewater systems	
		N10: Risks to food security	I10: Risks to waste management systems, excluding wastewater systems	

Urgency

CAN: Critical action needed	FI: Further investigation
CI: Critical investigation	WB: Watching brief
MAN: More action needed	SCA: Sustain current action

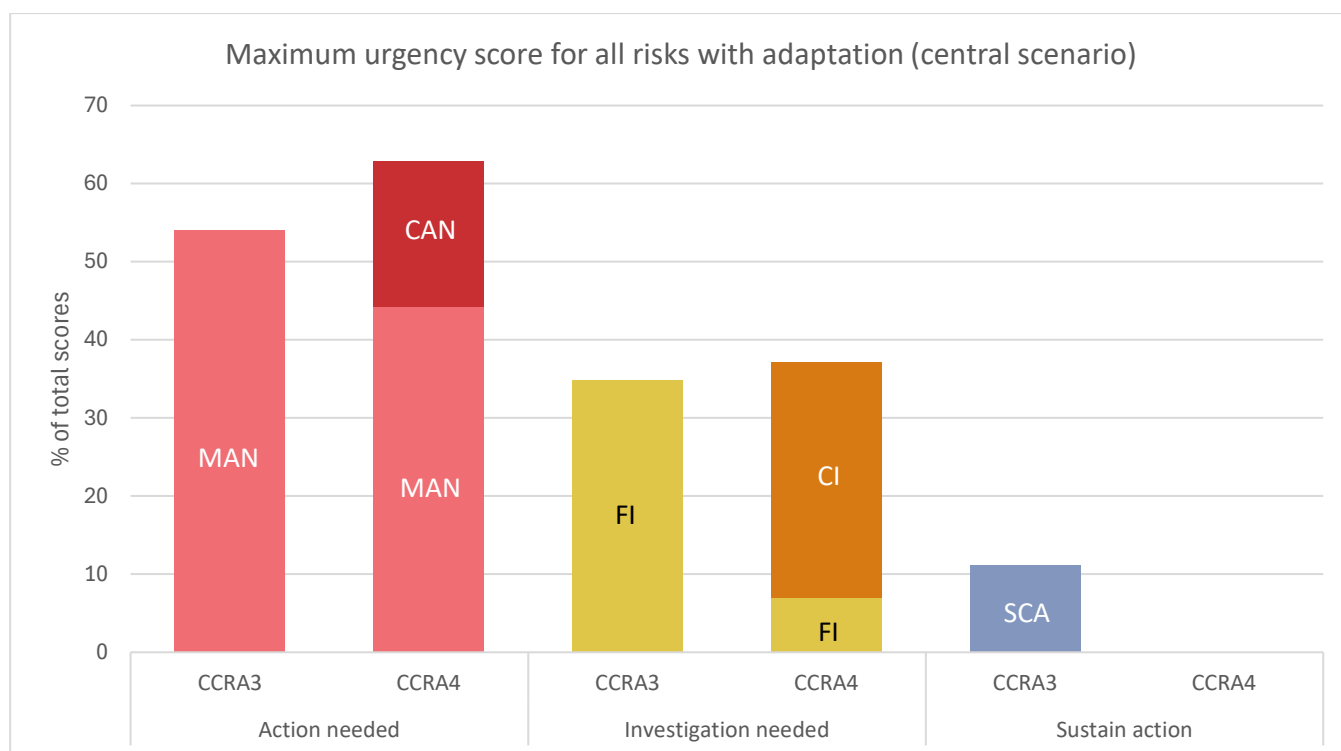
Taking account of all evidence, the authors of this technical report have concluded that the magnitude of impact from the risks are higher than that in previous assessments. The percentage of risks in each category in CCRA3-IA TR and CCRA4-IA TR are shown in Figure ES5. The increase in future risk has mainly been driven by new evidence of accelerating changes in climate and evidence of potential increases in exposure and/or vulnerability. This includes recorded events and lived experiences, such as the first summer day warmer than 40 °C and the severe drought in summer 2025, with their resulting impacts. It is consistent with the Climate Change Committee’s most recent progress reports for the UK, Northern Ireland, Scotland and Wales, which conclude that delivery of effective adaptation remains limited, with progress too slow to respond to keep up with changing risks. During the five years since the previous report (CCRA3-IA TR), the climate has continued to change, with further evidence of the impact of our changing climate accumulating each year. This trend in both climate change and climate impacts will undoubtedly continue without substantially increased adaptation efforts.

Many risks that were previously highlighted as requiring Further investigation are now judged to require Critical investigation. The percentage of risks and opportunities in each category in CCRA3-IA TR and CCRA4-IA TR are shown in Figure ES5. Additionally, the overwhelming majority of the risks in the Critical investigation category (8 of the 12 risks) and one of the opportunities also require (at minimum) action under the More action needed category in the present day or 2030s (Table ES2).

Table ES2: Risks and opportunities rated Critical investigation overall that have at least one time period up to the 2050s that include More action needed.

Risk Code	Risk Name	Years Rated MAN
BE6	Risks to cultural heritage and landscapes	Present, 2030
BE8	Risks to local resilience planning and emergency service response capabilities	Present, 2030
N4	Risks to soil ecosystems	Present, 2030
I5	Risks to road transport systems	Present, 2030
E3	Risks to domestic and international supply chains and resource inputs of UK businesses	Present
E4	Risks to productivity and availability of labour in the UK	Present, 2030
E6	Risks to public finances	Present, 2030
E7	Risk to household finances	Present
E8	Opportunities to UK businesses and financial institutions from delivering adaptation goods and services	Present, 2030

Figure ES5. Percentage of risks and opportunities in each urgency category from CCRA3-IA TR and CCRA4-IA TR. More action needed (MAN), Further investigation (FI), Sustain current action (SCA) and Watching brief (WB) have the same meaning in both assessments. Critical action needed (CAN) and Critical investigation (CI) are new categories for CCRA4-IA TR.



The evidence for informing risks in the UK is improving but gaps remain.

This Technical Report illustrates that the evidence base has continued to improve since CCRA3-IA TR, but significant evidence gaps remain across all five sectors. Often, these pertain to uneven data and evidence availability across the four nations, with frequent gaps evident in Scotland, Wales and Northern Ireland, whereas others are due to the rapidly changing nature of some of the sectors. In general, as per previous assessments, evidence for current levels of risk is stronger than future levels as the uncertainty in local climate change increases over time. Additionally, changes in exposure (such as population) and effectiveness of adaptation can be uncertain, impacting confidence in the urgency scoring of risks over long-term time horizons. Further research is also needed to better understand cascading risks, which remain a major uncertainty but are still poorly quantified in most sectors.

In quantitative terms, 14 risks (34% of the risks) and both opportunities in this assessment were judged to require additional investigation (Further investigation and Critical investigation), with 12 out of 14 risks and one of the opportunities in the new Critical investigation category. This compares with 35% in CCRA3-IA TR (Further investigation). The new Critical investigation category, which aligns the assessment with the precautionary principle, ensures that any risks with the strong potential for impacts of Very High magnitude are not overlooked simply due to a lack of current evidence.

An overall score of Critical investigation needed is based on the risk magnitude and confidence in the evidence from present day, the 2030s and 2050s. For these risks, improved evidence is urgently needed to fully establish the level of action needed, and especially whether the risk will progress to the Critical action needed category. For several of the risks assessed in the Critical investigation category, there is higher confidence in the nearer term which means action can be taken now. The risks for which there is a clear case for at least More action needed whilst the Critical investigation takes place are shown in Table ES2.

Box ES2 Key evidence gaps highlighted for critical investigation across sectors

The most urgent evidence needs are characterised by the risks with urgency scores of Critical investigation needed. These 12 risks and one opportunity are shown in Figure ES4, and Tables ES3. The sector chapters provide more detail on the research gaps.

Several cross-cutting issues are noted, which affect multiple risks in many sectors:

- There are fundamental gaps in climate science understanding, including changes in many types of weather extremes, compound and cascading risks and earth system tipping points.
- A major issue is the public availability and ease of access for data on assets, vulnerability and impacts. This includes for many public buildings
- Information on adaptation and preparedness messages and their effectiveness is an issue in multiple sectors. Metrics for monitoring adaptation progress are limited. Further, information on resilience often relies on the experience of specific individuals rather than robust, verifiable systems.
- There is insufficient evidence of systems interdependencies, especially for energy supply and transmission, which could affect risk scoring.
- Economic damages in many sectors are often poorly quantified, and there is generally less complete and less granular data on economic damages in most of the sectors considered.

Table 1E3a: Summary table of the national urgency score for the risks and opportunities in the Health and Wellbeing chapter. The urgency scores are abbreviated as follows: Critical action needed – CAN, Critical investigation – CI, More action needed – MAN, Further investigation – FI, Watching brief – WB, Sustain current action – SCA.

ID	Risk description	England	Northern Ireland	Scotland	Wales
Health and Wellbeing					
H1	Risks to people from heat	CAN	CI	CAN	CAN
H2	Risks to people from extreme weather, excluding heat	MAN	MAN	MAN	MAN
H3	Risks to people from changes in air quality	CI	CI	CI	CI
H4	Risks to people from climate-sensitive infectious diseases	MAN	MAN	MAN	MAN
H5	Risks to food safety and nutrition	FI	FI	FI	FI
H6	Risks to health and social care delivery	MAN	MAN	MAN	MAN

Table 2E3b: Summary table of the national urgency score for the risks and opportunities in the Built Environment chapter. The urgency scores are abbreviated as follows: Critical action needed – CAN, Critical investigation – CI, More action needed – MAN, Further investigation – FI, Watching brief – WB, Sustain current action – SCA.

ID	Risk description	England	Northern Ireland	Scotland	Wales
Built Environment					
BE1	Risks to buildings and communities from heat	CAN	CI	CAN	CAN
BE2	Risks to buildings and communities from flooding	CAN	CAN	CAN	CAN
BE3	Risks to buildings and communities from coastal change	MAN	FI	FI	FI
BE4	Risks to buildings and communities, excluding from heat, flooding and coastal change	MAN	MAN	MAN	MAN
BE5	Risks to indoor environmental quality	MAN	MAN	MAN	MAN
BE6	Risks to cultural heritage and landscapes	CI	CI	CI	CI
BE7	Risks to facilities delivering public services, excluding health and social care	MAN	FI	FI	FI
BE8	Risks to local resilience planning and emergency service response capabilities	CI	CI	CI	CI
BE9	Risks to households from changing energy demand	MAN	SCA	SCA	MAN

Table 3E3c: Summary table of the national urgency score for the risks and opportunities in the Land, Nature and Food chapter. The urgency scores are abbreviated as follows: Critical action needed – CAN, Critical investigation – CI, More action needed – MAN, Further investigation – FI, Watching brief – WB, Sustain current action – SCA.

ID	Risk description	England	Northern Ireland	Scotland	Wales
Land, Nature, and Food					
N1	Risks to terrestrial and coastal ecosystems	MAN	MAN	MAN	MAN
N2	Risks to freshwater ecosystems	MAN	MAN	MAN	MAN
N3	Risks to marine ecosystems	MAN	MAN	MAN	MAN
N4	Risks to soil ecosystems	CI	CI	CI	CI
N5	Risks to natural carbon stores and sequestration	MAN	MAN	MAN	MAN
N6	Risks to agriculture	MAN	MAN	MAN	MAN
N7	Risks to fisheries and aquaculture	MAN	MAN	MAN	MAN
N8	Risks to forestry	MAN	SCA	MAN	MAN
N9	Opportunities for agriculture, forestry, fisheries, and aquaculture	FI	FI	FI	FI
N10	Risks to food security	CAN	CAN	CAN	CAN

Table 4E3d: Summary table of the national urgency score for the risks and opportunities in the Infrastructure chapter. The urgency scores are abbreviated as follows: Critical action needed – CAN, Critical investigation – CI, More action needed – MAN, Further investigation – FI, Watching brief – WB, Sustain current action – SCA.

ID	Risk description	England	Northern Ireland	Scotland	Wales
Infrastructure					
I1	Risks to the delivery of infrastructure services from interdependencies with other infrastructure systems	CAN	CAN	CAN	CAN
I2	Risks to electricity generation	MAN	MAN	MAN	MAN
I3	Risks to electricity transmission and distribution systems	MAN	MAN	MAN	MAN
I4	Risks to fuel supply systems	CI	CI	CI	CI
I5	Risks to road transport systems	CI	CI	CI	CI
I6	Risks to rail transport systems	MAN	MAN	MAN	MAN
I7	Risks to aviation and maritime transport systems	CI	CI	CI	CI
I8	Risks to digital and communications systems	FI	FI	FI	FI
I9	Risks to water supply and wastewater systems	MAN	MAN	MAN	MAN
I10	Risks to waste management systems, excluding wastewater systems	FI	FI	FI	CI

Table 5E3e: Summary table of the national urgency score for the risks and opportunities in the Economy chapter. The urgency scores are abbreviated as follows: Critical action needed – CAN, Critical investigation – CI, More action needed – MAN, Further investigation – FI, Watching brief – WB, Sustain current action – SCA.

ID	Risk description	England	Northern Ireland	Scotland	Wales
Economy					
E1	Risks to UK Macroeconomic performance and stability	CAN	CAN	CAN	CAN
E2	Risks to domestic and overseas physical assets of UK businesses	CAN	CAN	CAN	CAN
E3	Risks to domestic and international supply chains and resource inputs of UK businesses	CI	CI	CI	CI
E4	Risks to the productivity and availability of labour in the UK	CI	CI	CI	CI
E5	Risks to financial institutions and the financial system	CAN	CAN	CAN	CAN
E6	Risks to public finances	CI	CI	CI	CI
E7	Risks to household finances	CI	CI	CI	CI
E8	Opportunities to UK businesses and financial institutions from delivering adaptation goods and services	CI	CI	CI	CI

Health and Wellbeing



Figure ES6: Urban green spaces, such as Kelvingrove Park in Glasgow, can deliver a range of physical and mental health benefits such as reducing chronic stress and encouraging exercise. Source: Adobe Stock

This Report Card provides a summary of the Health and Wellbeing chapter of the CCRA4 Independent Assessment's Technical Report, including an overview of each of the risks assessed as requiring the most urgent action or investigation. Full details including regional variations can be found in the chapter.

