

West of England Mayoral Combined Authority Climate Adaptation Report

Submitted for Adaptation Reporting Power 4th round Local Authority Pilot December 2024

Independent Foreword

This Climate Adaptation Report needs to be a catalyst for public attention on climate readiness. The West of England can send a powerful message to decision makers in every sector that now is the time to act. Climate impacts cause widespread disruption and are poised to worsen, even with ambitious action to reduce greenhouse gas emissions.

In November, the World Meteorological Organisation said 2024 is on track to be the warmest year ever recorded¹. Europe is warming at around twice the global rate. In the UK, we expect to see² warmer and wetter winters; hotter and drier summers; more frequent and intense weather extremes, putting communities at risk of devastation³ and loss of life.

As I write, we are again experiencing flooding in the West of England, with some communities recovering from Storm Bert and Storm Conall. There have been improvements to flood protection⁴ since 2007 when 55,000 properties flooded and 13 people were killed, but improvements are not keeping pace with climate change, and we must now do more and appropriately resource efforts to stay ahead of threats to lives and livelihoods.

Climate impacts are experienced locally. In November, Axa and Public First released a report⁵ identifying regions in England most vulnerable. Bristol is listed as showing higher vulnerability to heat, and Bath has both flooding and heat risks.

It is good to see the Mayoral Combined Authority (MCA), alongside local communities and businesses, working to prepare for a greater degree of climate security. The importance of listening to local experts comes across loud and clear, as does the need to work collaboratively. No one has all the answers.

I am pleased to see the MCA call for national government to make adaptation reporting a funded statutory responsibility, this is needed to ensure all local and regional authorities prioritise climate resilience as a part of day-to-day business. At a national level the Cabinet Office is working on a review of national resilience⁶ against the range of risks that the UK faces, and the Committee on Climate Change has started work on the UK's Fourth Climate Change Risk Assessment (CCRA4)⁷, to be delivered in 2026. But we can't wait for plans and assessments to materialise. A step change is needed.

If we continue to build roads, hospitals, schools, homes, energy infrastructure and more to standards based on past extremes, then those foundations will wear and tear and wash away. For too long governments have put adaptation and climate resilience on the "too difficult to do" list but it must become an immediate priority. The West of England has many voices, I hope this report will lead a chorus for action.



Emma Howard Boyd CBE
Chair, London Climate Resilience Review

Former Chair of the Environment Agency
December 2024

¹ [WMO: 2024 is on track to be the warmest year on record](#)

² [Met Office: Climate Change in the UK](#)

³ [Guardian: 'At least five dead amid 'devastating' flooding as Storm Bert batters UK'](#)

⁴ [Environment Agency: 15 years of technological advances since the 2007 floods](#)

⁵ [Axa: 'Extreme weather risks: An analysis of England's vulnerability to flooding and heat'](#)

⁶ [Covid-19 Inquiry Module One: Oral Statement](#)

⁷ [Proposed methodology for the Fourth Climate Change Risk Assessment – Independent Assessment](#)

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Executive Summary

As the latest UK Climate Change Risk Assessment (UKCCRA) confirms, our climate has already changed over recent decades, with global average temperatures having risen by over 1°C and further changes are expected by 2050 and beyond. What our future climate looks like is somewhat uncertain, with a wide range of future climate scenarios possible. The United Nation's evaluation or 'gap analysis' of greenhouse gas (GHG) emissions reduction, show that we are on course for at least 2.6°C of global warming (possibly 3.1°C) which will have significant impact on human and natural systems. Our weather will continue to be highly variable, and this uncertainty presents problems that we need to address now if we are going to adapt successfully.

The impacts of climate change are already being felt. The annual State of the UK Climate report shows us that during the last decade (2014-2023) the number of 'hot days' (28°C) doubled and 'very hot days' (30°C) more than trebled, compared to 1961-1990. We can also expect more frequent and intense rainfall and heavy storm downpours as a result of climate change. The 2023/2024 storm season was very active across the UK, and records have already been broken this year for the wettest September on record.

This presents us with a number of challenges in the West of England. Not least, an investment challenge and the risk of 'locking in' costs for the future if we do not consider adaptation and the need to be climate resilient to future climate scenarios. The National Adaptation Programme warns that the physical impacts of climate change could cost our national economy between 1 and 4% of Gross Domestic Product per year. Flooding alone cost the UK £333million in Winter 2019/20 and the insurability of assets is likely to become an issue as risks increase. Early investment, and consideration of future climate needs today, will reduce the cost and likelihood of economic, social, and environmental fall out. In short, investment for a climate resilient UK is likely to be sizable. Not investing now for a well-adapted UK will likely increase the costs we face in the future, disproportionately affecting those in society least able to adapt, including those living with disabilities or in areas of multiple deprivation.

Climate risk management is being placed at the heart of our work programme at the Mayoral Combined Authority (MCA), and this report sets out our key risks and how we can address these on multiple fronts to reflect opportunities offered by the role the MCA plays. Climate risks will need consideration, integration, and reporting across a number of our core functions, from day-to-day operations to our service delivery across



the region. This includes growth, place-making, jobs and skills, and innovation, where we make major decisions, for example on funding, that affect residents and businesses across our region. We are at the start of a journey that we intend to take very seriously as an opportunity to ensure our region, and the investments we make here, are fit for the future.

Our top risks as a region are shared by many regions across the country, including all the national priority risks. As we are new to the Adaptation Reporting Power journey, we particularly value the chance to take part in this Government pilot. It gives us the opportunity to set out our baseline of risks and vulnerabilities, testing these out with our Unitary Authorities and setting out how we will address these and report on them in the coming years. Our role as a facilitator and convener puts us in an important place to embed climate resilience into the areas of interests we share with our regional partners. This includes our Local Authorities, whose input into this report has been invaluable. Working with experts at the Bristol Advisory Committee on Climate Change has ensured that our report has considered the widest possible implications of climate change.

The key climate-related risks identified for the West of England include substantial flood risks from coastal, tidal, and river sources, which affect both urban and rural areas, with future projections indicating a rise in severe flood events. Extreme heat poses another

growing threat, particularly within dense urban areas where the heat island effect is most pronounced. Increased temperatures can pose significant health risks, especially for vulnerable or already deprived populations, as well as reduced productivity, and adds strain to our infrastructure. Transport infrastructure is especially vulnerable to climate impacts, with extreme weather threatening the region's networks. The interconnected nature of transport with energy, digital, and water infrastructure further amplifies potential disruptions.

The region's vulnerable communities are at higher risk, highlighting a need for equitable resilience planning that ensures at-risk residents can adapt to climate impacts. Additionally, natural ecosystems face stress from sea-level rise, drought, and invasive species, putting biodiversity and ecological services that help reduce climate impacts in jeopardy. There are other areas where our knowledge is currently more limited, and we need to know more, for example on the regional impacts on food security and health.

The report gives us a vitally important opportunity to set out our priorities for taking action on climate risk. We currently are not prepared or sophisticated enough in the way we deal with climate risk across the region, and in how we manage that risk and continue to thrive and grow. The MCA has identified six immediate priority areas, which include addressing flood risks, extreme heat, and vulnerabilities in

transport infrastructure, as well as supporting communities, businesses, and natural ecosystems. With increased investment and organizational capacity, the MCA aims to reduce climate vulnerabilities and achieve its long-term goals for a sustainable, resilient West of England.

In conclusion, the West of England must adopt bold adaptation measures to safeguard its communities, economy, and natural environment. The adaptation report sets out a framework for action and accountability, demonstrating the importance of local government support and funding to meet climate challenges. By building resilience across the region, the Combined Authority and its partners are committed to creating a safer, more sustainable future for the West of England.



1. Introduction

1 Introduction

The **West of England Mayoral Combined Authority (the 'MCA')** recognises the urgent need to raise ambition and accelerate action on tackling the climate emergency, where escalating impacts threaten our communities, businesses, and the economic prosperity of the region.

Our **Climate & Ecological Strategy and Action Plan (CESAP)** has a dedicated theme on climate resilience, where our strategic objective is working with our partners to accelerate adaptation action and build the region's resilience. We recognise the strong synergies between net zero, nature recovery and climate resilience and the co-benefits of integrated solutions to reduce risk and maximise opportunities.

We welcome the UK Government's invitation to participate in the **Adaptation Reporting Power 4th round Local Government pilot** (or ARP4) which invites infrastructure providers and bodies with functions 'of a public nature' to provide reports on how they are managing climate risk. We believe that Local Government, particularly combined authorities operating at a regional scale, have a crucial role in building the country's resilience to climate impacts.

This ARP4 report covers the MCA region (covering the Unitary Authorities of Bath & North East Somerset, Bristol, and South Gloucestershire) including the major cities of Bristol and Bath, the large towns of Yate and Radstock and a Severn Estuary coastline. It sets out how the MCA is approaching climate risk management through our new climate resilience work programme.

Our **key aims** for this reporting process are:

-  **To raise awareness** on the climate change challenges facing the West of England;
-  **To support the integration** of climate risk management into the MCA's work;
-  **To stimulate discussion and action** - with regional partners, sectors, and stakeholders;
-  **To support government** in understanding local government's levels of preparedness, and:
-  **To inform** the UK's National Adaptation Programme & Climate Change Risk Assessment.

South Gloucestershire Council are also submitting an ARP4 report to government. We have been working closely together in the development of our reports. We also cover neighbouring North Somerset Council in our Interdependencies section.

Following the submission of this report to Defra we will produce a Non-Technical Summary using Plain English to help share its key findings with different audiences.

This report is not a comprehensive, climate change risk assessment nor a delivery plan for the region. Nor is it perfect. Tackling climate risk is a dynamic complex challenge with multiple owners, and a shifting landscape due to ongoing evolving knowledge, legislation, policy, investment, and technology.

2. Scene-setting

2 Scene-setting

THE MCA ROLE & WEST OF ENGLAND REGION

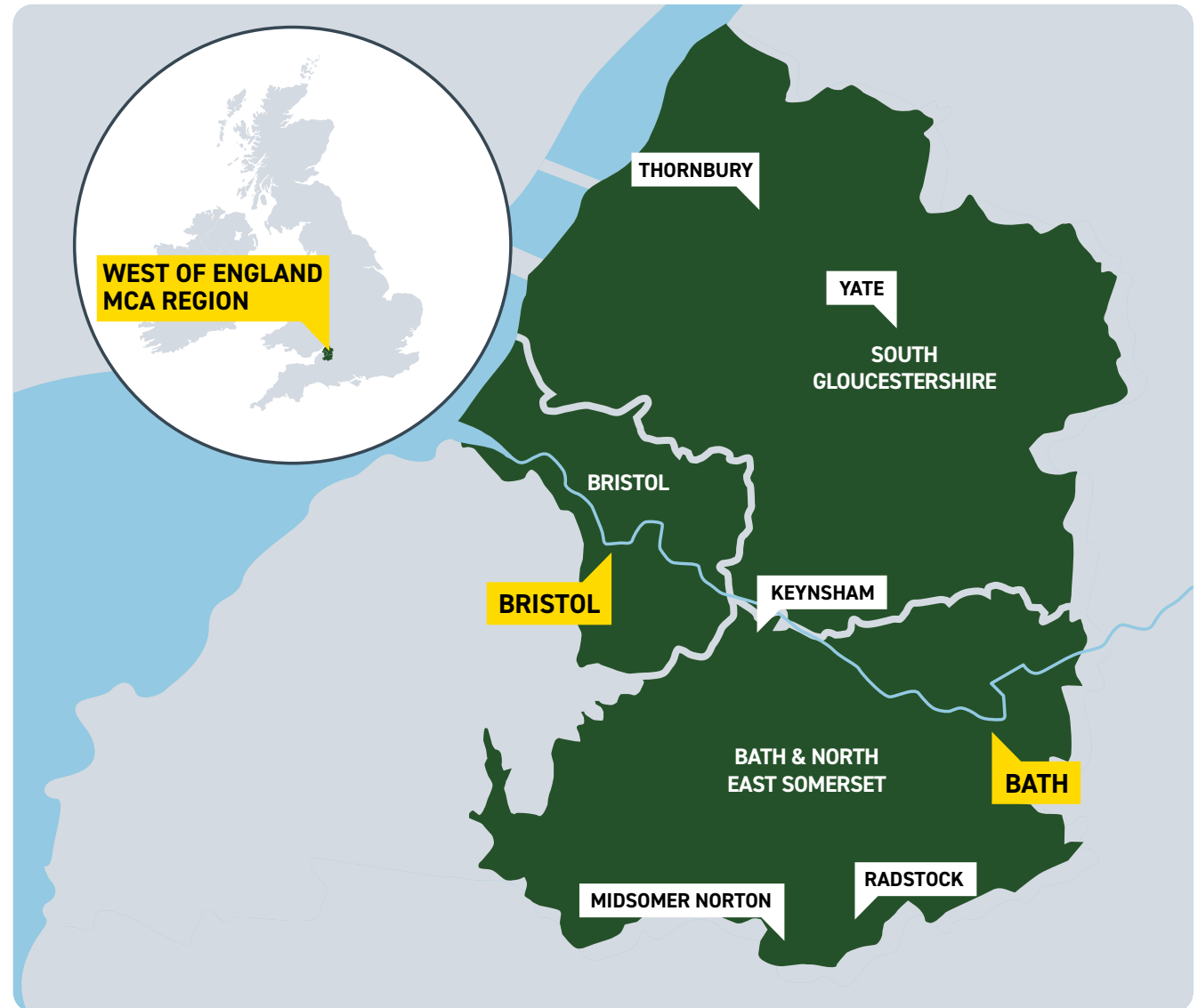
The **West of England Mayoral Combined Authority** was established in November 2017 and includes Bath & North East Somerset (B&NES), Bristol City and South Gloucestershire.

The MCA region is a melting pot of people, cultures, and places. 91 languages are spoken among our 950,000 residents, who come from over 150 countries. The region is home to world renowned cities, vibrant towns, a beautiful coastline, and rural settings.

A rich history of creativity, innovation and engineering strength has driven the success and development of our region for generations. From Brunel to Concorde - the West of England has played a crucial role in taking leaps forward in industrial development that have had global impact.

Our region is also a place of great natural diversity, with two National Landscapes (previously called Areas of Outstanding Natural Beauty), 5,000 hectares of onshore Sites of Special Scientific Interest, and important marine habitats and tidal resources in the Severn Estuary.

Figure 1: West of England MCA region



The West of England Mayoral Combined Authority is working to create a greener West of England, that is equal, fair, and inclusive and to make the region more prosperous. We make decisions that directly benefit our region, our residents, and our economy. As a Mayoral Combined Authority, we have significant powers and funding to tackle everyday challenges in the West of England – including transport, skills, jobs, support for businesses and tackling the climate and ecological emergencies.

Figure 2: Vision for the West of England – outcomes for 2040⁸



A greener West of England

The West of England will be net zero carbon, wildlife and the natural environment will be in recovery, and we will have built our resilience to the impacts of our changing climate.



A more equal, fair & inclusive region

People from all backgrounds and all parts of the region will share in this region's success and have access to homes, jobs and the services that will help improve their lives.



A more prosperous region

All residents will have rising quality of life, with improving incomes and living standards - the region will be growing in a sustainable way.

OUR CLIMATE & ECOLOGICAL EMERGENCY COMMITMENTS

The West of England set the ambition to become net zero by 2030 five years ago and recognised the need to address the ecological emergency as part of this. As a region, all of our partner Unitary Authorities have declared climate emergencies and are aiming to be net zero by 2030.

Despite these commitments and significant action across the region, collectively we are unlikely to meet these targets. Redoubling our efforts on net zero is essential to slow the rate of global warming and at the same time accepting that, as we have already passed 1°C, adaptation now is crucial to prepare for both current and future climate impacts.

We recognise that climate change is one of the main drivers of biodiversity loss and the ecological emergency. Our £60million Green Recovery Fund was created to help us meet our climate and ecology ambitions (investing £36m of our own funding alongside match-funding).

The **Climate and Ecological Strategy and Action Plan (CESAP)** sets out three core ambitions for reducing emissions, nature recovery and building climate resilience by 2030:

1. The West of England is net zero carbon;
2. Wildlife & the natural environment are in recovery, with their decline halted and the abundance of wildlife has increased by 30%, and;
3. The region has built its economic, social, and natural environment resilience to the impacts of climate change.

CESAP actions to deliver these goals sit across **six pillars**: Transport, Buildings & Places, Nature Recovery, Business & Skills, Net Zero Energy & Climate Resilience.

Many terms are used to describe the challenges and responses caused by our changing climate. Through our work with partners and stakeholders we recognise the need to use accessible language, with consistent terms, tailored and relatable for different audiences. This report uses the 'umbrella' term of **climate resilience** & our working definition is:

“The **capacity** of individuals, communities, institutions, businesses, and systems within the region to **survive, recover, adapt, & grow** in the face of worsening climate impacts including more extreme weather, rising sea level, & changing seasonal and weather patterns.”

We also use '**adaptation**' as a shorthand to describe the process/adjustment to change and '**preparedness**' to describe a state of 'readiness' for coping with climate change impacts.

⁸ Our strategy - West of England Combined Authority

CLIMATE EMERGENCY

A global challenge with regional impacts

The United Nation's evaluation or '**gap analysis**' of greenhouse gas (GHG) emissions reduction⁹ is a stark wake-up call. Ahead of the next round of national GHG commitments and COP30 in 2025, the UN call for new climate pledges to urgently close the emissions gap. Keeping global warming to 1.5°C is still technically possible but it will require unprecedented global mobilisation

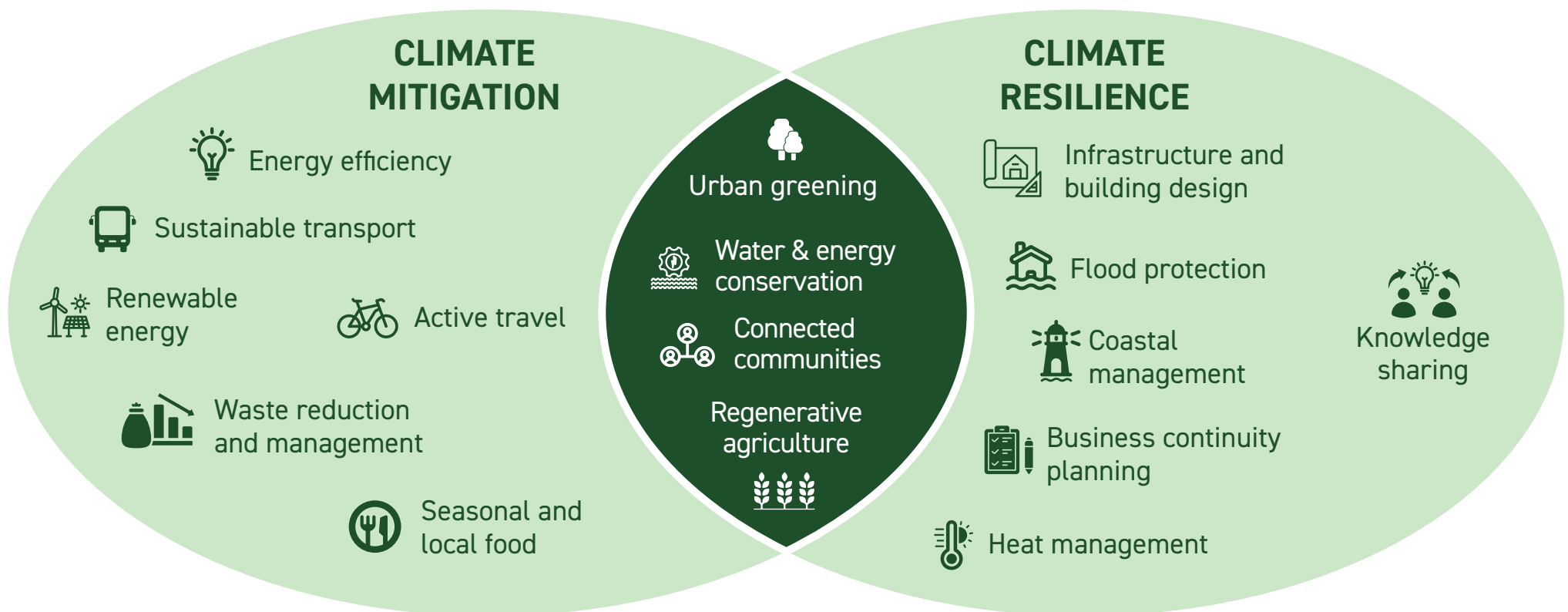
bringing '*sweeping & fast emissions cuts*' starting today, cutting GHG by 42% by 2030 and 57% by 2035. Failure to do so will put the world on course for a temperature increase of 2.6-3.1°C of global warming over the course of this century, with '*debilitating impacts to people, planet, and economies.*'

The Climate Action Tracker in Figure 4 is an independent project that tracks government action and pathways to meeting global temperature goals.

Global average temperatures have already risen by over 1°C, since pre-industrial times (around 250 years ago).