Chapter summary

Climate change presents a major threat to the health and wellbeing of vulnerable groups in the UK, such as young children, elderly people, pregnant people, people with underlying health conditions, and underprivileged and minority groups. The risks are both direct, through extreme weather and associated impacts such as heatwaves or flooding, and indirect, such as through the spread of novel diseases.

- **The need for action on risks to health and wellbeing has become more urgent** due to new evidence and continued warming in the five years since the previous Climate Change Risk Assessment (CCRA3-IA TR).
- **Extreme heat is an important factor which can worsen all health risks.** Heatwaves increase hospital admissions, worsen air quality, and strain healthcare services, for example, overheating incidents in hospitals in England have increased 53% in the last ten years. Heat-related deaths are projected to potentially triple by the 2080s (H1).
- **Flooding is a major risk to public health in the UK** with increasing evidence showing it causes long-term mental health issues. About 18 people per year die in floods in England and this could increase to about 29 people per year by the 2050s, accounting for population growth (H2).
- **Poor air quality is harmful for health.** It is currently unclear how climate change and adaptation measures will alter air pollutants in the future and this urgently needs further research.
- **Emerging infectious diseases are a growing concern (H4).** Higher temperatures and changing rainfall patterns will spread diseases rarely seen before in the UK, like West Nile virus, tick-borne encephalitis and dengue fever, some of which could become endemic in London by the 2060s.
- **Many adaptation measures for health rely on improving and expanding infrastructure** such as childcare facilities, schools, hospitals and social care structures, and these are themselves vulnerable to extreme climate events (H6). While NHS organizations have climate plans, adaptation is uneven, especially in care homes and primary care.
- Strong evidence shows that adaptation strategies based around green and blue spaces (such as parks, forests, lakes and coasts) can present **opportunities for climate resilience and public health** (Box 3.1). For example, parks in cities reduce the urban heat island effect and provide space for recreation.

CRITICAL
ACTION

H1: Risks to people from heat

Increases in heat and extreme heat pose a significant health threat. It contributes to diseases, affects medication efficacy and can impact wellbeing through lack of sleep. Vulnerable groups such as older people and those with underlying health conditions are disproportionately affected by extreme heat.

- **High temperatures result in thousands of deaths per year in the UK.** There is growing evidence of links to specific diseases, such as cardiovascular, respiratory and renal diseases, as well as negative mental health outcomes. Long-term data are needed to understand chronic heat exposure impacts. Heat-related mortality is generally higher in London and South East England.
- **Heat-related deaths across the UK could triple by the 2080s**, dependent on population growth and adaptation action.
- Policy responses in England and Scotland are fragmented and are lacking in Wales and Northern Ireland, so **critical action is needed to address the very high risk posed by extreme heat later in the century.**

CRITICAL
INVESTIGATION

H3: Risks to people from changes in air quality

Although the evidence of critical health impacts from poor air quality are clear, causing approximately 30,000 deaths per year in the UK, it is unclear how much these can be attributed to climate change. Climate change could interact with air quality in multiple ways. For example, high temperatures can increase the formation of ozone at ground level, or changing weather patterns could trap or move pollutants over large areas.

- **Critical Investigation is needed to fully understand this risk** as there is limited evidence on how much climate change currently contributes to poor air quality or how this could change in the future.

MORE
ACTION
NEEDED

H2: Risks to people from extreme weather, excluding heat

Aside from heat, flooding causes the most widespread health impacts in the UK. Other risks from extreme weather include those from drought, storms (including wind, hail and thunder), wildfire, and cold.

- **Currently, 6.1 million people in the UK are at risk of flooding and this is projected to rise significantly with climate change.** Health costs from flooding, including for mental health, are currently estimated to be hundreds of millions of pounds annually.
- **Cold weather will continue to pose a risk to health in the UK** – despite winters getting warmer, moderate cold events alone will remain a greater health risk than heat until at least the 2070s.
- **Droughts and wildfire are less well documented in the UK but are expected to grow**, with indirect health consequences. For example, significant numbers of farmers have reported feeling anxious and depressed during recent periods of extreme weather.
- **More action is needed as current and planned adaptation measures are limited**, in particular there is an evidence gap around health consequences for non-flood-related extreme weather.

H4: Risks to people from climate-sensitive infectious diseases

Higher temperatures and changing rainfall patterns will improve conditions for disease transmission and survival and could lead to the emergence of novel diseases and pests across the UK.

- **There is evidence that climate change has improved conditions in the UK for some disease-causing bacteria**, such as *Campylobacter*, *Salmonella* and *Vibrio*.
- Mosquito-borne diseases are an emerging risk in the UK. **West Nile Virus recently appeared in the UK for the first time**, likely due to climate change.
- The Asian tiger mosquito (*A. albopictus*) may establish across England by the 2040s and other UK nations by the 2060s. **Dengue fever could become endemic in London by the 2060s.**
- **Significant evidence gaps exist** around understanding of future risks across different nations, particularly from emerging diseases.
- Although the UK Biological Security Strategy offers a foundation to make the UK resilient to biological threats, **more action is needed to address the limited evidence of effective implementation of adaptation action across the UK.**

H6: Risks to health and social care delivery

The continuity and quality of healthcare are increasingly threatened by the risk of flooding, overheating, and extreme weather events, which disrupt services, damage infrastructure, and strain staff.

- **Overheating incidents in English hospitals increased by 53% from 2016 to 2024**, with the July 2022 heatwave causing treatment delays and IT outages at Guy's and St Thomas' Hospital in London. Supply chain disruptions from extreme weather will compound these risks.
- **About 26% of health facilities in the UK are at risk of flooding** — for example, Storm Ciaran resulted in ward closures and patient relocations at Ulster Hospital during — and is projected to reach 32% by the 2050s.
- Although NHS organizations must produce climate-focused Green Plans, **more action is needed as adaptation remains uneven, especially in care home settings.**
- Addressing the gaps identified in the Fourth Health and Climate Adaptation Report (2025) would strengthen resilience in health sector and reduce future risk.

Built Environment

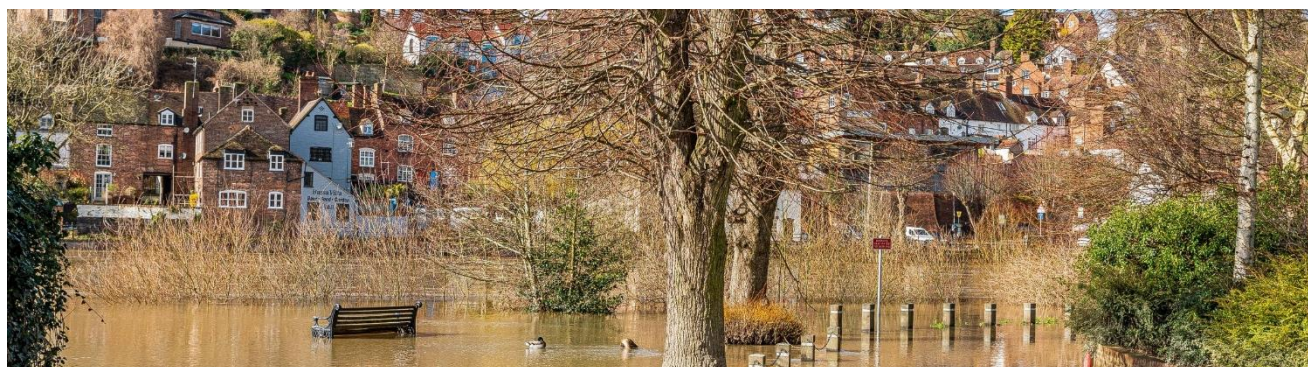


Figure ES7: Flooding by the River Severn in Bridgnorth, Shropshire, in March 2020, a few weeks after Storm Dennis resulted in severe property damage and evacuations. Flooding is a major and growing risk for communities across the UK. Image credit: Adobe Stock

This Report Card provides a summary of the Built Environment chapter of the CCRA4 Independent Assessment's Technical Report, including an overview of each of the risks assessed as requiring the most urgent action or investigation. Full details including regional variations can be found in the chapter.

Chapter summary

The UK's built environment, encompassing both residential and non-residential buildings across urban and rural landscapes, faces mounting risks from climate change. These risks are unevenly distributed, disproportionately affecting vulnerable populations in deprived neighbourhoods and isolated communities.

- **Overheating and flooding are the most critical risks** for buildings and communities, with millions of people already affected across the UK (BE1, BE2).
- **Prolonged overheating in buildings leads to health issues and cascading effects** (BE1). For instance, overheating impacts the health and comfort of people in homes, workplaces and public buildings, such as prisons and schools. Heat can lower productivity and cognitive performance, with evidence showing that academic test scores in schools have been affected (BE7). Energy demand from cooling technologies is projected to rise in the future but can be partially offset by passive cooling strategies (BE9).
- **Current flood risk is high and will worsen across all nations**, with 6.3 million existing properties in flood-risk areas in England, 45,000 in Northern Ireland, 400,000 in Scotland, and 245,100 in Wales (BE2). More intense rainfall will increase the risk of surface water and river flooding, threatening people's homes, essential services (BE7) and emergency service facilities (BE8).
- **New evidence shows that some risks from climate change will have greater impacts than previously thought**, for example, increased subsidence from reduced summer rainfall (BE4).
- **Adapting the UK's building stock to address long-term climate risks presents significant challenges and more action is required across all risks in this sector**. An important gap is around adaptation actions for existing buildings.
- **More evidence of climate impacts on the built environment and of the effectiveness of adaptation action are needed for individual countries**, particularly Scotland, Wales, and Northern Ireland, where gaps exist across several risks. However, information on climate impacts or effectiveness of adaptation in any one nation is often relevant across the whole UK and so evidence is available on which to plan action, taking into account local context.

BE1: Risks to buildings and communities from heat

Rising temperatures and heatwaves are overheating buildings and already impacting millions, particularly in England. Most existing buildings in the UK are expected to still be in use in the mid-to-late century, and many are poorly adapted to the extreme temperatures expected in the future.

- **Millions of people are already affected by overheating in buildings.** In 2023, 12% of households in England reported that their homes got uncomfortably hot.
- Hotter summers, higher nighttime temperatures and more frequent and severe heatwaves in the future will lead to **an increase building overheating across the UK** over the rest of this century.
- Although some adaptation actions for overheating exist within planning measures and building regulations for new developments, **critical action is needed around adaptation for existing buildings and to address a lack of evidence for the effectiveness of current adaptation actions**, particularly in Northern Ireland and Scotland.

BE2: Risks to buildings and communities from flooding

Flooding is a major and growing risk for communities, with the frequency and intensity of extreme rainfall events increasing due to climate change. Urban expansion and ageing infrastructure will make this risk worse.

- **Currently, 1.9 million people are at high risk of flooding in England.** Adaptation action has meant that about 200,000 properties were protected during storms Babet and Henk (2023/24).
- **By 2050, the number of properties at flood risk in the UK is expected to increase by 27%.** By 2080, annual damages for a single event could rise to £1.7 billion from £1.1 billion in England, but the highest damages per person are expected in flood-risk areas of Northern Ireland.
- Despite significant ongoing investment in flood and coastal erosion risk management, **critical action is needed to address the high number of people and properties at risk of flooding now and as the climate changes.** There are specific issues around slow project delivery and planning enforcement, while inconsistent methodology and data make UK-wide risk comparisons difficult.

BE6: Risks to cultural heritage and landscapes

This risk spans historic buildings, archaeological sites, monuments, collections, underwater heritage, and the cultural character of landscapes, including intangible elements like festivals and traditional crafts. The loss and damage of cultural heritage landscapes due to climate change is now seen as inevitable.

- **Climate change is already affecting cultural heritage and landscapes.** For example, 23 of the 35 UK World Heritage Sites are reported as exposed to climate risks; 74% of sites are exposed at risk from flooding, 26% from sea-level rise and storm surges, and 13% from severe weather events.
- **By the 2060s, 70% of National Trust sites across England, Wales and Northern Ireland may face a high or medium level of risk from climate change hazards**, rising from 30% in the present day.
- While significant effort has gone into adaptation guidance for heritage sites, this effort is variable across nations and **critical investigation is needed to understand the effectiveness of existing adaptation, as well as climate impacts on intangible aspects of our heritage and the wider cultural sector.**

BE8: Risks to local resilience planning and emergency service response

Weather events requiring emergency responses are expected to increase in the future, particularly with population growth and urban expansion. These events can sharply increase the demand for emergency services, straining resources, especially as incidents increasingly overlap or follow each other closely.

- **Wildfires are already straining emergency services.** By mid-June 2025, English and Welsh fire services had responded to 564 wildfires, more than double the 277 wildfires recorded by mid-June in 2022, the previous worst year on record.
- **There is an increasing threat to emergency service infrastructure.** For example, between 2040-2060, 20% more emergency service facilities in England could be at risk of flooding.
- Frameworks surrounding planning and response exist, but **critical investigation is still needed due to limited data and metrics available to assess this risk**, specifically around financial costs, operational delays, and physical demands on emergency services under future climate scenarios.

BE3: Risks to buildings and communities from coastal change

Coastal communities and buildings located in low-lying or erosion-prone areas are often highly at risk from climate change. Increased storminess and sea-level rise are accelerating shoreline erosion. This leads to displaced communities, harm to ecosystems, and costs from repeatedly damaged infrastructure.

- **The coastal regions of Norfolk, Suffolk, and Yorkshire are particularly vulnerable** with some areas retreating at rates of 2 to 4 metres per year. The Welsh coastline also has erosion 'hotspots' in parts of the Llyn Peninsula, Conwy Bay and Barry Island.
- **3,500 properties in England and 650 properties in Scotland are in areas that will be at significant risk from erosion** by 2055 and 2050 respectively.
- **Increasing sea levels will be a major challenge**, with Edinburgh expected to see between 30-40cm of sea level rise by the 2080s.
- Significant investment has been put into coastal flood and erosion defences and adaptation plans are being put in place across the UK, but **more action is needed as risks are increasing more quickly than current plans can address**.