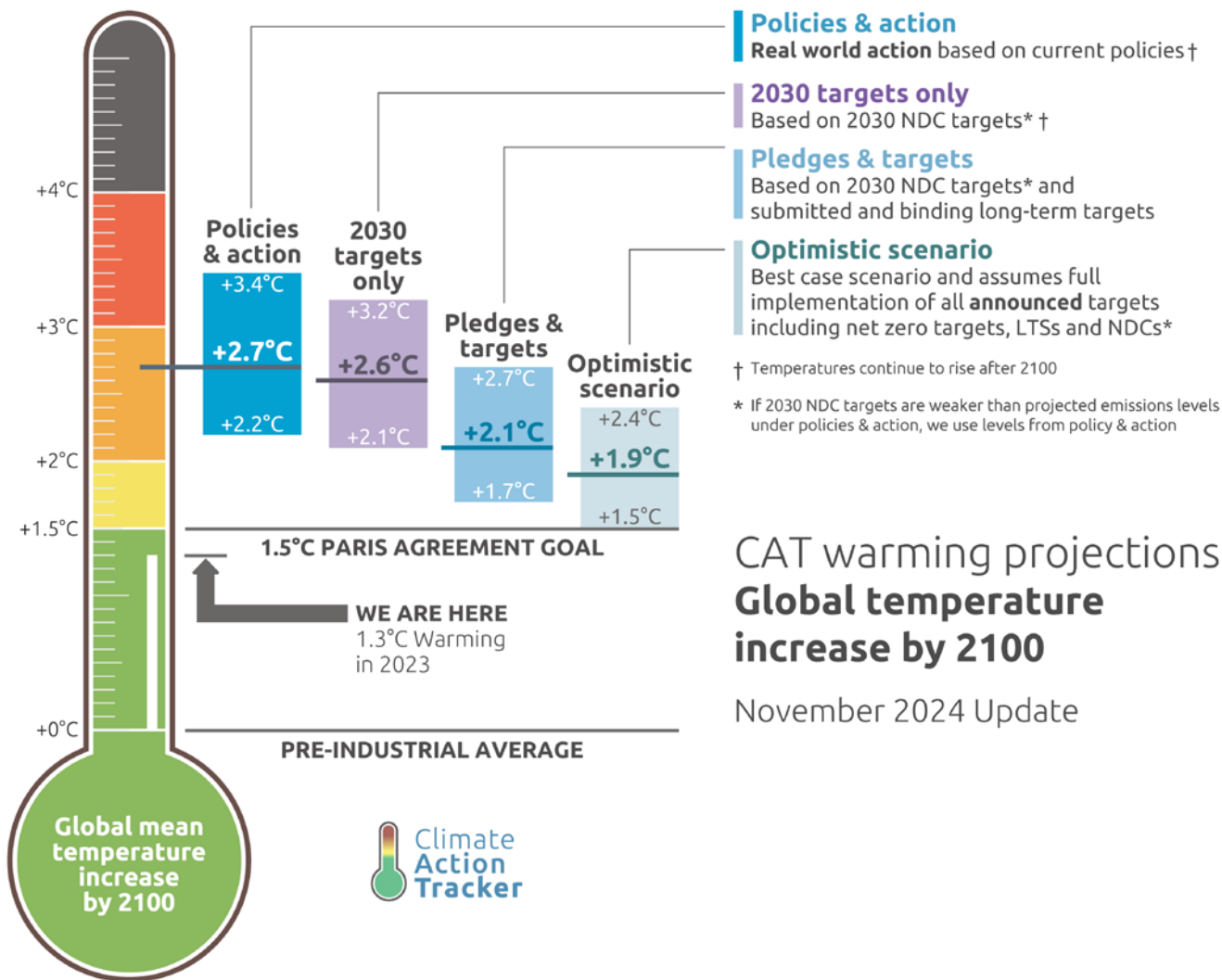
The greater the **global warming levels**, the greater the '**adaptation challenge**' in coping with the climate change impacts. International action to cut greenhouse gas emissions dictate how high this bar, or challenge is set. The higher the bar is set, the greater the likelihood that impacts will exceed what we can realistically adapt to, or cope with.

Figure 3: Climate mitigation versus climate resilience - what's the difference?



⁹ Emissions Gap Report 2024 | UNEP - UN Environment Programme

Figure 4: the Climate Action Tracker Thermometer¹⁰
(credit: Climate Action Tracker)



CAT warming projections Global temperature increase by 2100

November 2024 Update

The higher the bar and the lower our preparedness and climate resilience levels, the more we are forced into a survivalist or firefighting mode as the century progresses and impacts grow. Repeatedly dealing with crises, takes a toll in lives lost and economic fallout, but also risks diverting resources and focus away from longer-term measures to build resilience. Conversely, as climate change impacts grow, it could prompt a radical acceleration of adaptation and resilience efforts.

While rapidly reducing emissions is essential, some impacts are **'hard-wired'** for many decades into the climate system such as sea-level rise, even if we were to drastically cut emissions tomorrow. Significant impacts could happen earlier than expected too because climate models are inherently uncertain when looking into future change at the end of the century. There is a rapidly closing **'window of opportunity'** during which global warming needs to be radically slowed. There is consensus that the 2020s are a pivotal decade requiring seismic transformation in not just our net zero efforts but in our efforts to adapt to certain change and build greater resilience to impacts.

The Earth's climate system has **'tipping points'**,^{11,12} where exceedance of critical thresholds would cause positive feedback loops, which in turn could 'tip' the climate into a very different state, with irreversible impacts. For example, permafrost thaw, rainforest die back or ice sheet loss. The Met Office inputted into the UKCCRA on

¹⁰ Home | Climate Action Tracker

¹¹ ESA - Understanding climate tipping points

¹² Resources - Global Tipping Points

the potential physical impacts of tipping points on the UK¹³, and their Climate Dashboard¹⁴ provides observation data from land & sea, part of our early warning system tracking changes in key climate change indicators.

Climate change is already happening

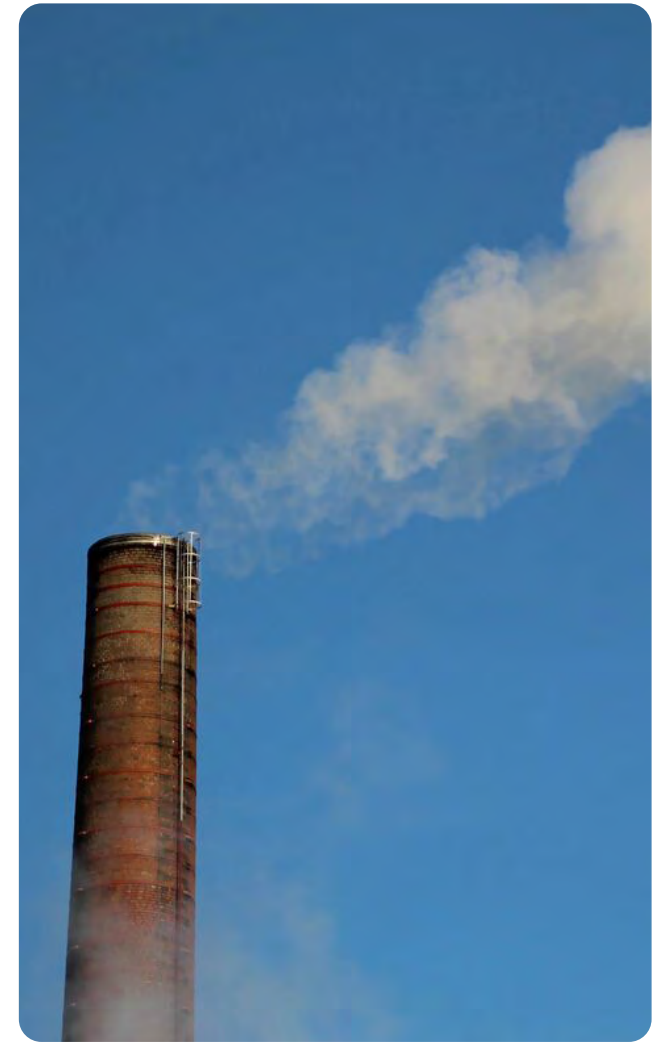
Climate records are being broken on a disturbingly regular basis around the world at a number, speed and scale that is alarming both climate scientists, and policy makers alike¹⁵. Global communities are feeling the impact of events in lost lives, lost businesses, and displaced communities on every continent around the world.

Our warming climate is already having dramatic impacts on nature - compromised ecological needs, impacts on geographical range, disruption to food webs and life cycles, and erosion of habitat health - increasingly causing population decline in species and threats to their survival¹⁶. Climate change is one of the greatest drivers of change of terrestrial, freshwater, and marine habitats in the UK over the last 50 years¹⁷.

The latest UK Climate Change Risk Assessment¹⁸ sets out the key messages for the UK's weather and climate:

1. The UK's climate has already changed over recent decades;
2. Further changes in the UK's climate are expected by mid-century;
3. A wide range of future UK climates remain possible in the second half of the century;
4. The UK's climate & weather will continue to be highly variable, and;
5. Low likelihood, high-impact climate changes outside the envelope considered by current projections could still be possible.

The annual State of the UK Climate report reveals that extreme temperatures are increasing at a greater pace than average temperatures. During the last decade (2014-2023) the number of 'hot days' (28°C) doubled and 'very hot days' (30°C) more than trebled, compared to 1961-1990. Records have been broken this year for the wettest September on record across ten English counties¹⁹.



¹³ [Effect of Potential Climate Tipping Points on UK Impacts - UK Climate Risk](#)

¹⁴ [Met Office Climate Dashboard](#)

¹⁵ [2023 shatters climate records, with major impacts - World Meteorological Organization](#)

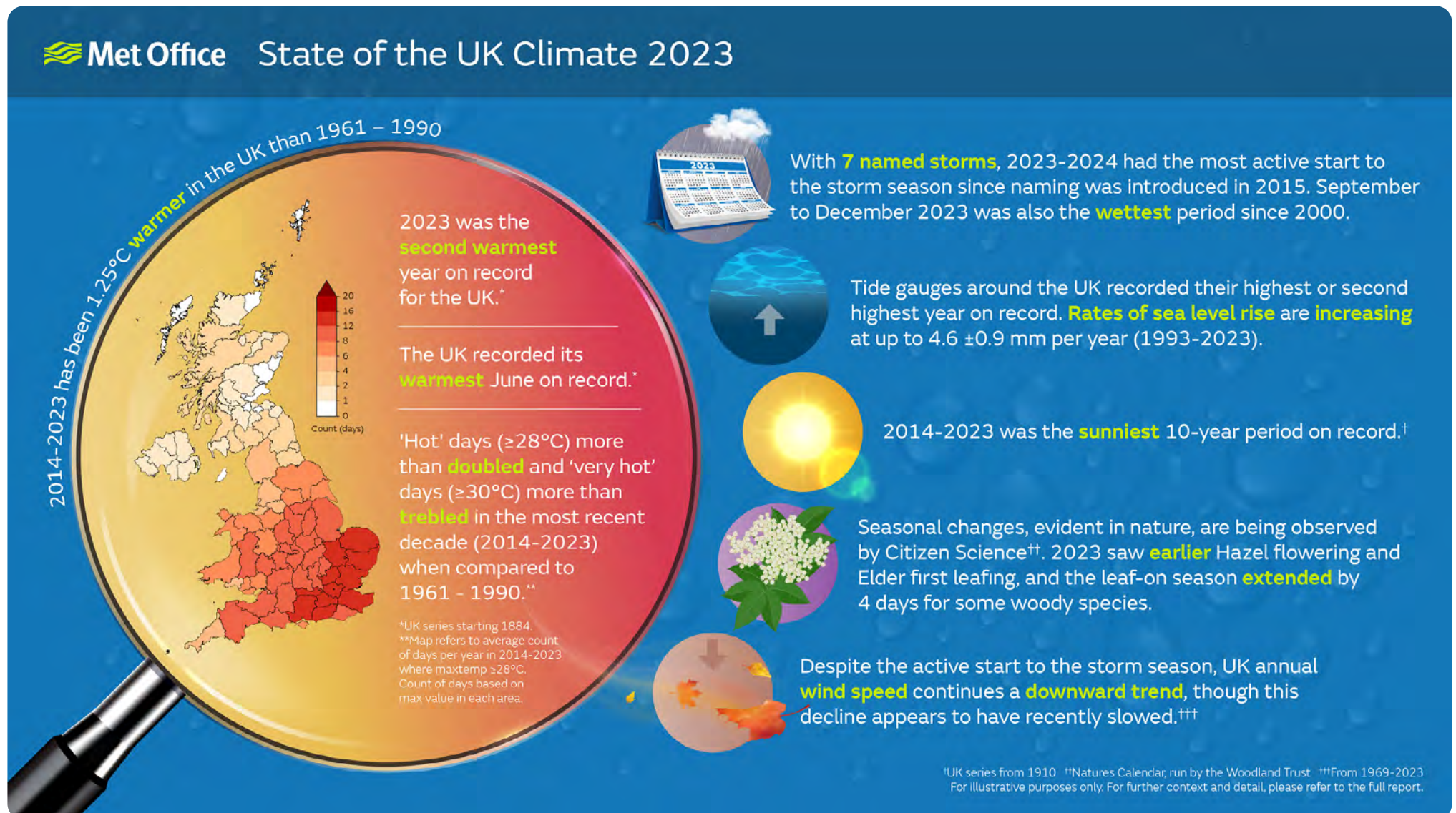
¹⁶ [Adaptation and the nature emergency - Climate Change Committee \(theccc.org.uk\)](#)

¹⁷ [State of Nature 2023 - report on the UK's current biodiversity](#)

¹⁸ [Independent Assessment of UK Climate Risk - Climate Change Committee](#)

¹⁹ [Record-breaking rainfall for some this September - Met Office](#)

Figure 5: State of the UK Climate infographic (credit: Met Office²⁰)



²⁰ State of the UK Climate - Met Office, Contains public sector information licensed under the Open Government Licence v3.0.

Survey data from the Office for National Statistics²¹ (ONS) reveals insights into how climate change is already affecting adults in Great Britain. Over the last 12 months, adults reported that they'd been affected by strong winds (40%), floods (35%) and heatwaves (30%), with two-thirds affected in at least one way. Asked about impact over the next 10 years, the expected changes were: increased temperatures (65%), increased flooding (60%), stronger winds (50%), rising sea levels or coastal erosion (44%) and water shortages (40%), with 8 in 10 (83%) expecting at least one.



An investment challenge & the costs of inaction

Investment today in addressing the climate and ecological emergencies will significantly reduce future costs.

The National Adaptation Programme²² highlights how the physical impacts of climate change could cost England's economy between 1% and 1.5% of Gross Domestic Product per year by 2045, increasing to between 2% and 4% per year by late century. Flooding events cost an estimated £333m between November 2019 and March 2020. A quarter of the risks identified in the UKCCRA could each have economic impacts greater than £1bn per year by 2050.

Estimating the total scale of investment needed for a climate resilient UK is very challenging, especially in the absence of an agreed or well-defined vision for what a well-adapted country actually looks like.

Despite this bigger picture, known areas of investment this decade are: £1bn per year for flood resilience, £0.7bn per year for public water systems resilient to a 1 in 500-year drought, £1bn per year for housing retrofit to reduce overheating risk, £3bn per year for nature restoration, and £650bn for infrastructure improvements (not explicitly for but benefiting climate resilience). An additional £10bn per



year may be needed to improve the UK's preparedness for climate change, with all figures increasing for higher levels of future global warming and limits to adaptation. See Investment for a well-adapted UK²³.

The Dasgupta Review: the Economics of Biodiversity²⁴ recognises that climate change is a major driver of biodiversity loss, and that **sustainable economic growth** is intrinsically linked to nature and its ongoing ability to deliver vital 'ecosystem services' for humanity. Over the last 50 years, monitored wildlife populations have seen a catastrophic decline of 73%²⁵.

²¹ [Public and business attitudes to the environment and climate change, Great Britain - Office for National Statistics](#)

²² [The Third National Adaptation Programme \(NAP3\) and the Fourth Strategy for Climate Adaptation Reporting \(publishing.service.gov.uk\)](#)

²³ [Investment for a well-adapted UK - Climate Change Committee](#)

²⁴ [The Economics of Biodiversity The Dasgupta Review: Headline Messages \(publishing.service.gov.uk\)](#)

²⁵ [WWF's Living Planet Report shows 73% decline | WWF](#)

3. Our approach

3 Our approach

Tackling the climate & ecological emergency is a priority and we are growing our capacity and capability to deliver our ambitious strategic objective of accelerating adaptation action and building the region's resilience.

The Climate and Ecological Strategy and Action Plan (CESAP)²⁶ included a climate resilience pillar and actions for the first-time in 2023. We have been working with colleagues and our partner Unitary Authorities to develop a new climate resilience work programme, led by our Climate Resilience Manager. Covering five workstreams and 28 short-to-medium term actions, this work programme replaces the original CESAP actions. The CESAP will be updated in 2025 to reflect these new actions. (See Appendix for CESAP 2023 actions).

Climate risk management is at the heart of this work programme, addressing it on multiple fronts to reflect the different roles the MCA plays within the region. Our high-level screening exercise exploring regional vulnerability to climate change, as set out in this report, has distilled the MCA's immediate priorities for the next two years.

Our **five workstreams** are:

-  1. **Strategic planning for building resilience & adapting to climate change impacts**
-  2. **Evaluating regional activity, ongoing impacts, & preparedness levels**
-  3. **Developing regional data, metrics & mapping resources**
-  4. **Building climate resilience into the region's fabric**
-  5. **Developing regional partnerships to accelerate progress**

A key objective has been trying to unpick/navigate the complex picture of regional resilience and articulate the **MCA's role** in that jigsaw and understand how our functions relate to delivering resilience at a regional level. So how does the MCA interface with climate change and what is our exposure to climate hazards such as flooding or extreme heat?



Climate risks could directly affect the MCA's day-to-day operations e.g., how heatwaves affect our city centre office and workforce. Climate risk management in this instance would focus on things like business continuity planning to minimise disruption and protect wellbeing.

However, the major interfaces between climate risk and **our role as an MCA** concern the running of a large, public sector organisation; our role in driving economic growth in the region and service delivery across a number of core functions, where we make major decisions that affect our residents and businesses. This requires us to understand climate risk and embed resilience into organisational processes and service delivery in a number of different ways.

²⁶ [West of England Climate and Ecological Strategy and Action Plan 2023 \(westofengland-ca.gov.uk\)](https://westofengland-ca.gov.uk)

For example, in developing strategies, we need to develop robust evidence bases that reflect growing climate impacts. When supporting the delivery of infrastructure schemes, we must ensure the design draws on that information and is future proofed.

Other core functions include commissioning, funding, grant allocations, place-making, jobs & skills, research, and innovation, all of which must consider their vulnerability to climate impacts.

We also have shared/aligned functions with our Unitary Authorities particularly strategic planning, transport, place-making, homes and tackling the climate & ecological emergency where there are clear benefits from joint working.

We welcome **Defra's ARP4 guidance** which was produced to support this Local Government pilot. This is an advisory and not mandatory document. In using our climate resilience work programme as the basis for reporting progress, we recognise

that we have taken a slightly different approach than proposed in the guidance (which is more of a traditional climate risk assessment).

We have produced a checklist in the Appendix summarising Defra's recommended content for ARP4 reports.

As we deliver our work programme, this will delve deeper into areas included in the guidance such as exploring the impact of different global warming scenarios on our work and the region.



4. Reporting progress

4 Reporting progress

CROSS-CUTTING ACTIVITY - HIGH-LEVEL SCREENING EXERCISE

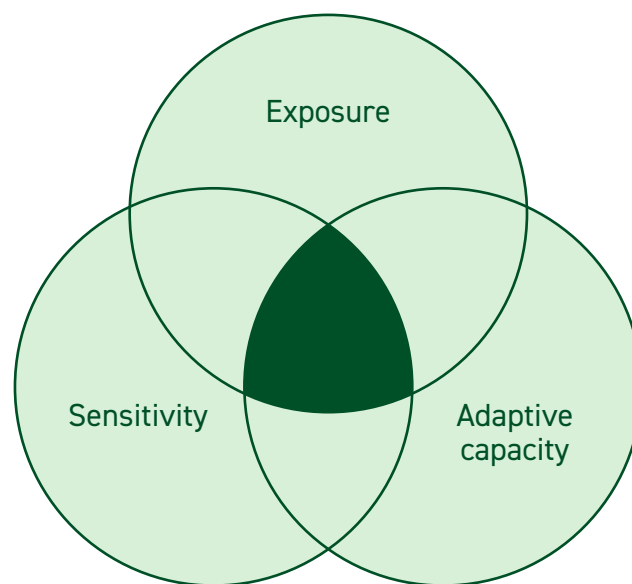
A high-level screening exercise has helped us explore regional vulnerability to climate change impacts across the whole Mayoral Combined Authority area, with a particular focus on extreme weather events. We have drilled down to the organisational level to identify immediate priorities for the MCA to take forward through our climate resilience work programme and the MCA's ongoing activities. Links to neighbouring authorities are covered in the Interdependencies section.

The UK Climate Change Risk Assessment identified priority risks by exploring current/future risks & opportunities, adaptation deficits, escalating risks, and significant opportunities for integrating adaptation or risks of 'lock-in' (see Appendix). We have taken inspiration from this process to shape our 'initial baseline assessment', comprising the following steps:

1. **Hazards** - summarising impact/trends predicted by latest climate projections;
2. **Risks** - filtering national climate change risks for regional relevance, identifying past extreme weather events, reviewing current evidence base on specific risks and flagging regional issues for further investigation;

3. **Preparedness** - summarising key MCA, UA & regional partner strategies, plans & projects which are increasing our preparedness levels (for both coping with near-term impacts e.g., emergency response and longer-term impacts e.g., strategic transport plans);
4. **Opportunities** - identifying 'entry points' for embedding climate resilience into the MCA functions and core areas of work, and;
5. **Synthesis** - identifying the MCA's immediate near-term priorities.

Figure 6: Vulnerability is a function of exposure, sensitivity, and adaptive capacity to hazards



There are many challenges in building our understanding of **regional vulnerabilities**. We are dealing with multiple data owners, different timescales & geographies, inconsistencies, and gaps in how climate change impacts are considered, and data sharing challenges. There is the practical issue of how this big picture is assembled, by whom and addressing capacity and capability needs in aggregating and interpreting data. The interaction with other shocks and stresses, and the indirect knock-on effect of events elsewhere e.g., overseas climate change affecting supply chains and the region's economy, adds another layer of complexity.

Workshops with climate leads from our three constituent Unitary Authorities (Bristol, B&NES & South Gloucestershire) and neighbouring North Somerset have informed this process. We have identified immediate priorities for our organisation for adapting to climate change and building resilience through discussion with senior management, showing how they align with core functions/policy areas and corporate priorities.

We recognise more detailed work is needed to collectively build this common understanding or 'situational awareness', for the region. Through future engagement, we will co-develop this regional baseline assessment. This process also helps build a powerful narrative and we are mindful that this can look different depending on who you involve and what questions you ask in building-up this picture, and it will evolve over time.

Ultimately an evidence base needs to be fit-for-purpose to aid effective decision making (rather than being 'perfect'). It will become more sophisticated over time as methodologies evolve and more resources become available.

Step 1 - high-level screening of hazards using a regional lens

The Met Office's world-leading climate science explores how the UK's climate might change for a range of future climate scenarios. Each scenario (known as Representative Concentration Pathways) corresponds to rising levels of global warming this century.

The latest **UK climate projections**²⁷ (known as UKCP18) are for: continued sea level rise and increases to extreme coastal water levels, an increased chance of warmer, wetter winters & hotter, drier summers, hot summers will become more common, increased frequency & intensity of extremes, and changing seasonality of extremes including more intense summer rainfall events.