BE4: Risks to buildings and communities, excluding from heat, flooding and coastal change

Other climate risks to the built environment come from wind-driven rain, storms, subsidence, high winds, and wildfires. Western Scotland and Wales are at highest risk of wind-driven rain, which increases the chance of moisture damage, mould, and material decay, particularly in heritage buildings.

- **Adverse weather is contributing to increasing home claims.** In 2023, the value of storm-related claims in the UK was £133 million, with a further £153 million related to burst pipes (excluding flood-related claims), largely caused by the succession of storms in Autumn 2023.
- **Declining average summer rainfall contributes to worsening soil drought and increases subsidence risk** with most clay-rich areas likely to be affected by subsidence by 2080. Wildfires are an emerging risk; hazardous fire weather days could increase five-fold under 4°C warming.

- Adaptation efforts taking place include updated building standards to address adverse weather and new Welsh legislation to addressing coal tip landslides, **but more action is needed to address risks to existing buildings and to respond to emerging risks like wildfires.**

MORE
ACTION
NEEDED

BE5: Risks to indoor environmental quality

Indoor Environmental Quality (IEQ) refers to conditions within a building, including thermal comfort (BE1) and indoor air quality (IAQ). It can impact people's health and wellbeing, particularly vulnerable groups. Non-climate factors such as building design have a major influence, but IAQ can be affected by climate change through rising temperatures, increased humidity and altered rainfall patterns.

- **Damp or mould currently affects almost 1 million, but potentially up to 6.5 million, households in England,** contributing to over 10,000 cases of respiratory conditions per year.
- **Wildfires can triple indoor particulate levels.** Although emission reductions are expected to drive greater improvements in air quality than climate change effects through to the 2050s, heatwaves and rising wildfire risk may worsen pollution episodes.
- Despite progress in ventilation standards for new buildings, **more action is needed to gather baseline data and consistent metrics for assessment in order to understand future IAQ risk.**

MORE
ACTION
NEEDED

BE7: Risks to facilities delivering public services, excluding health and social care

Public service facilities such as prisons, schools, and sports facilities are increasingly exposed to climate-related risks, mainly from overheating and flooding, which will be exacerbated by climate change.

- **Currently, nearly 50% of schools in England are at risk from flooding,** affecting 1.2 million pupils.
- **By the 2050s, all prison estates in England and Wales will face a high risk of summer overheating,** and up to 89% of prisons may also face severe flood risk.
- **By the 2080s cumulative lost learning time in schools could reach 14 days annually,** with children in Southern England experiencing 'severe' cognitive performance loss for over 80% of the Spring and Summer months without adaptation action.
- Adaptation action is highly variable across the UK and largely focussed on schools and prisons, particularly in England, with limited evidence of progress or effectiveness. **More action is needed to address climate risks for non-residential buildings other than schools and prisons.**

MORE
ACTION
NEEDED

BE9: Risks and opportunities to households from changing energy demand

Demand for cooling in the summer will rise due to increasing temperatures and more frequent heatwaves, while demand for heating in the winter will decline. Summer energy bills are influenced by the adoption of air conditioning (AC) and passive adaptation measures like shading or reflective roofs.

- **An estimated 8–19% of UK households currently own AC units, with 80% of purchases made since 2022.** Greater London has the highest current adoption rate of AC units.
- **Demand for cooling in the summer will rise along with increases in temperature,** particularly in England.
- Some action is being taken across the UK to consider overheating, for example in regulations for new buildings or in local government adaptation plans, but **overall more action is needed to monitor and manage the cost of increased cooling for households, particularly low income and vulnerable households.**

Land, Nature, and Food



Figure ES8: Firefighters tackle a grass fire on an upland moor in Wales. Wildfires are an emerging climate risk across the UK, threatening ecosystems, carbon stores and forestry. Image credit: Adobe Stock

This Report Card provides a summary of the Land, Nature, and Food chapter of the CCRA4 Independent Assessment's Technical Report, including an overview of each of the risks assessed as requiring the most urgent action or investigation. Full details including regional variations can be found in the chapter.

Chapter summary

Land, nature, and food make up the UK's natural environment, covering everything above and below ground, as well as freshwater areas and nearby seas. Climate change is altering ecosystems, disrupting commercial sectors, degrading soil and carbon stores and threatening food security.

- **Climate change presents a critical and growing threat to the UK's food security (N10) due to our reliance on climate-vulnerable food imports, while climate impacts on soils and agricultural productivity (N4, N6) reduce domestic resilience.** Future climate impacts in Europe could result in at least £1 billion annually being added to UK food prices.
- **Biodiversity loss and habitat fragmentation are accelerating as a result of rising temperatures, extreme weather, and sea-level rise (N1:N5).** Non-climate pressures including pollution, invasive species, and soil degradation, combine with climate change to weaken the health of land, freshwater, and marine ecosystems. Populations of UK seabirds such as puffins, storm petrels, and Arctic skuas could decline by up to 80% by the 2050s due to warming seas.
- **Agriculture, fisheries and forestry are already being damaged by climate change (N6:N8).** UK agriculture currently faces annual losses of around £1 billion due to extreme weather, and recent storms have damaged thousands of hectares of forests across the UK. Disruption to ecosystems from climate change has significant knock-on effects upon these industries.
- **Increasingly frequent and extreme weather events will have severe impacts across the natural environment in the future.** Extreme rainfall will erode soils more rapidly, peatlands and forestry will come under threat from increasing wildfire activity, and marine heatwaves will damage fisheries. Impacts are already leading to severe losses in crop harvest, for example by 2050 the proportion of 'high-quality farmland' in the UK is projected to shrink from 38% (1961-1990) to 11% due to droughts (N6).
- Awareness of climate risks across the natural environment sector is generally high but **adaptation actions are frequently fragmented or siloed by geographical boundaries** and with some important areas overlooked, such as impacts on blue carbon or soil health beyond arable farming. Evidence of adaptation action and its effectiveness is lacking across the whole sector.

N10: Risks to food security

Climate change is disrupting the UK food system and our access to safe, nutritious food. Extreme weather events, flooding, drought and soil erosion all affect domestic production, international imports and manufacturing. The UK is reliant on climate-vulnerable imports of fruit, vegetables, legumes and rice.

- **Around 18% of the UK's fruit and vegetables currently come from nations at high – and moderate – risk to climate change.** Crop yields have declined in the South and East of Europe, increasing food insecurity in the UK, particularly for low-income households.
- **By the 2060s, climate driven food price rises in Europe could be adding around £1 billion a year to UK national food costs,** while domestic production will come under increasing pressure.
- Food strategies at the UK and nation-level recognise climate risks, but **critical action is needed to address a lack of clear delivery plans which address systemic threats to food security.**

N4: Risks to soil ecosystems

Healthy soils underpin agriculture, water regulation, and wider ecosystem resilience. Climate change is increasing risks to soil stability and function, along with intensified runoff, erosion, pollutant mobilisation.

- **Soil erosion across the UK is happening faster than soils can naturally recover,** with the highest erosion rates in Wales and northern England where many peat soils are located. Around 16% of arable fields in the UK are losing soil at rates higher than a 'tolerable' level.
- Future impacts are expected to worsen, with **UK soil erosion from rainfall projected to rise by at least 15% by 2050.**
- **Adaptation policies for soil risks are limited and Critical investigation is required to understand long-term (i.e. beyond the 2030s) climate risks to soil health.** There is currently no coordinated long-term UK strategy to support soil health other than for arable land.

N1: Risks to terrestrial and coastal ecosystems

Climate change is accelerating the decline of UK terrestrial and coastal ecosystems. Warming temperatures, drought, wildfires, sea-level rise and invasive species are reducing habitat area, biodiversity, and ecological function. Terrestrial and coastal ecosystems are also affected by longstanding pressures such as pollution, fragmentation, drainage and land use change.

- **There is strong evidence from the past 30 years of climate impacts on UK ecosystems, with clear, observed declines in species and habitats, and ecological processes shifting.** For example, average UK flowering now occurs a month earlier than 30 years ago.
- Future impacts are projected to intensify. **By the 2050s, UK National Nature Reserves will likely face significant climate risks, with around 95% exposed to hotter summers, especially in southern England, where temperatures may rise by over 1.5 °C,** with about half facing lower river flows and higher wildfire risk, increasing stress on wildlife and habitats.
- **Action is needed to accelerate and expand current UK responses, as adaptation is largely confined to protected areas and fragmented restoration efforts.** Crucially, ecosystems are not currently considered alongside broader agricultural, coastal and development adaptation policy.

N2: Risks to freshwater ecosystems

Climate change is degrading the UK's freshwater ecosystems. Drought-driven reductions in river flow, warmer water temperatures, and heavier rainfall all harm water quality and weaken the overall health of freshwater habitats. This threatens the biodiversity of these ecosystems as well as services such as flood regulation. Land-use change, pollution, and invasive species are important compounding factors.

- **Freshwater ecosystems are already severely degraded**, with no river in England or Northern Ireland currently rated as having good overall chemical health. Climate change is reshaping ecosystems with cold-water species like brown trout declining and invasive species spreading.
- **By the 2050s, warming could push many freshwater ecosystems beyond their ability to adapt**, leading to widespread biodiversity loss, habitat decline, and ecological disruption.
- **Adaptation actions so far have had mixed success.** National frameworks and strategies lack both clear objectives and long-term targets and more action is needed to address this risk. There is also an urgent need to monitor and understand the effectiveness of adaptation actions.

N3: Risks to marine ecosystems

Marine ecosystems support biodiversity across the UK. They are increasingly disrupted by climate change, including warming waters, increased stratification, altered currents, acidification and de-oxygenation.

- The seas around the UK are warming rapidly; **there are now about four more marine heatwave events per year compared to the 1980s**. The resulting change in prey availability means that many seabirds are already at the southern limit of their breeding range.
- **By 2100, models project major climate-induced shifts in marine habitats**, threatening Marine Protected Area (MPA) effectiveness.
- The marine environment and ecosystems are recognised in national adaptation policies, particularly through the MPAs. However, MPAs are focused on protecting a certain habitat or species in present conditions, impact of climate change is not yet included in MPA planning. Thus, **more action is needed to address gaps in implementation of planned adaptation measures as well as gather information on their effectiveness**.

N5: Risks to natural carbon sources and sequestration

The UK's natural carbon stores include peatlands, native woodlands, and coastal ecosystems. They face escalating risks as climate change increases warming, drying, and wildfire incidence. These pressures compound existing degradation from agriculture, drainage, pollution, and infrastructure development.

- **Some peatlands, such as those in Northern Ireland, have already shifted from carbon sinks to net sources of carbon due to degradation and pressure from warming, droughts and wildfires.** 80% of England's peatlands are assessed as dry or degraded.
- Future warming will increase the risk to natural carbon stores. **Scotland's Flow Country peatlands, one of the largest bogs in Europe, could move outside the conditions required for peat formation by the 2080s.**
- **Adaptation efforts have increased in the last five years, but are fragmented and more action is needed**, particularly around blue carbon in coastal and marine ecosystems which is currently poorly integrated into current policy frameworks.

N6: Risks to agriculture

Extreme weather driven by climate change is already affecting UK agriculture. Rising temperatures, shifting rainfall, and more frequent extreme events reduce productivity, damage soils and ecosystems, and increase pressure on farmers.

- **UK agriculture is already experiencing losses of around £1 billion per year due to recent extreme events.** Wet conditions in 2024 affected wheat yields, lowering production by 20%, while increased poultry deaths from extreme heat in summer 2022 reduced production by 2.6%.
- Risks to UK farms will increase as a result of climate change. **By 2050, the proportion of ‘high-quality farmland’ in the UK is projected to shrink from 38% (1961-1990) to 11% due to drought.**
- New agricultural policies are promoting climate resilience but there is still **a need for more action to address gaps in strategic future targets as well as indicators to track changing climate risk and the effectiveness of adaptation.** Building awareness of adaptation options amongst farmers, especially ‘quick wins’, would support more effective uptake.

N7: Risks to fisheries and aquaculture

Fisheries and aquaculture are an important part of the UK’s economy and food supply. They face significant threats from climate change including rising sea surface temperatures, more frequent and intense marine heatwaves, and ocean acidification, all of which exacerbate the impacts of pests and pathogens and alter the suitability of marine environments.

- **Warming seas are shifting species distributions.** Coldwater fish such as cod have declined, reducing North Sea catches, while warmwater species such as European seabass are becoming increasingly common.
- **Future losses for fisheries from climate change could be severe** with the Northwest Atlantic projected to face 12% average loss of fish by mid-century and up to 35% by 2100.
- While climate adaptation policies exist in this sector, they are inconsistently applied and management is fragmented. **More action is needed to ensure that climate risks are not overlooked in fisheries planning and to coordinate across geographical boundaries.**

N8: Risks to forestry

Forests and the ecosystems they support are culturally significant to the UK and provide value through services and natural capital. They face increasing risks from climate change due to rising temperatures, shifting rainfall patterns, droughts, wildfires, and more frequent and intense extreme weather, in particular storms. Pests and diseases are also spreading more widely due to climate change.

- **Extreme wind causes severe damage to UK forests and wind speeds are expected to increase in the future.** Storm Arwen in 2021 affected around 4,000 hectares of Scottish forests and resulted in around 1 million m³ of fallen trees.
- **Forest ecosystems are increasingly at risk of partial or total collapse within the next 50 years** due to interacting climate-driven disturbances of wind, fire, pests, and bark beetles.
- New strategic action plans are helping support forestry adaptation across the UK, but **more action is needed to understand where adaptation measures are actually being used** as well as to consider compound risks, such as a windstorm immediately following a flooding event.

Infrastructure



Figure ES9: A repair platform fixes the railway line at Dawlish, Devon, following severe storm damage in 2014. This section of line has had to be repeatedly repaired in the following years, most recently after Storm Ingrid in January 2026. Image credit: Adobe Stock

This Report Card provides a summary of the Infrastructure chapter of the CCRA4 Independent Assessment's Technical Report, including an overview of each of the risks assessed as requiring the most urgent action or investigation*. Full details including regional variations can be found in the chapter.

Chapter summary

Our national infrastructure includes transport, energy and digital communication networks, as well as waste and water systems. It underpins the functioning of our society and economy, but climate change is already causing costly impacts either by directly damaging our infrastructure as a result of intensifying extreme weather events or altering the surrounding environment.

- The **highly interconnected nature of our national infrastructure makes it vulnerable to extreme weather**; a failure in one network or system has a cascading effect which can impact other infrastructure services (I1). This interconnection will only deepen into the future as our systems become more integrated, particularly through electrification and the use of digital technologies.
- In many cases **risks are compounded by the condition and design of long-life infrastructure assets** like road (I5) and rail networks (I6), and sewage systems (I9). Often these assets are aging and may not be resilient even to our current climate.
- **New technologies will bring major changes to our national infrastructure landscape**, most importantly around electricity generation, transmission, and distribution (I2, I3), as well as for road transport (I5) and fuel supply (I4). This presents an opportunity to build climate resilience into new infrastructure and networks.
- Without effective adaptation, the intensification of extreme weather and the associated hazards will cause greater damage and disruption to our infrastructure networks. Adaptation plans and policies exist for most infrastructure sectors, and actions are starting to be implemented, but **there needs to be increased monitoring and evaluation of adaptation actions to measure their effectiveness and the improvements to system resilience**.
- **England, Northern Ireland, Scotland and Wales will each face their own individual challenges**. For example, there is a high risk of collapse of coal spoil tips in Wales (I10), while Scotland has a relatively high number of private water supplies, serving about 2.5% of the population (I9).

11: Risks to the delivery of infrastructure services from interdependencies with other infrastructure systems

The UK's national infrastructure is highly interconnected – disruption to one system can trigger failures across others, amplifying extreme weather impacts. This reliance will deepen, as most infrastructure services are underpinned by changing electricity systems and are increasingly connected by digital and communication systems.

- **Examples of critical infrastructure breakdown due to extreme weather are being increasingly documented.** For example, a severe heatwave across the UK in July 2022 led to data centre outages at Guy's and St Thomas' NHS Trust in London, disrupting clinical IT systems for weeks.
- Increasingly large and frequent damage to infrastructure from extreme weather could lead to severe losses of function across multiple systems, with estimated **costs of £ billions annually by the 2050s.**
- **The impacts from cascading infrastructure failure could be severe and critical action is required to prepare for this risk.** In particular, there is currently no systematic UK-wide assessment of infrastructure interdependencies. Additionally, there is a need to understand the downstream impacts of sector-specific adaptation strategies on interconnected systems.

14: Risks to fuel supply systems

The UK's fuel supply system is complex, including infrastructure for the production, refining, storage and transport of both liquid and gaseous fuel. These diverse assets are exposed to impacts from extreme weather events, such as floods, droughts and wildfires, while high temperatures can reduce equipment operating capacity. As the UK decarbonises, the fuel supply system is also currently undergoing significant changes, bringing opportunities to build climate resilience.

- Although some evidence is available on current climate risks and the adaptation action that has taken place so far, **critical investigation is required to address limited information on future climate risk to fuel supply systems and a lack of quantitative evidence for the benefits of adaptation,** as well as gaps around monitoring and evaluation.

15: Risks to road transport systems

Road transport infrastructure, which includes active travel and bus services, underpins many of the other transport networks in the UK, as well as other infrastructure services. Without adaptation, road networks will suffer increasing impacts from more frequent and severe extreme weather in the future, for example from flooding, subsidence, and landslides.

- Current challenges around road transport systems include **adapting legacy infrastructure which is not resilient to present-day or future climate risks, and addressing risks to local roads,** which are less well-served than major road networks in terms of data, risk assessments, and adaptation planning.
- Beyond action to address present-day risks, **critical investigation is needed to understand future climate risks to road transport, including evidence on the impact of adaptation to reduce risks.**

17: Risks to aviation, and maritime transport systems

Aviation, ports, shipping, and inland waterways face a range of risks from climate change. Flooding and extreme wind are the main hazards for aviation, while sea-level rise, coastal flooding, extreme temperatures and increased wind-load are the main hazards for ports and shipping. International shipping and aviation can be impacted by climate hazards outside of the UK.

- There is evidence of adaptation taking place in airports, but there are limited adaptation policies in place for ports and shipping and very limited evidence exists around inland waterways. However, current adaptation plans are focussed on short timeframes and **critical investigation is needed to address the limited evidence around future climate risks, as well as to understand the effectiveness of adaptation action in the aviation and marine sectors.**

110: Risks to waste management systems, excluding wastewater systems

Waste management systems include infrastructure such as landfill sites, waste incinerators, recycling and material recovery centres, but also nuclear waste and decommissioned power stations, and mining sites, particularly coal spoil tips. Impacts from climate change include release of landfill waste as a result of coastal erosion or flooding, but reported cases are local in scale.

- The climate risk to waste management systems is assessed as low across the UK apart from in **Wales, where critical investigation is needed into the current high risk of potential coal spoil tip collapse** which can occur as a result of heavy rainfall, although this risk is expected to reduce in the future as a result of adaptation actions.

12: Risks to electricity generation

UK electricity generation capacity will expand to meet rising demand, with a larger share coming from distributed renewables. The future power system will be more weather sensitive with a greater use of wind and solar generation. However, the system will continue to be designed to deal with variability from weather, which is anticipated to be larger than any projected changes in weather due to climate change.

- Evidence of current climate impacts on electricity generation is limited, but **the system has demonstrated resilience to recent weather-related hazards.**
- In the future, the **number of power stations in England at serious risk of flooding could approximately double with a global temperature rise of 4 °C.**
- **There may be an increase in periods of low solar and wind resources for the UK** which are anticipated to be managed through adequate planning for security of supply.
- Awareness of climate risks in this sector is high, but **more action is needed to address a lack of detailed adaptation strategies and quantitative measures of success.**

MORE
ACTION
NEEDED

13: Risks to electricity transmission and distribution systems

The electricity network in the UK is a mix of physical assets, such as pylons and undersea cables, which transmit electricity from power stations and connect to overseas networks. Infrastructure is increasingly vulnerable to droughts, flooding, overheating and high winds as extreme weather becomes more common. The electricity network is also currently undergoing a significant transformation and upgrade.

- Named storms have brought substantial disruption to electricity distribution networks in the UK - **in 2022, storms Dudley, Eunice, and Franklin caused loss of power to over 1 million homes**. Substation flooding is identified as the current risk with highest overall impact.
- It is not yet fully understood how planned expansion and upgrades to the electricity system will be affected by climate change; risks will increase, but this is also an opportunity for adaptation.
- More action is needed to address risks to electricity transmission and distribution systems in England, Scotland and Wales, as **while adaptation is taking place, there is limited evidence on how effective that adaptation has been**. Northern Ireland is not subject to the same reporting powers as the rest of the UK and so evidence for action to address future risks is limited.

MORE
ACTION
NEEDED

16: Risks to rail transport systems

Extreme weather affects rail networks both by damaging infrastructure and by causing service disruptions. Much of the UK's rail network was built before modern-day design and construction standards, increasing the risk from climate hazards.

- In Great Britain, **disruption costs from wind, flooding and subsidence were £383 million, £316 million and £144 million respectively, from 2006-2024** while the impact of extreme heat on rail networks has become more prominent in the past decade.
- Increasingly frequent and severe extreme weather events in the future could result in **costs in the £ billions in England and £10s of millions in Scotland by the 2080s**.
- Adaptation to climate change is recognised as essential by the sector; risk assessments and adaptation plans have been carried out across the UK. However, **more action is needed to address a lack of quantitative evidence on the effectiveness of adaptation to date**.

MORE
ACTION
NEEDED

19: Risks to water supply and wastewater systems

Water supply and wastewater infrastructure will come under increasing pressure from droughts and flooding, compounded by future population growth and an expected rise in industries with high water demand. Droughts, high temperatures, and floods will also pose a major threat to water quality, compounded by inadequate pollution control and an emerging risk from wildfires.

- **The UK's water supply and wastewater systems are currently vulnerable to extreme weather events. Drought in particular poses the principal threat to future UK water supply.** For example, two drought-prone areas with high water abstraction have been identified in Scotland near the rivers Spey and Tay, where the frequency of drought could more than double by the 2080s.
- Planned adaptation action will reduce climate risk to this sector in the future, although the risk is still expected to remain high. **More action is needed as the quality of adaptation planning is variable**, lacking specificity and with limited evidence on quantitative measures of success or monitoring of implementation.

Economy



Figure ES10: Industrial zones such as the port at Felixstowe, Suffolk, are major hubs for the transport of goods, but are at risk from saline intrusion, more severe storm surges, and erosion, as a result of sea level rise. Image credit: Adobe Stock

This Report Card provides a summary of the Economy chapter of the CCRA4 Independent Assessment's Technical Report, including an overview of each of the risks assessed as requiring the most urgent action or investigation. Full details including regional variations can be found in the chapter.

Chapter overview

Climate change poses significant risks to the UK economy, affecting macroeconomic stability, business assets, supply chains, productivity and labour, public and private finance, households, and adaptation opportunities. Most economic risks have become more urgent since the CCRA3-IA-TR, except for household finances. Many risks were not listed individually in the CCRA3-IA, reflecting the growing recognition of economic challenges.

- **The overall economy of the UK, the macroeconomy, has already been affected by climate change and these impacts are expected to rise sharply in the future (E1).** Under a 'current policies' scenario, the UK economy could see losses of at least 7.4% of Gross Domestic Product (GDP) by the end of the century.
- The impact of climate change on the economy is an aggregate of all risks in this report and the **potentially severe economic losses reflect an urgent need for adaptation across all sectors.**
- **The UK's economy is exposed to rising international climate risks due to globalised supply chains, overseas business assets and its role as a financial hub.** Climate shocks abroad directly influence UK production, prices and macroeconomic stability (E1, E2, E3, E5). Rising global demand for adaptation goods and services presents opportunities for UK businesses (E8).
- **Without adaptation, households will face increasing financial pressures which will disproportionately affect vulnerable groups and the less well-off.** Rising food prices could cost the average household about £275 more per year by 2050, insurance premiums will increase and many people will face direct costs to repair their homes following extreme climate events.
- **Compared to other sectors, less quantitative evidence is available on how climate change will affect the UK's economy,** and so the assessment of climate risks and urgency for action in this chapter also use expert opinion along with evidence from other countries. Additionally, extreme climate outcomes are generally not accounted for in macroeconomic modelling. This highlights an urgent need for measurements and modelling of economic climate impacts on the UK.
- **Awareness of climate-related economic risks is growing,** but as highlighted throughout this report, there is a need for robust evaluation of real-world effectiveness of adaptation actions in order to fully understand the risks from climate change to the economy.

E1: Risks to UK macroeconomic performance and stability

The macroeconomy refers to the economy at the national level, so this risk represents an aggregation and synthesis of all other sectoral risks across the CCRA4-IA-TR. Climate change poses complex risks to the overall UK economy, affecting GDP, inflation and productivity, with increasing economic shocks from floods, droughts and storms disrupting trade, investment and fiscal stability in the UK and overseas.

- **The costs imposed by climate change are already significant, even at the current level of warming.** For the last decade a lower bound on economic losses in the UK due to climate change is between £2-10 billion per year (0.05-0.35% of current GDP).
- **Future economic damages are expected to rise sharply.** Substantial GDP losses are expected at higher levels of warming; under a 'current policies' scenario with 4 °C temperature rise by the end of the century, the UK economy could see losses of at least 7.4% GDP.
- Progress on UK adaptation overall is assessed as inadequate and so preparedness for climate risks to the macroeconomy are considered limited. **Critical action is needed to ensure that adaptation delivery matches the scale of risks identified across the whole of this report** and to address the lack of macroeconomic risk indicators that can be used in adaptation planning.

E2: Risks to domestic and overseas physical assets of UK businesses

Business infrastructure, equipment and property in the UK and overseas are at risk from physical climate hazards such as floods and heatwaves. These can cause disruption to operations, damage infrastructure, stop production, and increase insurance costs, leading to reduced asset values.

- **Extreme weather currently causes major financial costs for UK businesses** — the estimated direct costs of flood damage to business properties across the UK is £670 million per year. 40% of business-critical infrastructure in England is currently at risk from flooding.
- **UK owned assets are widely spread globally, exposing firms to different climate risks.** Half of the UK's foreign investment is in Europe, where flood risk is the largest physical climate risk.
- Despite significant progress, **challenges remain and critical action is needed to address an uneven uptake of climate adaptation measures**, with small and medium-sized enterprises often constrained by financial or informational barriers.

E5: Risks to financial institutions and the financial system

The financial and insurance services sector is a significant part of the national economy; in 2023 it contributed £208.2 billion to the UK (8.8% of total economic output). Climate risks in this sector already influence lending from banks, underwriting of insurance and capital allocation from investors.

- **Current economic damage to the UK's financial system is material but not yet considered system-threatening and is estimated in £ hundreds of millions.** UK institutions are highly exposed to climate risks due to their central role in international finance, but to date have not experienced significant climate-related liability losses.
- **Climate risks to the finance sector will increase with warming and more frequent extreme weather.** By the 2050s, climate-related insurance claims and loan losses are expected to rise with UK insurers facing ~50% higher annual losses under severe scenarios. There is evidence that physical climate risks are not

assessed accurately by the financial system, for example, 65% of insurers currently use historical claims data for pricing, rather than models that adjust for future climate change.

- There has been progress in identifying and managing climate-related financial risks, but these measures are only partial and **critical action is needed as the scale and speed of climate impacts may outpace current risk management and supervisory tools.**

CRITICAL
INVESTIGATION

E3: Risks to domestic and international supply chains and resource inputs of UK businesses

UK supply chains are vulnerable to climate impacts, particularly where they are global, complex, or concentrated. Extreme weather events can be highly damaging for critical transport and other infrastructure, both in the UK and internationally. Supply chains are crucially important to the UK's food security and for our health system.