The new Met Office Local Authority Climate Service²⁸ shows how the region's climate may change in the future and also looks back

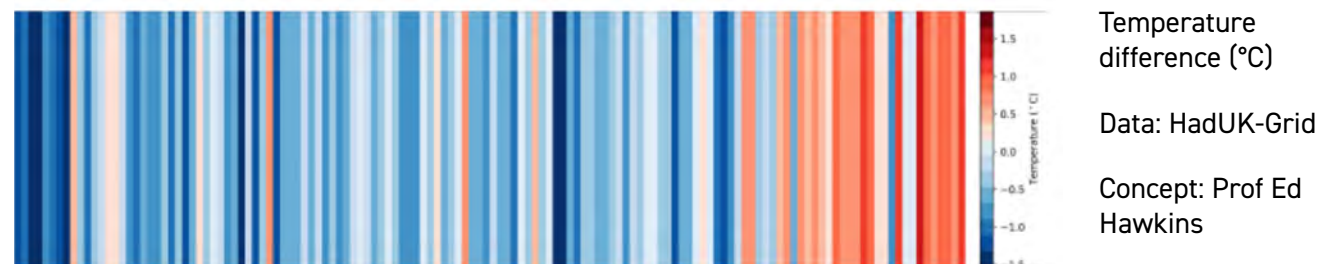
into the recent past to put this change in context. This information is simplified below and will be developed as we build our regional baseline assessment. We will also be drawing on industry expertise to help us investigate plausible pathways for preparing the region for a range of climate scenarios (see Workstreams 1, 2 & 3). The Committee on Climate Change recommendation is to adapt for 2°C of change and consider the implications of 4°C²⁹.

The **West of England climate stripe** shows the annual average temperatures rising steadily over the past 150 years, with an acceleration in the last few decades. With each blue stripe showing a cooler than average year and each red stripe showing a warmer than average year (compared to an average year during 1981-2000). It shows that many of the hottest years have occurred in the past twenty years.

Figures 8 and 9 below show the **range of climate change** the region could experience, depending on how successful international efforts are to stop the growth in greenhouse gas emissions which are driving climate change. They also show the approximate timing when specific Global Warming Levels (GWLs) may be reached for two different climate futures. For example, for a high-emissions scenario where efforts to control greenhouse gas emissions fail, 4°C may be reached by the end of the century but has a low likelihood or probability. The uncertainty in these futures increases over the course of the 21st century.

Figure 8 sets out projected changes³¹ for different **Global Warming Levels** which align with the 1.5°C Paris Agreement³² and the Committee on Climate Change's recommendation to prepare for 2°C and assess risks for 4°C.

Figure 7: West of England climate stripe (credit: Met Office³⁰)



²⁷ [UK Climate Projections: Headline Findings](#)

²⁸ [Local Authority | The Met Office climate data portal](#)

²⁹ [Committee on Climate Change: Why do we look at high warming levels when assessing UK climate risk](#)

³⁰ Data source: [HadUK-Grid Overview - Met Office](#), Contains public sector information licensed under the Open Government Licence v3.0.

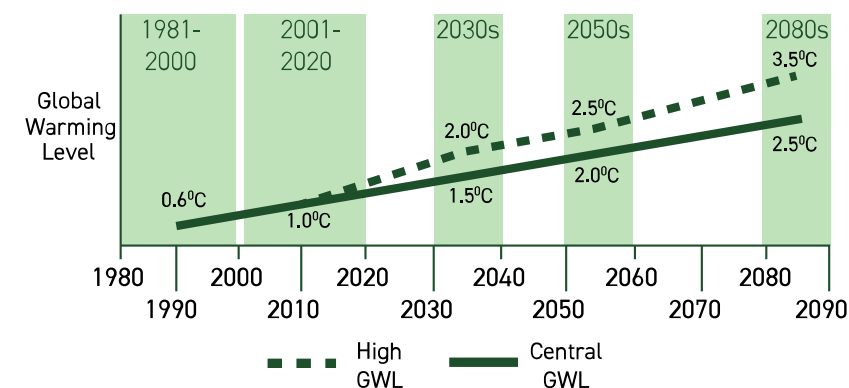
³¹ Notes - modelling at 12km resolution, middle figure 50% mid-point probability level, range - 10% lower probability level and 90% upper probability level

³² [United Nations Framework Convention on Climate Change: The Paris Agreement](#)

Figure 8: Regional climate change for different Global Warming Levels (credit: Met Office³³)

		0.6°C GWL Baseline 1981-2000	1.0°C GWL Recent Past 2001- 2020	1.5°C GWL Paris Agreement	2°C GWL Guidance: Prepare	4°C GWL Guidance: Assess risks
	TEMPERATURE	°C	°C	°C change	°C change	°C change
	Summer Maximum Temperature	29.0 28.8 to 29.3	31.0 30.1 to 32.3	+3.1 +0.7 to +3.5	+3.4 +2.0 to +4.9	+7.0 +6.1 to +9.5
	Summer Average Temperature	16.0 16.0 to 16.0	17.1 16.7 to 17.6	+1.3 +1.0 to +2.6	+2.1 +1.5 to +2.6	+4.3 +3.7 to +5.3
	Winter Average Temperature	4.7 4.7 to 4.7	5.4 5.0 to 5.7	+1.0 +0.6 to +1.2	+1.3 +0.7 to +1.6	+2.7 +1.8 to +3.2
	Winter Minimum Temperature	-7.1 -7.6 to -6.9	-6.1 -7.2 to -3.3	+1.8 +0.9 to +3.2	+1.9 +1.1 to +3.9	+4.1 +3.2 to +4.9
	Annual Average Temperature	10.1 10.1 to 10.1	10.9 10.8 to 11.1	+1.1 +1.0 to +1.3	+1.6 +1.2 to +1.8	+3.3 +2.9 to +3.8
	PRECIPITATION	mm/day	mm/day	% change	% change	% change
	Summer Precipitation Rate	1.96 1.96 to 1.97	1.92 1.61 to 2.07	-6 -19 to -2	-16 -25 to -4	-31 -50 to -26
	Winter Precipitation Rate	2.71 2.70 to 2.72	2.85 2.72 to 3.27	+6 -2 to +18	+8 +3 to +18	+21 +15 to +32

Figure 9: Global warming levels create different climate futures (credit Met Office³⁴)



Climate data presented here, is generated by running multiple **climate simulations** where model parameters in for example the land, atmosphere and ocean are varied slightly to reflect uncertainties in model set-up³⁵. This means that data is presented as probability levels where a 50% or 'central estimate' is where the bulk of the models are in agreement with one another. Using 10% and 90% probability levels represents the upper and lower end of projections where there is less agreement between different model simulations.

Climate projections are available at a range of **geographic scales**. This information tells us about **typical or average conditions** so the region could still experience years that are different from these long-term trends (known as 'natural variability'). The data is also averaged across the region and does not account for variation within the region where higher resolution models or local data would be needed.

The Appendix signposts resources explaining how climate data is generated, guidance on interpreting the results plus caveats and limitations.

³³ Met Office: [Local Authority Climate Service](#), Contains public sector information licensed under the Open Government Licence v3.0.

³⁴ Met Office: [Local Authority Climate Service](#), Contains public sector information licensed under the Open Government Licence v3.0.

³⁵ UKCP18 Land Projections: Science Report

Step 2 - high-level screening of risks using a regional lens

Reviewing national climate change risks

We reviewed the UK Climate Change Risk Assessment's 61 risks and identified two-thirds as regionally relevant, including all 8 priority risk areas. These risks are grouped into four focus areas - Infrastructure networks, Places & communities, Business & industry, and Land & sea. See Appendix for all UKCCRA risks in full.

We have added the abbreviations used in the UKCCRA after each risk to show the links - I (Infrastructure), B (Business & Industry), H (Health, Communities & Built Environment), ID (International dimension) and N (Natural Environment).

The UKCCRA **only partially captures** the cumulative impact of some interacting risks. It does not explicitly draw out the way that existing vulnerabilities, deprivation, and health inequalities intensify the risks and impacts on some people and communities. It is crucial that we acknowledge and understand better this aspect of climate risk so it can inform the implementation of adaptation measures. This will help ensure a fairer distribution of benefits which address existing inequalities and protect our most vulnerable communities who are least able to adapt to climate change.

Figure 10: West of England MCA region - key locations for screening climate risks





Infrastructure networks:

The MCA region like many places has traditional infrastructure networks - transport, energy, digital & telecoms, and waste, alongside other key infrastructures for healthcare, communities, education, food, and emergency services.

Regional risks:

- Cascading failures affecting water, energy, transport, ICT (I1)
- Flooding affecting infrastructure services (I2, I3)
- Multiple risks affecting transport (I5, I12), public water supplies (I8), energy (I9, I10)
- Overseas risks affecting UK food supplies (ID1)
- Delivery of health & social care, & education services (H12, H8, H13)



Places & communities:

The MCA region is home to large urban areas including the City of Bristol the largest city in the South West and the City of Bath, with large areas of countryside dotted with villages and more rural communities. Deprivation levels vary across the region.

Regional risks:

- High temperatures & air quality changes affecting health & wellbeing (H1, H7)
- Flooding affecting people, communities & buildings (H3)
- Viability of coastal communities from sea level rise (H4)
- Changes in summer & winter household energy demand (H6)
- Health risks from water quality & changes in household water supply (H10)
- Risks to building fabric & cultural heritage (H5, H11)



Business & industry:

The MCA region includes several enterprise areas and has strong digital, high tech and creative industries alongside environmental sector (head offices for Environment Agency (EA), Triodos Bank, Sustrans & Soil Association) & independent businesses. The City of Bath (UNESCO World Heritage Site) & Bristol are major tourist destinations.

Regional risks:

- Flooding & extreme weather affecting business sites, locations & infrastructure (B1, B2)
- Employee productivity affected by infrastructure disruption & higher temperatures (B5)
- Opportunities for business from changes in demand for goods & services (B7)
- Risks to finance, investment & insurance including access to capital for businesses (B4)
- Risks to the UK financial sector from climate change overseas (ID8)
- Risk multiplication - interactions and cascades across systems and geographies (ID10)
- Risks to building fabric & cultural heritage (H5, H11)



Land & sea:

The MCA region sits within the Bristol Avon Catchment and the tidal River Avon has the second highest range in the world, extending through the Avon Gorge into Bristol city centre. Home to internally important wetlands, SSSIs and local nature reserves.