- **UK supply chains are highly globalised, putting them at risk from climate shocks.** A fifth of the economic value from UK global supply chains originates in countries and regions at 'medium' to 'very high' levels of climate risk.
- **Infrastructure for supply chains will be a greater risk from climate impacts in the future.** 95% of all UK trade, by volume, is transported by sea. The number of key global ports at high risk from multiple climate hazards could nearly double by 2100 — rising from 385 to 691.
- Some action is taking place at a national level as well as within businesses. **However, overall the UK is only partially prepared for climate disruption to supply chains and critical investigation is needed to build the evidence base for adaptation action,** in particular there is lack of comprehensive mapping of UK supply chain dependencies.

CRITICAL
INVESTIGATION

E4: Risks to the productivity and availability of labour in the UK

Climate change has already had direct and indirect impacts on the UK's workforce. For example, heatwaves affect people's health and productivity in the workplace, while increased flooding will affect their ability to get to their workplaces. Those sectors of the economy involving outdoor labour, such as agriculture and construction, are particularly vulnerable.

- **Extreme temperatures already affect people's productivity and health in the UK.** Hot days are currently estimated to cost the UK £1.2 billion per year in productivity losses.
- **Long-term estimates of extreme heat's impact on labour productivity are highly uncertain** due to unpredictability of future work practices, for example, the role of AI, automation technologies, hybrid working policies, and shifting job types and locations.
- Evidence gaps in UK-specific data limit the assessment of this risk and **critical investigation is needed to understand current and future impacts on labour productivity from heat stress.**

CRITICAL
INVESTIGATION

E6: Risks to public finances

The government's core fiscal levers for managing public finances - taxation, borrowing and spending - all face growing pressure from climate change. Rising adaptation costs and increased demand for disaster recovery put increased demands on government expenditure, while tax receipts may decrease because of reduced output, productivity and growth.

- Estimates suggest that that **government spending in response to current climate impacts in the UK is about £4-5 billion per year,** with costs estimated to be around £10 billion a year to reach adaptation goals.

- **Risks are expected to increase over time** with evidence suggesting that every additional degree of warming will raise government consumption by about 0.32%.
- While there is growing awareness and interest around risks to public finances from climate change, there is a **major lack of evidence specifically addressing this risk. Critical investigation is needed to fully understand the magnitude of possible costs** such as datasets and reporting of annual climate-related expenditure by the UK government.

CRITICAL INVESTIGATION

E7: Risks to household finances

Households and individuals will face financial costs and burdens from climate change. These can be direct, for example through flood damage to property or increases in food prices, and indirect, for example from rising insurance costs and disruptions to employment. The impacts will be highly unequal, with lower income and vulnerable groups at greatest risk.

- **Households are already facing higher costs as a result of climate change** – across the years 2022 to 2023, average UK food and energy bills increased by about £605 due to climate-related shocks.
- **Climate costs to households will increase in coming decades.** Homeowners in flood-prone areas will have to pay, on average, an additional £60-80 per year by the 2050s on repairing damaged housing or contents. While there will be reduced energy demand for heating, with the largest benefit for poor households, energy demand for cooling will increase, although ownership of air conditioning will likely be concentrated in higher-income households.
- Overall, future costs to households will strongly depend upon the climate adaptation measures taken more broadly across society, as described in the other risks in CCRA4-IA TR. **Very limited evidence is available that is specific to the UK and critical investigation is needed to understand household-level financial exposure to climate risks.**

CRITICAL INVESTIGATION

E8: Opportunities to UK businesses and financial institutions from delivering adaptation goods and services

As national and global climate pressures increase, demand for adaptation solutions will grow across all sectors of society. This will create opportunities for UK businesses, such as developing flood-resilience technologies or climate-related insurance products. Providing enabling conditions for market opportunities is crucial, for example, by using public investment to unlock adaptation action.

- **Adaptation goods and services are already a significant opportunity for the UK.** An increase in demand for adaptation services could become a market valued at several billion pounds, based on the current size of the UK environmental advisory services market (around £2.9 billion in 2022).
- **These opportunities are set to increase significantly in the future.** The growth potential of the global adaptation market is about 10% per year and could reach £36.5 billion by 2032.
- Preparedness will depend on how well-equipped businesses are to take advantage of these opportunities, supported and enabled by government. Currently national policy and strategy frameworks provide little detail on opportunities for climate adaptation sector and there is a lack of metrics to track the contribution of adaptation to the economy. **Critical investigation is required to understand the size and growth potential of these markets.**

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A Well-Adapted UK

The Fourth Independent Assessment of UK Climate Risk (CCRA4-IA)

Executive summary

Climate change is undermining the UK's security and prosperity. We are already experiencing serious impacts now, and further impacts are inevitable. By the middle of the century, the UK's climate will be much more extreme than today. Hotter heatwaves could see 92% of existing homes overheat, creating dangerous conditions for vulnerable people. Peak river flows will be up to 45% higher, last longer, and be seen more frequently, driving increased flooding. Drier summers will mean shortfalls in water supply could reach over five billion litres per day, making drought more widespread. Without global emissions reductions, these risks may go past the point where the UK can protect itself with adaptation measures.

Under the UK's Climate Change Act, the UK Government must assess climate risks every five years. The Climate Change Committee has a statutory responsibility to provide independent advice on these risks to inform the UK Government's assessment and is tasked with compiling the evidence on climate risks. This report, and the accompanying [CCRA4-IA Technical Report](#), do that. For the first time, the Committee is offering advice on potential solutions to address these risks. While this statutory responsibility is to the UK Government, the Committee hopes this report will provide evidence to support action by the governments of Northern Ireland, Scotland, and Wales, who helped to commission it. The report can also be useful to other organisations focused on action to adapt to climate change.

The UK was built for a climate that no longer exists today and will be increasingly distant in years to come. While efforts to keep global warming well below 2°C above preindustrial levels must remain a priority, the world is not yet on track for this. At a minimum, the UK should prepare for the weather extremes that will be experienced if global warming levels reach 2°C above preindustrial levels by 2050. At the high end of possibilities, reaching 4°C above preindustrial levels by the end of the century cannot yet be ruled out. This should be considered as part of effective adaptation planning.

We know what needs to be done to start preparing for a 2°C level of global warming by 2050. Cooling to protect from heat, increased flood preparedness, and improved water management are the highest priorities. Deploying these adaptations at scale will help avoid loss of life – particularly amongst those most vulnerable to climate impacts – and unnecessary damage and disruption to people and to the economy.

Hospitals and care homes must keep to safe temperatures for the sick and elderly during heatwaves. Land, crops, and habitats must be able to withstand the rising number of droughts. Supply chains, especially those for our food, must be resilient to climate shocks around the world. Adaptation actions need to ensure residual risks can still be insured, underpinning the property market and wider economy. Essential infrastructure must be resilient to rising heat and flood risks, with better coordination to avoid disruption, particularly in the energy and digital systems, cascading across sectors.

This report sets out climate risks, actions, and enablers across 14 key systems including health, land, and the economy. Breaking down our analysis in this way allows for clear recommendations and accountability. But climate risks do not simply sit in single systems. Many of the most dangerous risks will cascade across them. Further analysis could help understand the potential for avoiding these cascades, but the priority is action now to address known risks.

Adaptation can also operate across systems. The Committee has sought to take this into account in proposing objectives, targets, and actions – for example, minimising deaths due to extreme heat requires actions in health and social care, and in homes and communities.

The Committee estimates that investment of around £11 billion per year (range £7–£22 billion, 2025 prices) is needed from the public and private sectors. This will generate returns in the tens of billions. Whilst limits in data and methods mean both the investment and the returns are likely to be underestimated, investment of this order is manageable in an economy that currently invests around 50 times as much. Investment requirements are likely to be split in roughly equal proportions from the private and public sectors.

However, not every possible adaptation will be affordable. Government needs to lead a public dialogue about the level of resilience people expect and their willingness to pay for it. This can build on the results of our citizens' panel, published alongside this report. The panel found that people want adaptation to limit harm and disruption to levels which are no greater than at present, recognising the costs of going further. People want to see adaptation happening now and for it to be done 'properly', with long-lasting preventative solutions.

The Committee agrees that adaptation cannot wait. Keeping people secure is a fundamental duty of the State. This is already being compromised by climate change. Adapting to climate change needs the same level of focus and commitment as geopolitical and other security threats. Damage is already happening which can be avoided. Taking action today is cheaper than taking action tomorrow. The main challenge is leadership, getting adaptation underway at sufficient scale and speed.

A well-adapted UK can only be created with action right across society. We need a new approach to adaptation in our governments to create national adaptation frameworks capable of driving the necessary action. This includes action from other public organisations, businesses, and households, across all four UK nations. We need increased ambition from government, captured in clear objectives. We need measurable targets to define what well-adapted means for the UK, in areas ranging from health to financial services. Targets, with clear ownership across government, need to be backed by delivery plans and sufficient resources.

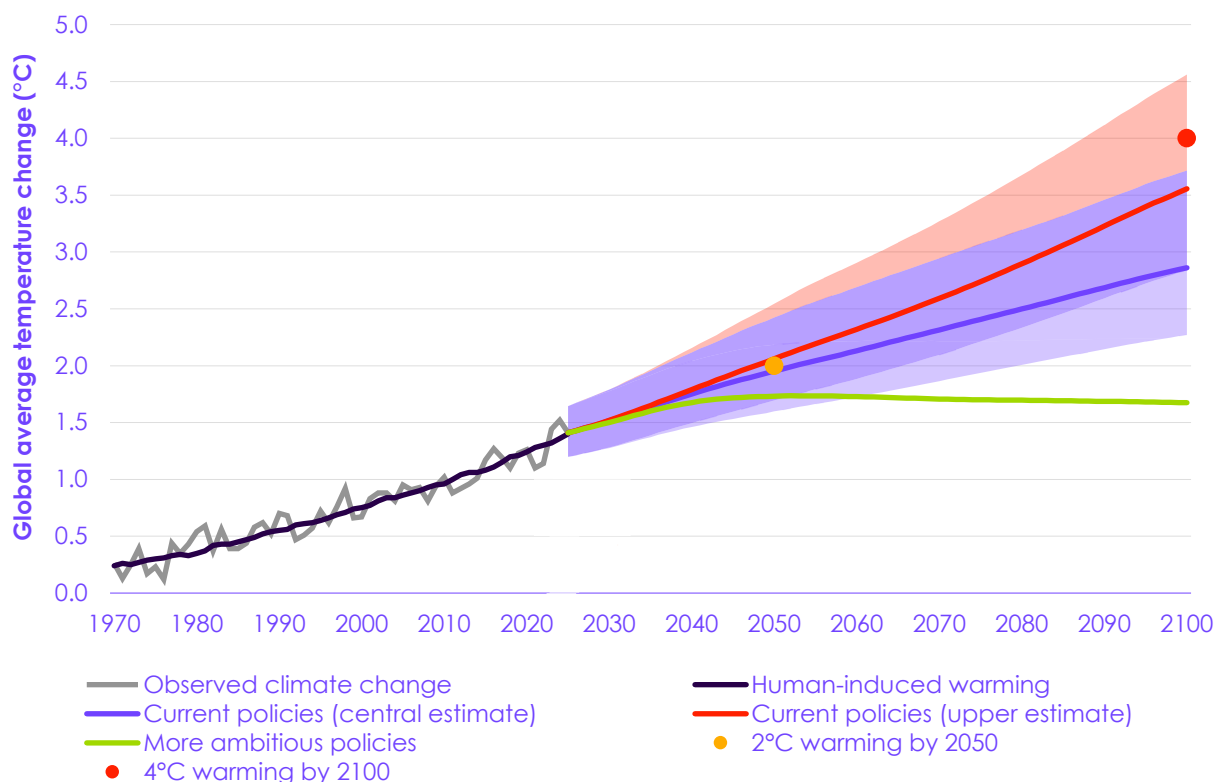
Climate change

Global average surface air temperatures are now around 1.4°C above preindustrial levels and are continuing to warm at record pace. This is being driven by greenhouse gases released into the atmosphere, mostly from the global use of fossil fuels, agriculture, and land use change. The effects of human-induced climate change across the world are clear. Drought in the Horn of Africa from late 2020 to 2023, fatal flash flooding in Valencia in 2024, and wildfires in California in 2025 are just a few recent examples that demonstrate the devastating consequences of ongoing climate change. Unprecedented extremes are now regularly seen all around the world.

Even with rapid reductions in global greenhouse gas emissions, further climate change in the decades ahead is inevitable. Until the world reaches Net Zero CO₂ emissions, with deep reductions in emissions of other greenhouse gases, global temperatures will continue to rise. It remains possible to keep warming globally to well below 2°C above preindustrial levels, but the world is currently not cutting emissions fast enough to achieve this. The world is currently on a path to around 2°C above preindustrial levels by 2050, with warming continuing thereafter towards 3°C by 2100 (Figure 1). International action since the 2015 Paris Agreement has reduced projected future warming. However, warming as high as 4°C above preindustrial levels by 2100 remains within the range of plausible outcomes on the current global emissions path.

The UK can end its contribution to ongoing global climate change by reaching Net Zero emissions. The Committee's 2025 advice to the UK Government on the level of the [Seventh Carbon Budget](#) sets out how that can be achieved by 2050. However, it remains essential to prepare for the climate impacts already unfolding and the worse impacts to come in the decades ahead.

Figure 1 Global warming under different emissions scenarios



Description: Global temperatures have risen since 1970. Under current emissions scenarios, temperatures are projected to increase further to around 2°C of warming by 2050. It is possible that under current emissions warming could reach 4°C by 2100. More ambitious policies to reduce emissions could limit warming to around 1.7°C by 2100.

Source: Met Office (2025) *Climate Dashboard – Tracking the Changing Climate with Earth Observations*; Forster, P. et al. (2025) *Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence*; Rogelj, J. et al (2023) *Credibility gap in net-zero climate targets leaves world at high risk*; United Nations Environment Programme (2025) *Emissions Gap Report 2025: Off Target – Continued collective inaction puts global temperature goal at risk*.

Notes: (1) Current policies (central estimate) – the median expected effect of policies currently in place around the world. This scenario does not assume that existing Nationally Determined Contributions (NDCs) or Net Zero targets are delivered. (2) Current policies (upper estimate) – the upper end of the range of the expected effect of policies currently in place around the world. (3) More ambitious policies – the median outcome for a scenario in which global emissions decline rapidly, assuming all conditional NDCs and national Net Zero pledges are delivered. (4) The shaded bands show the 10–90 percentile ranges for these scenarios arising from climate response uncertainty.

The impacts of ongoing climate change are increasingly visible in the UK. In summer 2022, unprecedented high temperatures, including record-breaking 40°C heat, caused the early deaths of over 3,000 people in England and Wales. Combined with widespread wildfires, emergency services experienced a 500% spike in 999 calls, putting huge pressure on their ability to respond. Human-caused climate change has made exceeding 40°C in the UK today at least 20 times more likely than it would have been in the 1960s.

The winter of 2023 to 2024 was the wettest October to March on record for the UK. Prolonged and repeated flooding displaced thousands of people and contributed to the second lowest arable harvest on record. The intensity of rainfall on stormy days during this winter was estimated to have been amplified by around 20% due to climate change.

Last year, 2025, was the UK's hottest year on record. Very dry conditions were widespread, leading to the most destructive wildfire season ever recorded. Over 40,000 hectares burned, including the first wildfire over 10,000 hectares in the UK, which occurred in Scotland in June 2025.

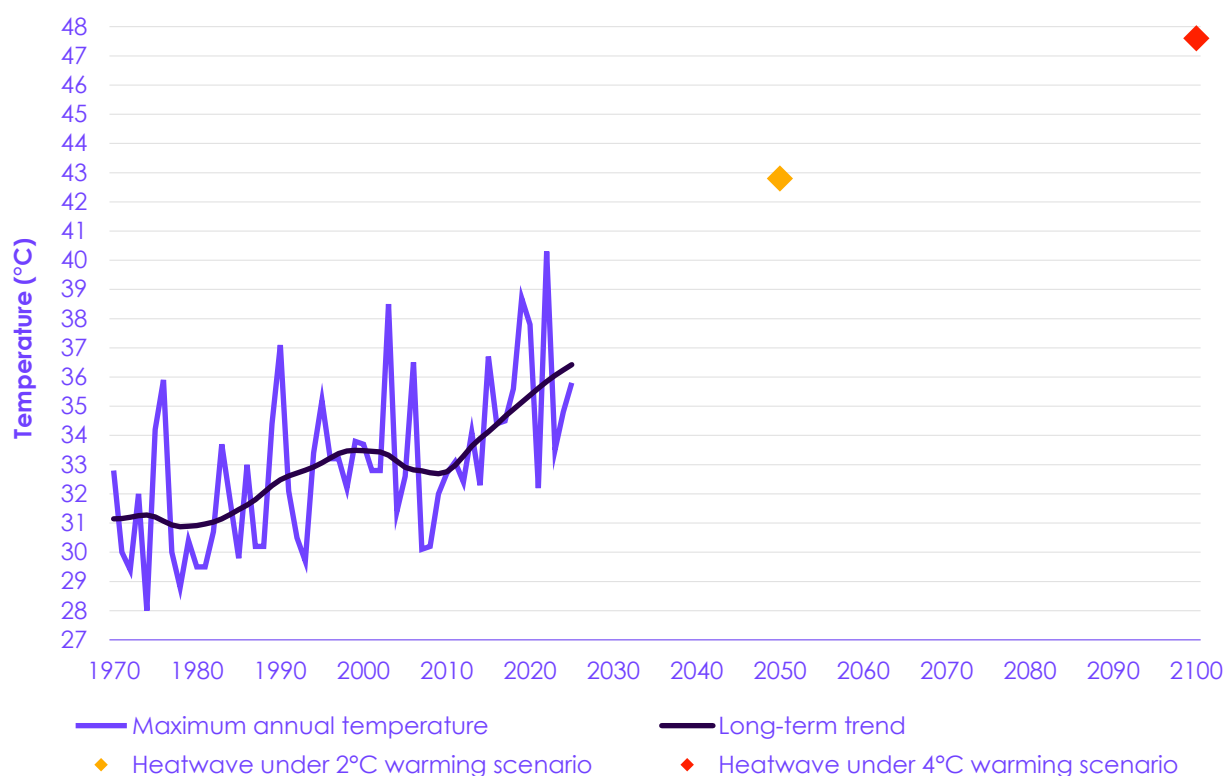
Early 2026 was exceptionally wet in parts of the UK. Northern Ireland had its wettest January in 149 years, and long unbroken spells of rain have been seen in many parts of the UK, leading to widespread flooding. The impacts seen in the past few years, with swings between dry to wet periods, show that the UK remains inadequately prepared for the weather extremes already being experienced, let alone those coming in the future.

Priority risks under 2°C of global warming by 2050

By 2050, at around 2°C of global warming, the UK's climate will be fundamentally different from the climate of today – which itself has already been altered by climate change. This will mean a wide range of hazards being felt in the UK, including increasing coastal erosion, risks of subsidence, and the effects of climate change overseas. However, there are three key hazards that drive fundamental challenges to the functioning of the UK.

- **Intensifying heat:** recent record hot summers (such as 2018, 2022 or 2025) will become the new normal summer – regularly stressing domestic agricultural production. Heatwaves lasting at least a week will be common – posing challenges for keeping vulnerable people sufficiently cool. In southern England, heatwaves could regularly exceed 40°C, and the hottest ones could be several degrees hotter than the record 2022 heatwave (Figure 2). Heatwaves hotter than 45°C could be possible.
- **Growing flood risk:** winter rainfall will rise with warming, meaning an average winter could be more like a wet winter today. The intensity of heavy bursts of rainfall throughout the year (not just in winter) could be around 15–60% higher than in the late 20th century – driving more risk of flash flooding and potential risks to life. Storms will have stronger extreme winds and bring more rain, and it is possible that they will be more frequent. This raises their potential to cause damage and disruption to property and infrastructure. Sea levels will be 20–45 cm higher around UK coasts than today, raising the severity and frequency of coastal flooding and coastal erosion.
- **Rising drought and wildfire risk:** despite bursts of increasingly heavy rain, summers will, on average, become drier. The number of days that have the potential conditions for serious wildfires could double, and the wildfire season will be longer, leading to increased exposure to the health harms from fire smoke and damages to infrastructure and buildings. Warm, dry weather will often arrive earlier in the spring and persist deeper into the autumn.

Figure 2 Hottest temperatures recorded



Description: The hottest temperature recorded each year in the UK has been increasing since 1970, with the trend increasing from around 31°C to 36°C, and the highest temperature of over 40°C recorded in 2022. Under 2°C warming by 2100, extreme temperatures could be as high as 43°C or 48°C respectively.

Source: Met Office (2025) *Met Office Integrated Data Archive System (MIDAS) Land and Marine Surface Stations Database*; Met Office (2025) *UKCP Local Projections – on a 5km grid, bias corrected using scaled distribution mapping over the UK*.

Notes: (1) Data shows the maximum temperature recorded at UK meteorological stations for each year. (2) The long-term trend line is a loess smooth with a 50-year span that reveals the general trend in the data over a 50-year period. (3) Projection data are chosen to provide a similar likelihood to the 2022 40°C event. Corresponding events are shown in the maps in Figure 1.6. (4) The maximum temperature shown uses the fifth highest temperature value to avoid occasional single-cell hotspots in the UKCP18 local projection data.

If left unmanaged, climate hazards that are already threatening health, lives, livelihoods, and nature will rise further. The Committee concludes that eight climate risk areas are the highest priorities for action now – informed by the evidence summarised in the CCRA4-IA Technical Report. While not all aspects of climate change are predictable, these risks are well-enough understood to be addressed today. Priority adaptations, proposed targets, and recommendations for near-term actions by government are set out for each of these priority risks in the next section. Table 1 summarises the priority risks and a set of achievable proposed targets for 2050 or earlier to adapt to these risks.

Table 1 Priority climate risks to the UK	
Priority risk	Proposed adaptation target
Risks to the lives of vulnerable people from extreme heat	By 2050, excess heat-related mortality should be no greater, and ideally lower, than today's annual average.
Risks of damage, disruption, and deaths from flooding	By 2050, the total number of residential properties impacted by flooding in the UK from all sources should remain no greater than today's level. Levels of risk should be below today's level in all parts of the UK where this is technically feasible and cost-effective.
Risks to water availability from drought	By 2040, water supply should be resilient to a 1 in 500-year drought.
Risks to the state of nature	By 2030, 30% of land should be protected for nature and by 2050 should be in good condition.
Risks to the viability of farming	From now through to 2050, domestic food production as a share of food consumed should be sustainably maintained at 60% at least.
Risks of food insecurity and inflation	From now through to 2050, the impact of climate-related food price inflation on household budgets should be minimised.
Risks to the availability of insurance	From now through to 2050, the UK insurance protection gap should not grow due to climate change.
Risks of cascading impacts on infrastructure	From now through to 2050, critical infrastructure systems should continue to deliver reliable services and recover quickly from any disruption.*

If global warming is allowed to reach 4°C above preindustrial levels by 2100, the UK's climate will be unrecognisable, with potentially catastrophic impacts. Therefore, strengthened global efforts to reduce greenhouse gas emissions are essential to reduce the probability of reaching such high levels of warming. However, when planning assets with long lives, such as new settlements and long-lived infrastructure, the possibility of this much more extreme climate needs to be accounted for through flexible designs that can be upgraded if required over time.

As warming increases, so does the likelihood of abrupt climate shifts, cascading risks, and adaptation limits being reached – outcomes that would bring dramatic consequences for the UK and beyond. The ability of current tools to project these risks with confidence is still developing, and the full consequences of how these risks would play out across an interconnected world will not be entirely predictable. This means that the potential to underestimate the risks under such high levels of global warming is large.

* This proposed adaptation target serves as a proxy for the set of infrastructure system targets proposed across Chapter 8 to Chapter 12 of this report.

Adapting to 2°C of global warming by 2050

Although climate risks are intensifying, the resulting damages are not inevitable. Proven and cost-effective adaptation measures are available for immediate deployment. Risks can be significantly reduced with established and cost-effective actions available to deploy now. Their implementation will be critical to protecting lives, infrastructure, and economic prosperity in the warming climate. Clear adaptation objectives, supported by targets to measure progress, are possible for all our outlined priority risks. These are set out below. The Committee also makes immediate recommendations for government to start addressing each these risks over the next few years.

1. Protecting from heat

Proposed target: by 2050, excess heat-related mortality should be no greater, and ideally lower, than today's annual average.

Increasingly extreme and frequent heatwaves are the greatest risk to health in the UK from climate change. Annual heat-related excess deaths in heatwave periods already range from 1,400–3,000 each year, overwhelmingly concentrated among the elderly. By 2050, under 2°C of global warming, this could rise to 3,000–10,000 each year without additional adaptation. This would mean increased heat-related mortality in all parts of the UK, exacerbated by the UK's ageing population.

Keeping people cool can avoid this increase in mortality. Cooling is especially important in people's homes, care homes, and hospitals, where those particularly vulnerable to heat are most likely to be. New buildings should be designed to keep people cool from the outset. Low-cost passive cooling measures, such as natural shading, may be sufficient interventions in some parts of the country.

However, the intensity and duration of future heatwaves mean that we need to plan for more active cooling (such as air conditioning). Active cooling measures, alongside low-cost passive measures, are more likely to be needed for retrofitting existing homes (which make up the majority of homes that will exist in 2050). For some homes, relying entirely on passive measures to keep temperature to safe levels would either be not possible or too expensive.

Creating at least one cool room in a house through low-cost active cooling could help avoid significant national-level increases in heat-related mortality if deployed in the 30% most vulnerable urban households. Further rollout could reduce mortality further and would also be cost-effective. Households and businesses will and should increasingly install cooling for their own comfort and productivity. Additional support might be needed to ensure that sufficiently effective cooling can be accessed by those who are both heat-vulnerable and low-income. Increased levels of active cooling can be managed alongside the transition to a reliable low carbon electricity system (as modelled in our advice on the level of the Seventh Carbon Budget). Heat pumps which provide both low-carbon heating and cooling could help to ensure this is achieved at low-cost and with minimal disruption, particularly for new builds.

It will take time to roll out cooling in all the places where it is needed. While this happens, lives can be saved with other low-cost, no-regrets, and rapidly scalable adaptation actions. These include preventative healthcare visits to heat-vulnerable people, the creation of public cool spaces (as seen in other European countries), changes in working practices, and support to deliver changes in behaviour for those at risk. These actions, alongside cooling in the healthcare system, could avoid around 40% of projected heat-related mortality in 2050 and help to relieve the already significant pressures from heat on healthcare.

Recommendations for government

To drive forward adaptation in the next two years, government should:

- **Invest in cooling for key public services.** Cooling will be needed in critical settings such as hospitals, schools, prisons, and care homes in many parts of the country to protect wellbeing and often lives. Low-cost passive measures should be used, especially in new builds. In areas at greatest risk, active cooling will be needed alongside low-cost passive measures, to manage risk fully. To minimise cost and disruption, this needs to be aligned with the transition to low-carbon heating systems where possible. Regulations and standards can drive uptake in privately provided services such as care homes.
- **Set maximum temperature regulations for workplaces.** Maximum working temperature regulations would address the increasing risks that high temperatures pose to workers' safety and incentivise the deployment of the necessary cooling. Businesses are largely responsible for investing in their own adaptations but must ensure that workplaces and working practices are safe for employees, including for those working outside.
- **Accelerate the uptake of cooling for the most vulnerable.** Most households will invest in cooling themselves. However, those who have low incomes and are already vulnerable (for example, low-income pensioners) might need additional support. Mechanisms could build on existing incentive schemes that reach these groups, including by supporting heat pumps capable of cooling as well as heating.

2. Managing flood risk

Proposed target: by 2050, the total number of residential properties impacted by flooding in the UK from all sources should remain no greater than today's level. Levels of risk should be below today's level in all parts of the UK where this is technically feasible and cost-effective.