Regional risk:

- Multiple risks affecting terrestrial, coastal & freshwater habitats (N1, N2, N11, N12, N17)
- Threats to soils from changing climatic conditions (N4)
- Risks & opportunities - natural carbon stores & sequestration & GHG emissions (N5)
- Risks & opportunities - agriculture & forestry (N6, N7, N8)
- Risks to aquifers & agricultural land from sea level rise, saltwater intrusion (N10)
- Risks & opportunities - landscape character (N18)

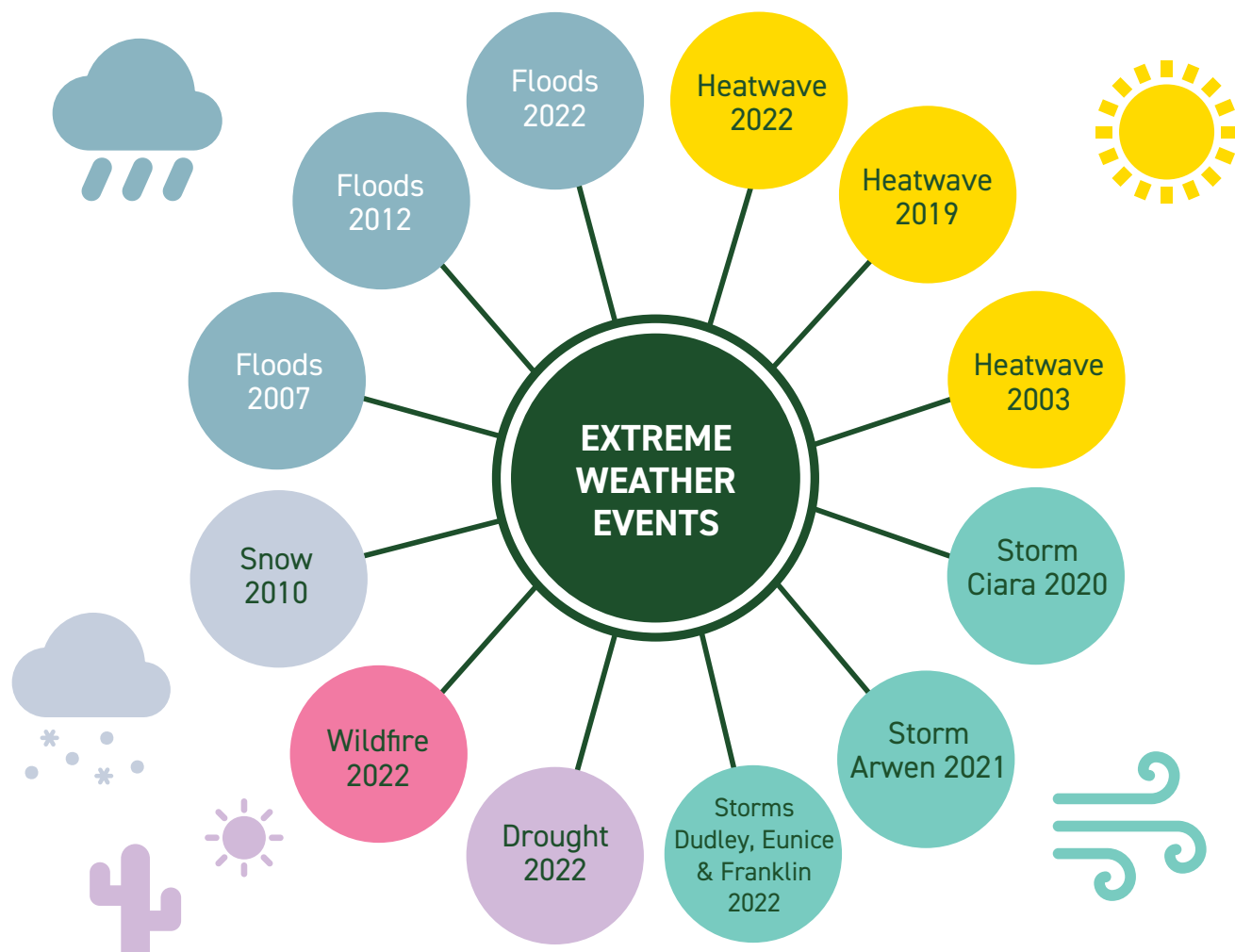
Identifying recent extreme weather events

Since the turn of the century, **UK weather records have been consistently broken**. Ten of the warmest years in the UK have occurred since 2003 (records began in 1884). 2023 was the second warmest year in the UK and these national trends are consistent with global climate observations. Carbon dioxide concentrations in the atmosphere are at their highest for at least 2 million years³⁶. 2024 is on track to be the **Earth's warmest year on record**.

As our climate changes, **extreme weather events are becoming more frequent, severe, and longer-lived**. The UK is already feeling the impacts of flooding, heatwaves, drought, and storms. Extreme cold is still part of this picture too, although the trend for cold winters, snow, ice, and frost is decreasing due to climate change. Wildfire events have increased in recent years. Scientists are increasingly able to demonstrate how climate change has been influencing these events³⁷.

Over the past decade, the region has experienced several flooding events with a range of impacts, including River Avon tidal flooding affecting transport routes³⁸, river flooding affecting low-lying properties in Bath, Keynsham, Swineford & Hanham, and flash flooding in the Chew Valley. During Storm Eunice 2022, a major incident was declared by the Avon & Somerset Local Resilience Forum³⁹. The Met Office issued a rare red weather warning due to the threat of a storm surge, with major flooding along the Severn Estuary narrowly avoided.

Figure 11: Examples of significant extreme weather events this century^{40,41,42,43}



³⁶ [2023 was second warmest year on record for UK - Met Office](#)

³⁷ [The influence of climate change on severe weather - Met Office](#)

³⁸ [March 2020 Flood Investigation - Bristol City Council](#)

³⁹ [Red weather warning for Storm Eunice | Avon and Somerset Police](#)

⁴⁰ [Past weather events - Met Office](#)

⁴¹ [Weather case studies - Met Office](#)

⁴² [Summer 2022 drought provides warning for future years | UK Centre for Ecology & Hydrology](#)

⁴³ [Summer wildfires increased fourfold in England in 2022 | Wildfires | The Guardian](#)

The last major flood was on 10th July 1968 where heavy rainfall caused loss of life, property flooding and infrastructure disruption in South Bristol and the Chew Valley. Bristol's fluvial flood risk has been significantly reduced by the construction of large interceptor tunnels following this event. The last hosepipe ban caused by droughts was in 1975, extending into 1976 due to an exceptional hot and dry period⁴⁴.

Currently there is no centralised system for recording significant weather events affecting the region, with limited monitoring or assessment of impacts. In some instances, monitoring and investigations are in place due to statutory duties being placed on organisations. For example, at a national level the UK Health Security Agency (UKHSA) monitors heat mortality⁴⁵. At a local level, Unitary Authorities must investigate and produce reports on significant flood events, with online systems allowing the public to log events, for subsequent follow-up.

Reviewing current evidence base

The following section draws from ongoing work investigating different climate risks. Several organisations are key players in building-up this picture including the Environment Agency, our Unitary Authorities, the Met Office, our four regional universities, and other regional partners. The Interdependencies section summarises flood risk for neighbouring North Somerset. (See Workstream 3 - Roadmap).

Coastal inundation & flooding

The MCA region faces significant flood risks from coastal, tidal, fluvial, and surface water sources. We are working with the Environment Agency, our Unitary Authorities, and other regional partners to complement existing work and build this regional picture. (See Workstreams 3 Action 3.1. Roadmap & Workstream 5 Regional Water Group case study).

Many sources build this evidence base - flood studies & modelling, data from monitoring network e.g., river gauges and learning from past flood events. The EA are updating national data⁴⁶ and locally, our Unitary Authorities undertake strategic flood risk assessments, and detailed local studies (there is a two-way flow between national and local data). Our aim is to include regional mapping on our West of England open data portal (see Workstream 3).

A range of metrics are used to explain flood risk⁴⁷ which can be confusing, describing the likelihood and magnitude of floods, including areas affected, speed and depth of floodwaters. Factoring in the impact of climate change on longer-term flood risk further adds to this complexity, exploring the impact of different scenarios and how it affects sea level rise, rainfall, and river flows. We recognise how certain terms can be misleading and will work with our partners and stakeholders to use more accessible language.

In this report we use two key terms, 'return periods' and 'annual chance' events. For example, a flood could be described as both a 1 in 200-year event (or return period), and a 1 in 200 annual chance event⁴⁸ (or 0.5% probability level). This type of flood has the same probability of happening every single year, it doesn't mean that if a 1 in 200-year event happened this year it wouldn't happen again for another 199 years. The chance or probability of a flood happening is related to the scale of flooding, so in any one year a large flood (e.g., 1 in 200) has less chance of occurring than a smaller flood event (e.g., 1 in 100 or 1 in 50) but has bigger potential impacts.

The most **significant source of flooding** by local authority area⁴⁹:

B&NES - fluvial flooding from its main rivers:

Flooding from the River Avon, River Chew, Cam Brook, and Wellow Brook. Although the area is land-locked, the River Avon is tidal up to Keynsham Weir, which could lead to issues with tidal locking of fluvial flows.

Bristol - River Avon tidal flooding:

Especially low-lying areas surrounding the Floating Harbour. Around 1,400 properties, including homes and businesses, are at risk from a 1 in 200-year event (high tides combining with storm surges) in 2030, rising to almost 3,100 at risk by 2130 due to climate change.

⁴⁴ [A history of hosepipe bans in Bristol & the surrounding areas - Bristol Water](#)

⁴⁵ [Heat mortality monitoring reports - GOV.UK](#)

⁴⁶ [Updates to national flood and coastal erosion risk information - GOV.UK](#)

⁴⁷ [Understanding Flood Risk | The Flood Hub](#)

⁴⁸ Notes - the technical term is Annual Exceedance Probability, also expressed as a probability level

⁴⁹ Notes - summary based on a high-level, not in-depth review - to be developed through regional baseline assessment which will enable comparisons across the region and take into account effect of climate change

South Gloucestershire - Severn Estuary tidal flooding:

Updated modelling is being produced to establish residual flood risk once the new Severnside Avonmouth coastal defences are completed, which protect for a 1 in 200-year flood event until 2098.

Surface water flood risk is also a significant regional problem, sometimes called flash flooding, due to heavy rainfall events (as is the case across many areas in the country). In urban areas flooding can also occur due to the sewerage network and highway drainage systems being overwhelmed and blockages in drainage infrastructure or equipment failure. In the West of England, Wessex Water is responsible for the sewerage network, while adopted highways drainage is either the responsibility of the Unitary Authorities or the Highways Authority (motorways and major A roads).

Local authority **surface water flood risk hotspots** are⁵⁰:

B&NES:

Bath, Keynsham, Radstock, Midsomer Norton, and Paulton. 737 residential properties currently at risk for a 1 in 100-year event, expected to rise to 1,393 by 2085 due to climate change.

Bristol:

Ashton, Southmead, Henbury, Hengrove, St George & base of Dundry Hills in South Bristol. Approximately 3,440 properties are at risk for a 1 in 100 annual chance event (rainfall 60-minute duration).

South Gloucestershire:

Urban areas north & north east of Bristol (Filton & Kingswood), Thornbury, Longwell Green, Yate, Chipping Sodbury, Pilning, Hanham, Aust and North Common. Tide-locking is a risk around Oldbury-on-Severn, preventing surface water draining away.

The region includes several **Rapid Response Catchments** in both urban and rural areas including Bristol Avon (Upper & Lower), River Frome, Brislington Brook and River Chew. These areas are at risk from rapid flash flooding, where watercourses respond quickly to heavy rainfall due to the local topography, typically steep slopes. The speed of flooding following heavy rainfall, creates challenges in alerting local communities, risk management options and use of flood warnings.

Groundwater flooding is considered a relatively minor risk across the region, but it is less well understood compared to other risks. Basement flooding has been reported in some locations, and natural springs can cause localised flooding.