There are nearly seven million properties located in flood-risk areas across the UK today. Annual flood damage is already estimated at £3.3 billion per year (2025 prices). By 2050, under 2°C of global warming, the number of properties at risk could increase by up to 40% and potential annual damages from flooding are projected to rise to £4.5 billion (2025 prices). Without additional action, places that are already at risk of flooding will flood more often and more severely, and new areas will be at risk of flooding.

Protecting properties from flooding wherever possible should be the priority for addressing growing flood risk. The cost and health impacts on those who are affected by flooding are great, and wider disruption to the economy is significant. Well-maintained flood protections and adequate drainage, in the right places, created for the right depth of flood water, are needed. It is vital that new developments are restricted from building in places that could be at flood risk today or later in the century, unless sufficient measures are implemented to protect them. Surface water flooding will be an increasingly important risk. This will need to be addressed by adequate drainage including through increased use of permeable surfaces, such as green space, in towns and cities.

However, even with improved large-scale flood protections, flood water cannot be kept from all homes and businesses under all conditions. Lower-cost measures to prevent water from damaging properties (such as one-way valves on wastewater pipes, flood doors, barriers, and covering air bricks) will be necessary, particularly for surface water flooding. A rapid rollout of property-level measures over the next five years in places that are already at risk of flooding could cut average annual flood-related losses by up to half. In other places, there will need to be challenging conversations with communities where flood protection is not viable, especially with rising sea levels. Evacuation plans, effective warning systems, and sufficient emergency response capability

will all be needed in these places to live with some level of flooding risk. Managed relocations will be necessary in some cases to manage risk from coastal and potentially river flooding.

Keeping the aggregate level of flood risk across the country at levels similar to today will require significantly more investment than we are currently putting into flood risk management. Investment will be needed both for maintenance and strengthening of existing assets to appropriate standards, alongside new protection schemes. A sustained programme of investment of around £1.6–£2.2 billion each year (2025 prices) through to 2050 is required to keep overall risk similar to today's levels. This funding will be mostly public but should leverage private investment where possible.

Recommendations for government

To drive forward adaptation in the next two years, government should:

- **Invest more into long-term flood defence programmes.** Investment in flood risk management must rise to around £1.6–£2.2 billion each year (2025 prices) across the UK to hold flood risks approximately constant at today's levels despite climate change. This will ensure that large-scale programmes for building and maintaining flood protections (both traditional and natural) are sufficiently well-resourced over the long term. Protections must cover surface and groundwater, as well as river and sea flooding, and be delivered in time to reduce impacts on households. This investment would also support property-level actions, asset maintenance, and early warning and emergency response systems.
- **Ensure new buildings are not increasing the risks of climate change impacts.** Planning policy must be sufficiently robust to ensure new builds are fit for the future climate over their lifetimes (2°C global warming level by 2050 and considering 4°C by 2100) and don't increase risks, either locally or for others. New developments should not be built in undefended areas at risk of existing and future flooding and coastal erosion. Climate resilience needs to be a core part of planning frameworks, reflective of the latest evidence. Compliance needs to be enforced.

3. Avoiding water shortages

Proposed target: by 2040, water supply should be resilient to a 1 in 500-year drought.

Water scarcity is becoming more prevalent. In April 2025, almost all of Scotland experienced an early warning of water scarcity. Parts of South East England remained in drought, requiring temporary restrictions on water use, until January 2026 following prolonged dry weather in summer 2025. By 2050, under 2°C of global warming, current projections estimate a five billion litre per day shortfall of public water supplies in England – with similarly rising risk in dry parts of Northern Ireland, Scotland, and Wales. Without action, this would create costly and widespread water restrictions that go beyond today's hosepipe bans and lead to losses for water intensive industry and agriculture. Without adaptation, some areas of the UK may need to use options such as standpipes in the street and restrictions on access to water for non-essential uses, to avoid the taps running dry.

Effective water management is essential for dealing with rising drought risks. Some adaptation is underway, but action to manage drought risks will need to be increased and funded at a higher level over the decades ahead.

Storing excess water from wetter periods allows it to be used in drier ones. A sustained programme of investment in large-scale water storage – such as reservoirs – is vital. This investment can also help to address flood risks in periods of too much water. Small-scale storage, such as in industry or on farms, can also be effective. Water transfers, which move water from regions that have enough to those that do not, can help the UK to use its available water more flexibly.

Large water supply projects like reservoirs can take decades to build. However, drought risks are already rising. It is essential to take the immediate actions that are available to reduce the risks. These include increasing efficiency and behavioural changes in households and businesses, and improving leakage rates from the water system. It is estimated that these actions would meet up to 80% of the deficit in England over the next decade and will be similarly important in the other nations of the UK. While demand and leakage are decreasing, this is not happening fast enough to meet existing near-term or necessary long-term targets.

Together these adaptations can deliver improved water system resilience, with the UK becoming resilient to a more severe 1 in 500-year drought by 2040. Meeting this target would mean that we would not rely on emergency measures like standpipes for drought management – except in very rare circumstances. Funding for this adaptation would be provided from water users primarily via (regulated) bills in England, Scotland, and Wales, and from the taxpayer in Northern Ireland. Water efficiency labelling and smart metering, where the effects of different user choices are clear, are key to support actions by households on water efficiency.

Recommendations for government

To drive forward adaptation in the next two years, government should:

- **Ensure regulation in the water sector maintains a clear focus on drought.** Regulators need robust climate resilience mandates to drive investment. In the water sector, progress on adaptation is being made. However, it is not happening fast enough and it is struggling for attention above the challenges of dealing with the environmental effects of sewage. Public confidence in the water sector in England is low. Regulatory reforms that are being proposed in England and Wales must help to restore public confidence and maintain investment in drought resilience over the next decade. The regulatory system should support the linking of actions in the water sector that would manage both drought and flood risks (for example, partnership funding with Lead Local Flood Authorities).
- **Ensure new development is drought sensitive.** New homes should be built to use water efficiently. Minimum water efficiency standards for appliances can ensure more efficient appliances become the default for households and businesses. Water intensive infrastructure, such as data centres, should be sited and constructed without adding to regional drought risk, and with minimum standards to avoid the lock-in of less efficient technologies.

4. Supporting nature to adapt

Proposed target: by 2030, 30% of land should be protected for nature and by 2050 should be in good condition.

The UK is already one of the most nature-depleted countries in Europe, with further degradation being accelerated by emerging climate change impacts. Without additional adaptation, by 2050 under 2°C of global warming, there is a risk of widespread ecosystem loss and disruption. This includes globally unique ecosystems such as chalk streams – making existing nature restoration targets impossible to achieve. Unless they adequately consider climate change, nature restoration efforts risk creating small and fragmented habitats which are more vulnerable to species loss as the climate changes. This will mean that protection goals may not lead to land being in good ecological condition in 2050 and beyond.

The UK's nature will change in response to climate change. To adapt well, habitats need to be healthy, diverse, connected, and well-managed. If successful, this climate resilient natural environment will provide benefits beyond adaptation. These benefits include reducing other risks not primarily driven by climate change, and maximising the health, economic, and societal

benefits provided by nature. Greater diversity of terrestrial habitats at a genetic, species, site, and landscape scale will increase resilience through spreading risk and reducing climate-driven losses. Increasing habitat connectivity will enable species to move more easily and adjust their range as the climate changes. This will help maintain species diversity.

Actions to prepare for and reduce the occurrence and spread of wildfire in natural landscapes are increasingly important. Wildfire risk management needs to be built into other land management and nature restoration actions, such as woodland planting or habitat creation. Early warning systems and education can help prevent wildfires from starting and spreading.

These adaptations are needed for successful delivery of existing nature restoration goals – such as the '30 by 30' commitments that governments around the UK are signed up to. Regulations and public funding for nature restoration need to reflect the realities of the UK's changing climate. Significant strengthening is required. Crucially, measurement, protection, and restoration of nature need to be forward-looking and focused on the species and habitats that can thrive under future local climate conditions, instead of past ones, in different parts of the UK. Current policies and designations for nature protect what we currently have and are not designed to accommodate a change in climate.

Recommendations for government

To drive forward adaptation in the next two years, government should:

- **Invest public money in nature restoration compatible with future climate change.** Actions on UK land are partly funded by public subsidies. Future subsidies should be targeted to support nature and to make growing food sustainable in a future climate. More coherent and joined-up land use frameworks and planning can integrate adaptation responses across landscapes, bring land users together, and scale up action to adapt.
- **Make nature protection regulation forward looking.** Habitat regulations and legislation are important tools to protect sites of environmental importance. Protected site designation and regulation, which drive approaches to management, need to move away from being based on current or past baselines. These are increasingly difficult (and at times no longer possible) to achieve as these sites change in response to climate change.

5. Keeping farming viable

Proposed target: from now through to 2050, domestic food production as a share of food consumed should be sustainably maintained at 60% at least.

UK farmers are already being impacted by the effects of extreme weather including flooding, heat, and drought. Challenging weather conditions for farming are often occurring in consecutive seasons and at unprecedented severity. For example, yields in the UK were over 10% lower than the 10-year average for crops like wheat and oats due to the hot and dry spring and summer in 2025. By 2050, under 2°C of global warming, the amount of high-quality farmland is predicted to drop from an average of around 40% of land in England and Wales (between 1961 to 1990) to just over 10% by 2050 without adaptation. In the worst years, disruption could make some farms unviable.

Farming needs to adapt to remain viable. What is produced and how it is produced will need to change to ensure farming can survive the bad years and flourish in the good ones. Resilient soil and water management practices and better use of technology will be needed across all farm types, as well as leaving more space to help nature adapt on farmed land.

Some farms will have to shift production entirely. New crops will need to be grown that are more appropriate for future climate conditions. Warmer weather brings some opportunities on this front –

as do the required changes in farming for the UK to reach its Net Zero by 2050 target. Crops such as oranges or chickpeas will become viable in the south of the UK with warmer average temperatures.

Adaptation is required to maintain existing target levels of the proportion of food consumed that is produced in the UK at 60% (by value) at least. This will support a thriving farming sector in our future climate. Farmers will need new skills, training, and access to finance to help them adapt. Public subsidies for farming will need to incentivise the adaptation necessary for sustainable long term food production. These are a material share of income for many farms.

Recommendation for government

To drive forward adaptation in the next two years, government should:

- **Support the viability of farming under climate change.** Farmers must be enabled and encouraged to take adaptation actions (such as storing water on farms, changing farming practices, and varying what is produced) to keep farming viable. Government can enable farmers by providing access to the right skills, information, and training to empower farmers to make the appropriate decisions for their farms. Removing regulatory barriers to farmers adapting their business models, such as making it easier to store water on farms, can help facilitate action in the sector. Subsidies that continue to support agricultural production should be used to provide incentives to adjust farming models as needed to adapt.

6. Understanding the risks to food security

Proposed target: from now through to 2050, the impact of climate-related food price inflation on household budgets should be minimised.

Around 40% of the food we eat is imported. Therefore, international climate impacts can be just as important for food prices in the UK as domestic ones. By 2050, under 2°C of global warming, simultaneous crop failures in multiple major producer regions, or significant disruption of food supply chains, could lead to increased food prices and more volatile inflation. This would hit lower-income households the hardest. Climate change also raises the potential risk of food shortages across entire nutritionally important groups for sustained periods.

Food businesses across the entire value chain will need to develop measures to manage risks in the privately operated food system. Actions that could be taken to adapt include diversification and investment in resilience across supply chains, as appropriate to individual business models. These ensure that food of sufficient quantity and quality can be provided.

Government-led stress-testing of critical food supply chains will be needed to gain a better understanding of what can go wrong in food supply chains and where bottlenecks might exist. Government may also need to provide 'top-up' help to lower income households during food price shocks, as it does today in parts of the UK during unusually cold weather.

Objectives on food security, that consider climate risks, have already been set by the UK Government. However, supporting targets that operationalise the objectives, specifically for addressing the climate risk, are lacking. There is more work to do to determine the level to which food price shocks can be minimised, but progress against this target could start to be measured by assessing the change in price of a climate-impacted basket of goods.

Good information is vital in this sector. Private sector adaptation in the food system can be supported by enhanced corporate sustainability disclosures on climate risks and adaptation, under standardised approaches. These are not covered in sufficient detail under existing corporate

disclosure regimes (such as the Taskforce on Climate-related Financial Disclosures) that large food supply chain businesses are subject to.

Recommendations for government

To drive forward adaptation in the next two years, government should:

- **Improve information on climate risk in the food system.** The Adaptation Reporting Power (ARP) is a key lever to gather information on climate risks and force key organisations to plan for climate change. Large food companies (including supermarkets) should be included in the scope of the next set of ARPs, and reporting under the power should be made mandatory, to provide critical information on risk management in the food system.
- **Explore government-led adaptation.** Government should also explore the viability of government-led adaptation in the food system. This should include systemic stress-testing in the medium to long term to work out what could go catastrophically wrong in the food system. It should also consider the potential for large-scale national food stockpiling to avoid risks of shortages across whole nutritionally important groups. It should also explore the use of policies to alleviate the impacts of food price inflation.

7. Maintaining access to insurance

Proposed target: from now through to 2050, the UK insurance protection gap should not grow due to climate change.

Flood-related insurance claims are rising. Home insurers have paid out more in claims than they received in premiums for the five years to 2024. By 2050, under 2°C of global warming, many homes and businesses, particularly in areas of high flood risk, may not be able to access insurance due to lack of coverage or high premiums. This impacts those with low incomes the most and threatens the viability of the property market, the local economy, and the sustainability of communities in these regions.

The UK's insurance gap is a measure of the share of economic losses from natural catastrophes that is not covered by insurance. The UK's overall protection gap was estimated at 29% in 2024, with an average of 22% over the past decade. This is low relative to most other countries, but without sufficient adaptation, the protection gap is expected to grow as climate risks increase and new climate risks emerge. A large insurance protection gap means many homes and businesses cannot access insurance due to lack of coverage or high premiums. It also puts stress on the financial sector, as banks face higher default rates on mortgages and business loans, and on public finances through disaster support needs.

A resilient and affordable insurance market is vital for enabling businesses and households to manage their risks and to recover quickly from climate events. Achieving this will depend on effective adaptation, so that residual risks remain insurable. It is also likely to require continued government involvement in the insurance market, building on experience with Flood Re, which has supported the availability of insurance for homes facing flood risks. New business models will help insurers to continue serving UK homes and businesses. Innovations could include incentives for adaptation, products that bring capital into insurance, and new risk-pooling mechanisms. Other climate risks, such as wildfire and increased subsidence may create risks to insurance provision and need to be better assessed and understood before potential issues arise.

Meeting this target will mean that most properties and activities can continue to access insurance across key hazards (particularly flooding) as the risk of damage increases.

Recommendation for government

To drive forward adaptation in the next two years, government should:

- **Clarify the future of flood reinsurance.** The 2039 end date for the Flood Re reinsurance scheme is already creating uncertainty in the property insurance market. It could start to have impacts on housing market decisions for properties that continue to be at flood risk. Government must provide clarity by undertaking an in-depth review leading to a publicly announced decision on the future of Flood Re within the next five years.

8. Adapting infrastructure to avoid cascading disruption

Proposed target: from now through to 2050, critical infrastructure systems should continue to deliver reliable services and recover quickly from any disruption.

Infrastructure systems are increasingly connected and so impacts to one system can cascade into other systems. By 2050, under 2°C of global warming, weather-related infrastructure damage and service disruption could be common. A key dependency comes from the electricity distribution system. Overheating of power systems in heat extremes could trigger power cuts with the potential to cause knock-on outages, such as to digital payments, transport systems, and public services, costing billions in losses and recovery. These costs will eventually be passed onto households – often impacting those on low incomes the most.

Key infrastructure systems need to be designed and maintained to work appropriately for the weather conditions expected over their lifetimes. This is the fundamental step in reducing the risks of cascading infrastructure failures. For shorter-lived infrastructure assets, it will often be most cost-effective to replace assets at the end of their life with upgraded alternatives, designed to be resilient from the outset. But much of our infrastructure has long lifetimes and will need to be retrofitted.

Significant infrastructure investments are being made now in water, energy, and transport, giving a critical window to ensure that new assets in these systems are adapted for future climate. Standards should be set for infrastructure resilience consistent with an expected 2°C global warming level by 2050 and considering the possibility of 4°C global warming by 2100. For existing long-life assets, upgrading and maintenance will be essential to ensure that they can continue to function. Where affordability is constrained, actions will need to target the most vulnerable and critical parts of the network.

To deal with the potential for cascading risks, improved governance frameworks with clear roles and responsibilities are necessary to support coordination between critical infrastructure sectors and their key service users. There should be coordinated assessment and management of cascading climate risks between sectors and joint planning of the responses across sectors to extreme events. Government needs to facilitate this by setting clear responsibilities for addressing cascading risk. In particular, government needs to ensure regulators have responsibility to help their sectors to work together and fund the necessary action. Developing appropriate standards, methods, and metrics for cross-sector collaboration can help facilitate this.

Recommendation for government

To drive forward adaptation in the next two years, government should:

- **Establish a more structured approach to managing interdependencies.** Coordination is lacking in a range of areas to manage interdependencies effectively, particularly for Critical National Infrastructure (CNI). Implementing the recommendations from the North

Hyde review, and the commitments from the UK Government's response, would help to address this. Establishing clear responsibility for addressing interdependencies should be integrated within efforts to set infrastructure resilience standards by 2030.

The investment case for a well-adapted UK

The adaptation actions needed for the UK are mostly known and available today. The challenge is to deploy these adaptation actions with sufficient speed and at sufficient scale. Adaptation does not need to wait for the promise of future technological progress. We can start building a well-adapted UK with what we know and can see works today.

Adapting now can avoid unnecessary harm that is already happening today. Adapting now will cost the UK less than dealing with the damages and disruption from climate change. The measures identified in this report will bring benefits that will pay back the investments in them several times over their lifetimes (Table 2).

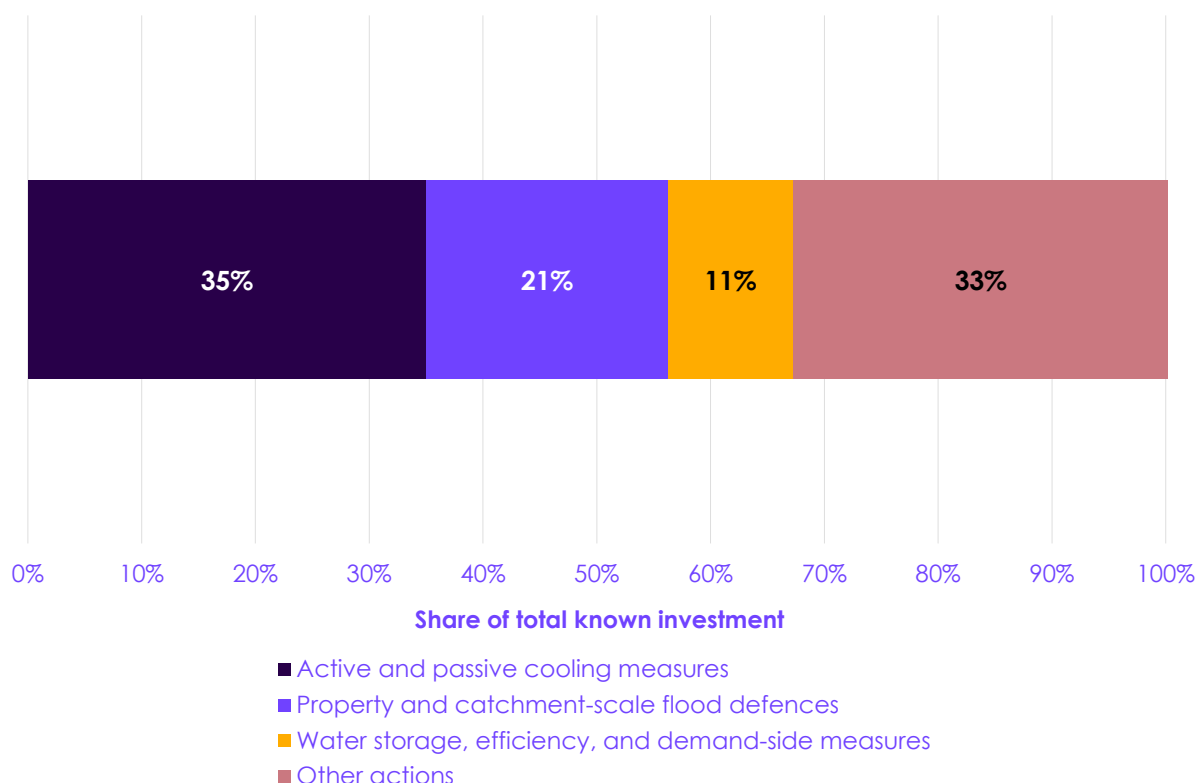
This report identifies an annualised investment need of at least £11 billion per year (range £7–£22 billion, 2025 prices) from today to the 2050s. Limits in data and methods mean this is likely to be an underestimate, but it gives a sense of the scale of investment needed. Most of this investment is dominated by three core adaptations of cooling, flood preparedness, and water management (Figure 3). Deployed at scale, these three adaptations could save tens of billions of pounds in climate impacts each year, averaged over their lifetimes. This scale of investment, shared between public and private sectors, is feasible for the UK economy. Total UK investment in 2025, across all categories, was £547 billion, around 50 times as much.

There is strong support from the public for a pragmatic programme of adaptation that will make a real difference to their lives. People want their health, homes, and livelihoods to be protected and they know that the UK is not yet prepared to deal with the impacts of climate change. Stepping up delivery does not have to be complex. The pragmatic principles for effective adaptation, set out in Chapter 3, provide an action-oriented guide to do adaptation well, avoid lock-ins, and take advantage of opportunities. Ambition can be set, effective actions identified, delivery enabled, and progress evaluated. Examples at local, national, and international levels increasingly show that these challenges can be overcome with sufficient will and leadership from government at both national and local levels.

Table 2 A selection of UK-based benefit-cost ratios for adaptation actions		
Hazard	Adaptation actions	Benefit-cost ratios
Flooding	Natural flood management.	3:1–5:1
	Property flood resilience measures.	5:1
	Flood and coastal erosion risk management.	5:1
Warming	Active cooling measures with some passive cooling (for example, loft insulation, shutters).	3:1 *
	Heatwave plans.	10:1–30:1 (for the 2040s)
Drought	Demand-side water efficiency measures.	1.8:1
	Rainwater harvesting and storage.	2:1 (property level), 3:1 (community-level)
	Supplying water via transfers and storage infrastructure.	11:1 (range 7:1–15:1 across England sub-regions)
Multiple hazards	Proactive maintenance of existing infrastructure.	5:1–10:1
	Emergency response, prevention, and protection by UK Fire and Rescue Services.	6:1
	Embedding climate resilience into new infrastructure.	4:1
Notes: (1) This table highlights a selection of benefit-cost ratios (BCR) from external literature and bespoke research projects for the Well-Adapted UK report. It highlights feasible actions that are cost-beneficial today. These were selected as point estimates or ranges from robust literature sources. The costs included will vary by source, but broadly include the capital, operating, and maintenance expenditure required to deploy an action. (2) The benefits primarily refer to the directly avoided damages from climate change by implementing an adaptation measure, as well as co-benefits that can and have been quantified. These vary significantly by source. (3) The BCRs presented are from both retrospective and modelled studies.		

* Assumes a rollout of these measures at a UK-national scale to 30% highest risk regions and demographics.

Figure 3 Known investment needs for adaptation



Description: Two-thirds of the known investment needed for key adaptation actions comes from three actions: cooling measures, flood risk management, and water storage and efficiency.

Source: CCC analysis.

Notes: (1) This analysis includes the known actions included as a part of the investment analysis for CCRA4-IA. This compiles evidence from a range of literature estimates and bespoke analysis and is not comprehensive of all systems and actions referenced in the Well-Adapted UK Report. (2) Property and catchment scale flood defences include both engineered and natural flood management. (3) The 'Other actions' category consists of the remainder of actions costed for this analysis, the largest share of which are: climate-proofing rail infrastructure (9%) and meeting biodiversity targets (6%).

Delivering a well-adapted UK

Delivering the adaptation set out in this report requires action from across society. Households will need to invest in their own resilience and change their behaviours to avoid unnecessary risks. Businesses will be responsible for investing in their own upgrades and will play critical roles in adapting privately operated systems such as food provision and infrastructure. Government must create the policy environment, with incentives, regulation, standards and information, as well as support to enable businesses and households to protect themselves. The public sector will need to fund adaptation actions which have large public benefits (such as flood protection and nature management), support low-income households who cannot meet the costs of adaptation, and adapt public services to protect their functioning.

Recommendations to build a better national adaptation framework

For too long, adaptation across the UK has suffered from a national approach and a framework that is not fit for purpose. A working adaptation governance framework that can give the public sector, businesses, and households clarity on their roles in delivering a well-adapted UK is urgently needed.

We recommend four steps which need to be taken now to establish an effective adaptation governance approach.

- **Establish meaningful adaptation objectives, supported by targets, and assign ownership.** Existing visions for adaptation lack meaningful objectives and measurable targets. These need to be put in place by the time of the next set of national adaptation plans (NAPs), due around 2028, even if they are not perfect. Objectives and targets can be improved over time and additional ones added as needed. In this report, the Committee propose a set of objectives and targets which can provide a starting point to adapt to a 2°C global warming level by 2050. On some, there is a need for a public dialogue on acceptable levels of risk and cost. Accountability for each target must be clearly allocated to the appropriate part of government. The relevance and adequacy of adaptation objectives should be reviewed regularly: the five-yearly assessment of the latest evidence of impacts required under the Climate Change Act would allow for that review.
- **Create delivery plans, backed with the necessary resources to deliver the objectives.** Delivery plans for each target must be put in place. For these plans to succeed, they need to be backed with upfront investment. Not all the actions or funding needs to come from government. However, government must provide clarity on who is expected to act and invest, what that looks like, and how it will be enabled. On current practice, we estimate that close to half of the investment needed over the next 25 years would come from the public sector. The next NAPs need to provide clarity on how much is currently being spent on adaptation and how this will be scaled up to the required levels during the next NAP period (around 2032) at latest.
- **Monitor delivery progress against targets.** A complete and consistent monitoring and evaluation framework needs to be put into operation to track outcomes of adaptation delivery. This report sets out what can currently be tracked and where monitoring needs to be strengthened, for each of the 14 systems covered. Government needs to use these monitoring frameworks to track progress towards adaptation targets and publish annual updates. Regular reviews of progress, within each NAP cycle, should be undertaken by government to allow ambition and plans to be adjusted as necessary and to ensure that adaptation resources are used effectively. The Committee will continue to provide independent scrutiny, as required under legislation.
- **Improve tools, methods, information, and skills on adaptation.** Improving the capacity across government on adaptation should be a priority for the NAPs. In too many places, adaptation is poorly understood, undermining effective action. Priorities include high-level standards, planning assumptions, and tools for climate risk assessment and adaptation action. These should focus on supporting the uptake of the principles for effective adaptation proposed in Chapter 3 of this report, across government and beyond.

Taking the next steps

Chapter 1 to Chapter 3 of this report cover the climate risks facing the UK and summarise the case for adaptation and how it can be done effectively. Chapter 4 to Chapter 17 contain a detailed analysis of what it means to be well-adapted to climate change in the UK across 14 key systems, as well as connections between those systems. This builds on the analysis in the CCRA4-IA Technical Report, which provides a detailed assessment of UK climate risks, and is published alongside this report. Objectives and targets, including but not limited to the proposed targets covered in this executive summary, are set out in each chapter to provide a starting point for measuring what a well-adapted UK could mean in each of those systems (see Annex 1).

It is now up to the UK Government to consider this advice and to lay a Climate Change Risk Assessment before Parliament by January 2027. It is then for the UK Government, Northern Ireland Executive, Scottish Government, and Welsh Government to respond with their next national adaptation plans.

A well-adapted UK is both necessary and achievable, but also urgent. Action is required right across society from households, businesses, and the public sector. Continued delay will lead to greater costs, more lives lost, and livelihoods ruined. The choice to move on from the failures of the past now sits clearly with government.