Extreme heat

The MCA region has major urban areas which will experience more extreme heat during heatwave events than surrounding areas due to the **Urban Heat Island** (UHI) effect. Urban environments with large areas of concrete, tarmac and roofs absorb and retain heat more easily than green spaces, releasing it slowly at night. Heat also builds up due to waste emissions from building and vehicles with street layouts and buildings trapping and delaying its release. **Green spaces are cooler** as heat is lost through natural processes like evaporation.

Evidence-building **initiatives** by our Unitary Authorities and partners will feed into the development of the MCA's regional evidence base and mapping tool (see Workstream 3 Action 3.1. Roadmap). For example, the Bristol Advisory Committee on Climate Change⁵¹ are convening evidence-gathering workshops on urban heat risks and the Urbisphere⁵² project is generating temperature data using a temporary weather station network. Emerging research is showing that mental health can be a major factor in heat risk, sometimes more significant than age⁵³.

⁵⁰ Notes - based on Unitary Authority input & local flood risk management strategies (see appendix)

⁵¹ [Helping Bristol towards its ambition to be a carbon neutral and climate resilient city by 2030 - Bristol Advisory Committee on Climate Change](#)

⁵² [Home - urbisphere](#)

⁵³ [Identification of individual-level clinical factors associated with increased risk of death during heatwaves: a time-stratified case-crossover study using national primary care records in England - BMJ Public Health](#)

Bristol City Council worked with the Met Office and an embedded researcher from the Tyndall Centre for Climate Change to explore urban heat risks (see Workstream 5 Bristol - tackling urban heat risks). The following figures show the results of this work and are taken from the **Keep Bristol Cool Framework**⁵⁴, covering:

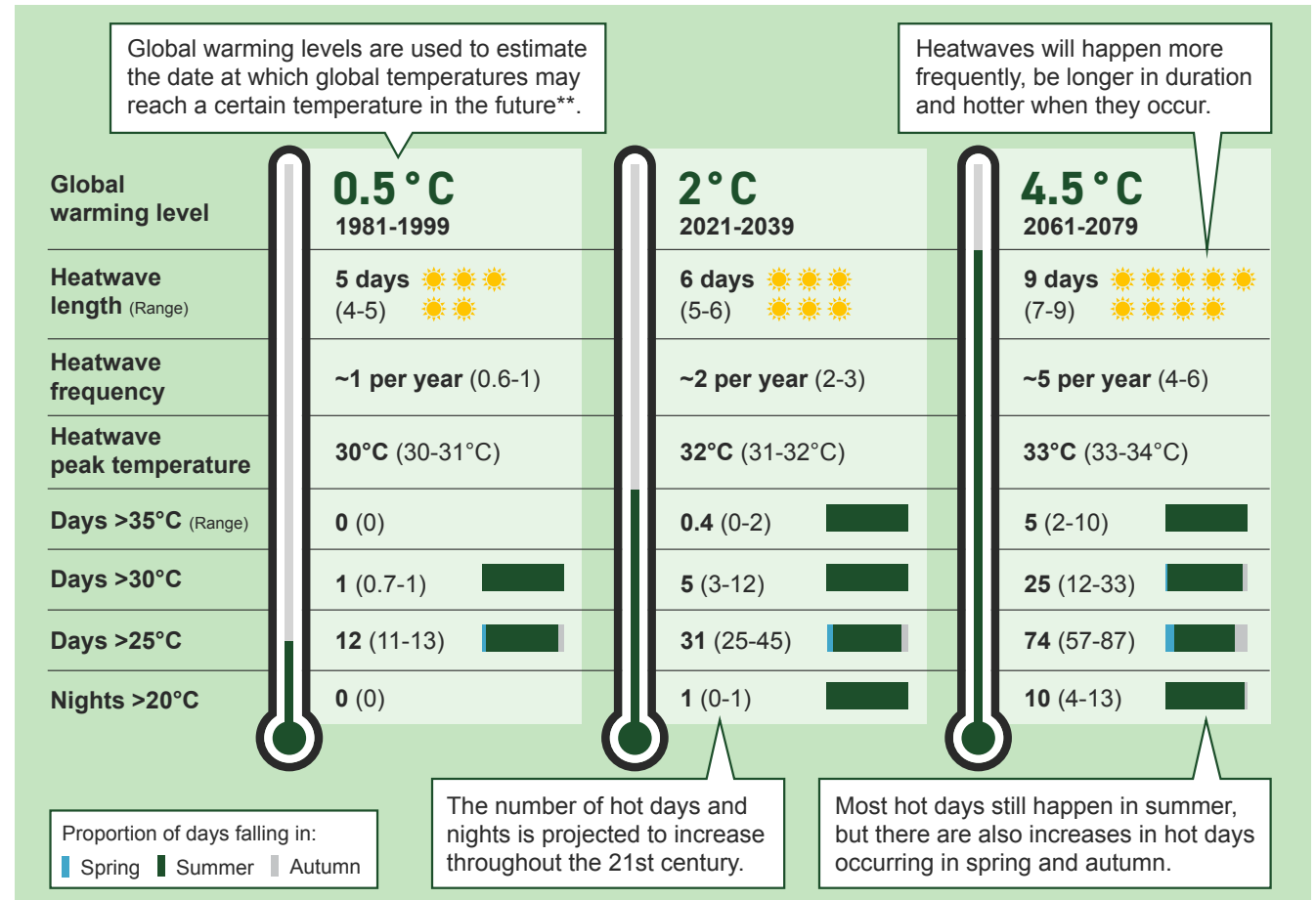
- increasing severity of heatwaves and high temperatures this century (Figure 12),
- mapping future patterns for 'very hot' summer days over 30°C in the 2070s (Figure 13),
- mapping current patterns of heat vulnerability using an index scoring system, (Figure 14) and,
- feedback on homes overheating from Bristol's annual Quality of Life survey (Figure 15).

The climate data was generated using UKCP Local projections, for a high-emissions scenario⁵⁵ where efforts to control emissions are limited and global warming reaches about **4.5°C** by the 2080s. This modelling uses a 2.2km scale similar to weather forecasting which is better able to represent urban areas. See the Keep Bristol Cool Technical Appendix⁵⁶ for further information on Bristol's climate data - methodology, interpretation and limitations.

By the **2080s**, average summer temperatures could increase by between 3.1°C and 7.6°C when compared to the end of the 20th Century. Figure 12 shows that by this point about 1 in 5 summer days could be hotter than 25°C, with one in 15 over 30°C.

Heatwaves could have more than doubled in frequency when compared to the 2030s to five times a year, representing a five-fold increase on the 1980s and 1990s. A typical heatwave could last for 9 days, reaching a peak temperature of 33°C.

Figure 12: Future extreme heat trends for Bristol during 21st century (credit: Met Office⁵⁷)



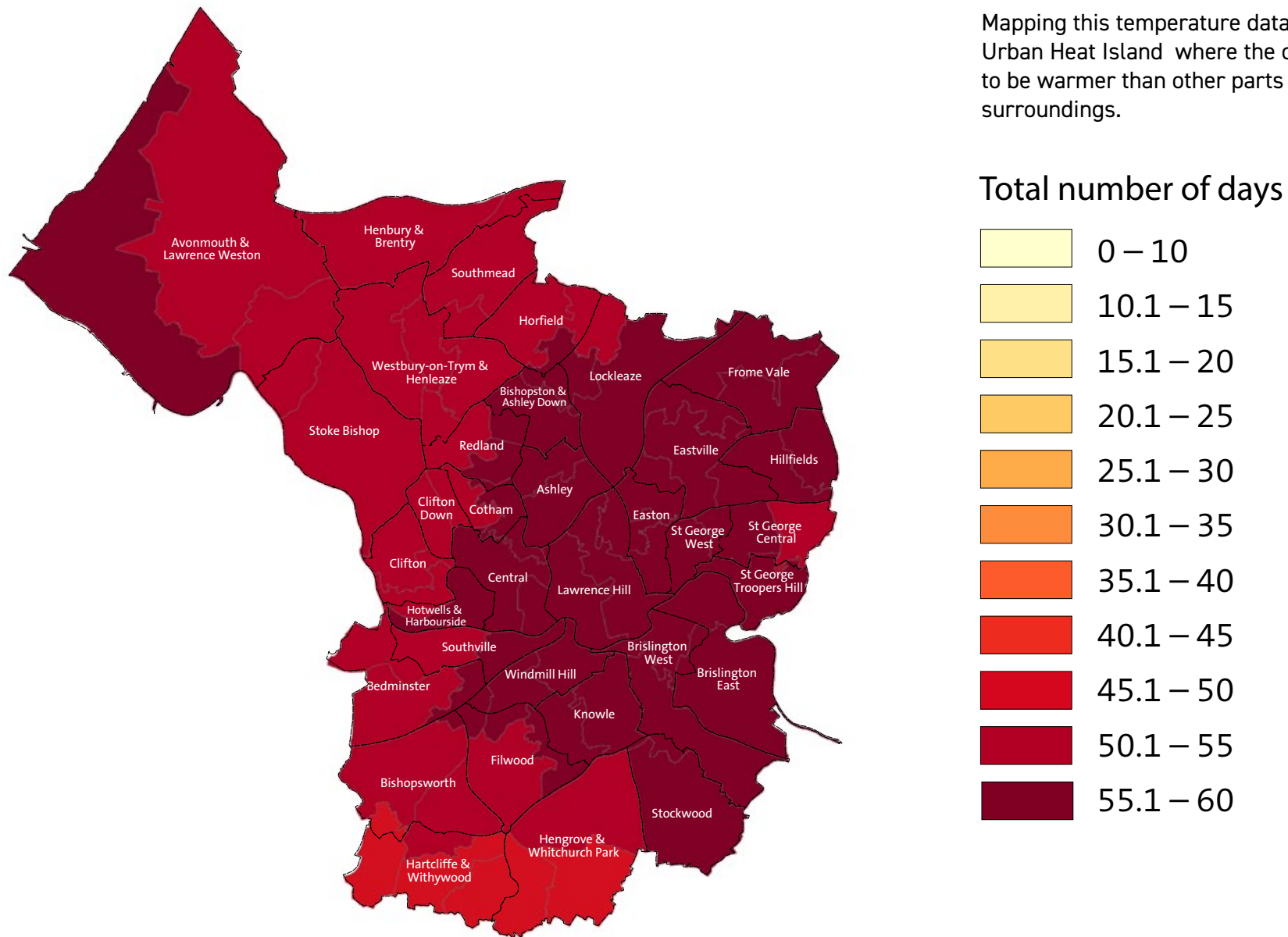
⁵⁴ [Keep Bristol Cool Framework - Bristol City Council](#)

⁵⁵ Notes - RCP8.5, 50% mid-point probability level & range from lower 10% to upper 90% probability levels

⁵⁶ [Keep Bristol Cool Framework Technical Appendix - Bristol City Council](#)

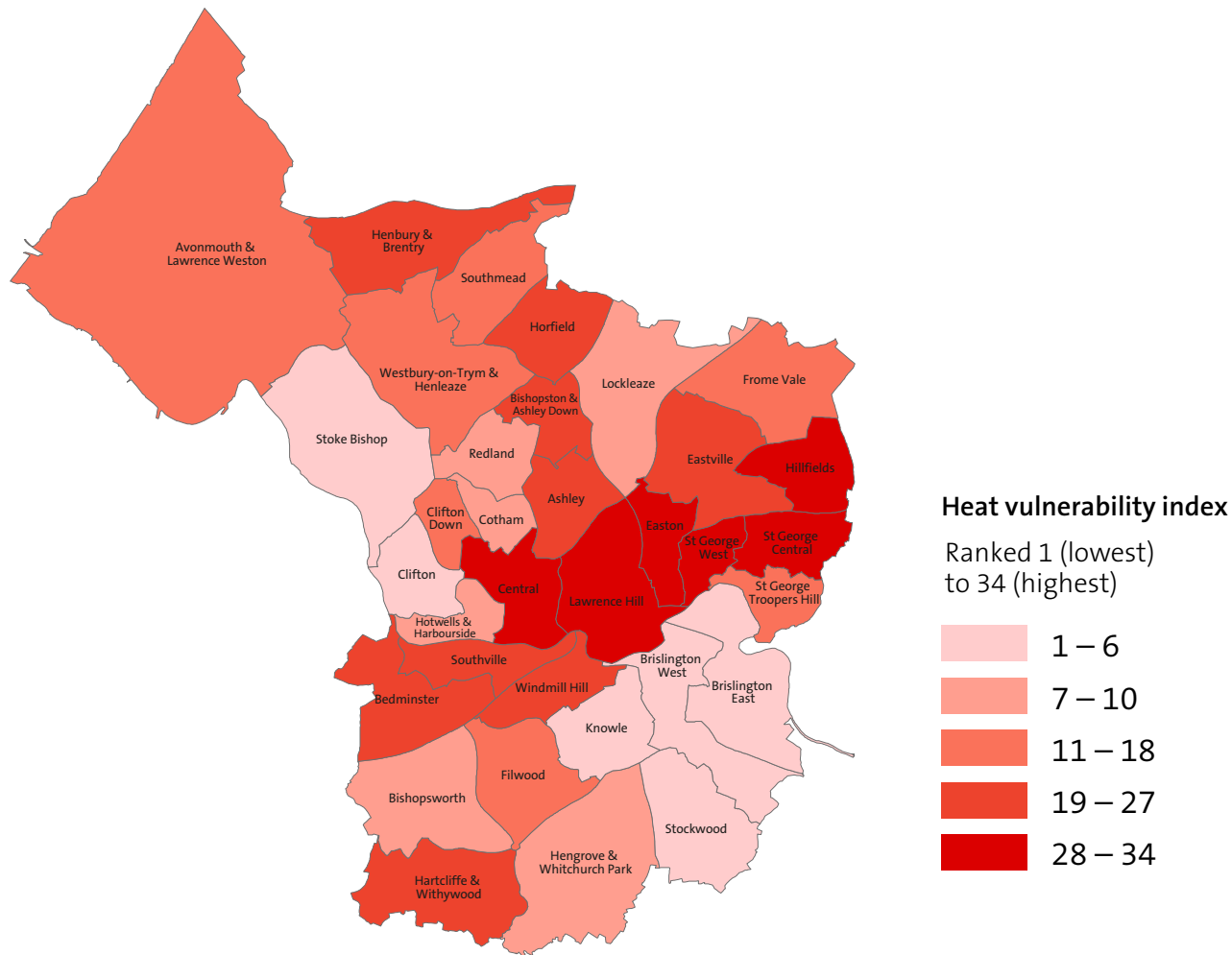
⁵⁷ [Met Office Bristol Heat Pack](#), Contains public sector information licensed under the Open Government Licence v3.0.

Figure 13: Average number of summer days above 30°C for period 2061-2070 (credit: Bristol City Council & Met Office⁵⁸)



⁵⁸ Keep Bristol Cool Framework, Contains OS data © Crown copyright [and database right] 2024, © Met Office

Figure 14: Overall Heat Vulnerability Index by Bristol ward (credit: Bristol City Council⁵⁹)



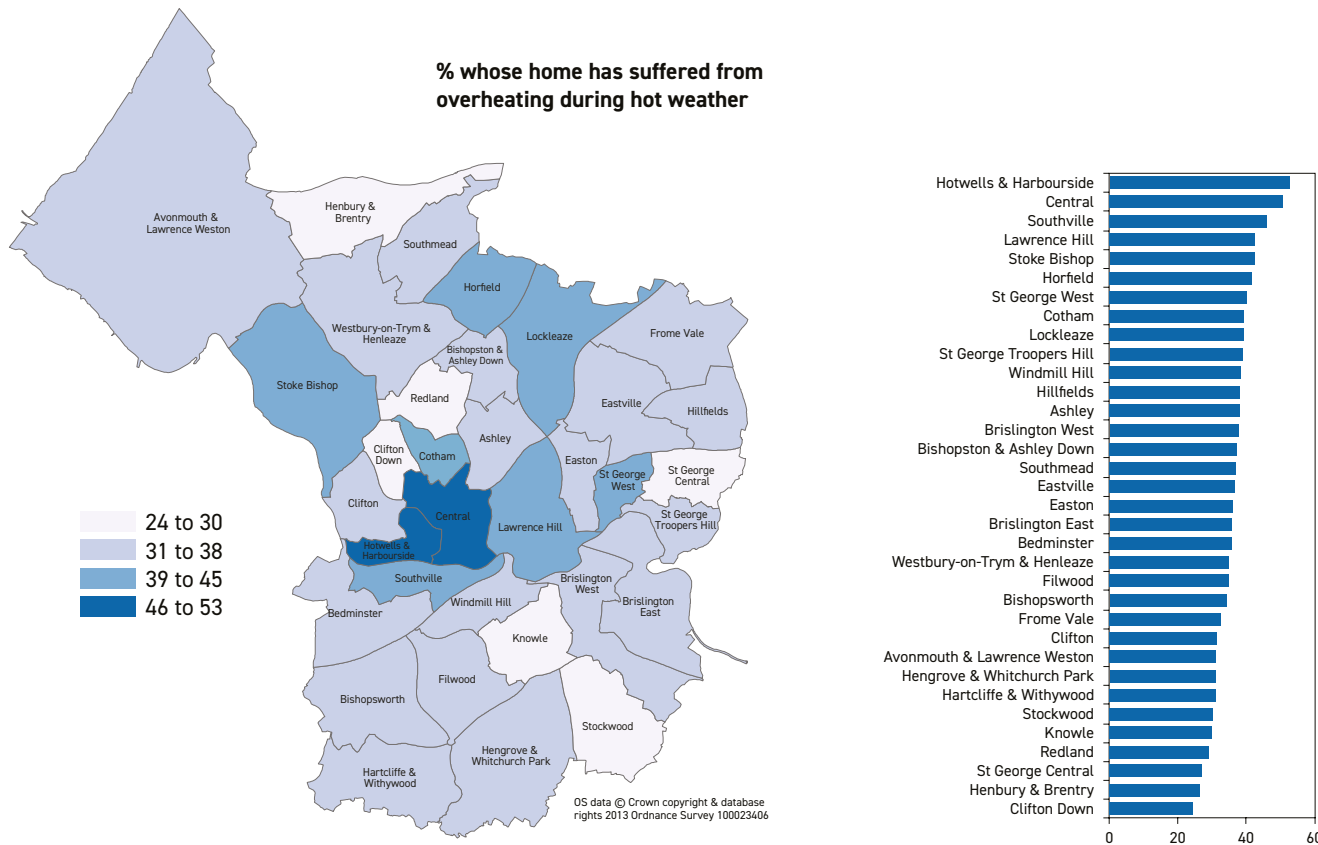
Different types of data were brought together to create the Heat Vulnerability Index (HVI) by exploring:

1. A person's **sensitivity to heat** such as age (especially over 65s and under 5s) and any health conditions.
2. A person's **ability to adapt to high temperatures**, which is influenced by factors such as income, employment, and education.
3. A person's **exposure to high outdoor temperatures** because they live in an area with a strong Urban Heat Island effect e.g., a very urban environment with limited green space and tree cover.
4. A person's exposure to high indoor temperatures because their home is more prone to overheating e.g., south facing property with large windows.

Mapping the HVI shows that the highest risk areas of Bristol are in the central and eastern areas. Lawrence Hill is the most vulnerable ward, with very high rating for deprivation levels, homes at risk of overheating and outdoor exposure due to urban environment.

⁵⁹ Keep Bristol Cool Framework, Contains OS data © Crown copyright [and database right] 2024

Figure 15: Quality of Life 2022 survey (credit: Bristol City Council⁶⁰)



Data from Bristol's Quality of Life survey⁶¹ shows an upward trend in people saying that their homes have overheated over the last 4 years. During the record breaking 2022 heatwave, the Bristol average was 36%, rising to about 50% of people living in the city centre wards of Hotwells & Harbourside and Central. The Bristol average dropped slightly to 33% of residents completing the 2023/24 survey, but this still represents about one third of homes overheating during extreme hot spells.

South Gloucestershire worked with the UKHSA and the University of Bristol on the co-development of a 'proof of concept' vulnerability mapping tool⁶². Through this feasibility study the researchers combined a vulnerability index with data on heat and flooding exposure, alongside demographic, health, and housing data. Next steps include a summary report distilling key findings locally and nationally plus discussions with the UKHSA on the implications of a national roll-out within the context of other mapping tools.

⁶⁰ [Keep Bristol Cool Framework, Contains OS data © Crown copyright \[and database right\] 2024](#)

⁶¹ [Quality of life in Bristol - Bristol City Council](#)

⁶² [Mapping vulnerability to climate-related hazards to inform local authority action in adaptation: A feasibility study - ScienceDirect](#)

Other extreme weather risks & climate stresses

We will work with our partners and experts to improve our understanding of drought & water scarcity, storms & high winds, and wildfire, and potential regional impacts.

The UKHSA's comprehensive review of the impacts of adverse weather and climate change on **health and wellbeing**⁶³ also provides evidence on a broad spectrum of risks to support their adverse weather planning - covering heat, cold, flooding, drought & storm risks.

Researchers define four types of drought - meteorological **droughts** (rainfall levels), soil moisture or agricultural droughts, hydrological droughts (river levels/flows), and socio-economic droughts (water supply restrictions). The five-year UK-wide research project About Drought⁶⁴ looked into historic droughts, drought predictions, managing risks, impacts & uncertainties, and people's lived experience of drought (Drought Risk & You⁶⁵ led by the University of the West of England). We will engage experts such as UK Centre for Ecology & Hydrology⁶⁶ and the region's water companies - Bristol Water and Wessex Water.

Although there are some familiar impacts of **high winds**, for example, temporary closure of the Severn Bridges, no studies so far have provided a link between changes in UK storminess and climate change^{67,68}. **Storms** are complex systems which can be affected by small changes in

regional and global patterns. Climate change is likely to affect the following, which in turn influence storm activity: sea surface temperatures, extent of sea ice, position and strength of jet stream, and climate patterns e.g., El Nino.

Climate change is a significant driver of **wildfires**, with projections indicating that a 2°C increase in global temperatures could double the number of days with 'very high' fire danger in the UK by the 2080s and extend the wildfire season into late summer and autumn. Research further suggests that the number of fire danger days could increase 3-4 times by the 2080s, particularly during the summer and in the South & East of England, but with increases across the UK. More frequent and prolonged heatwaves are predicted, causing vegetation to dry out and become more susceptible to ignition. Fuel, weather, and topography all affect fire behaviour, alongside fuel management, ignition sources and fire management.

Identifying regional risks for further investigation

Our regional evidence base is far from complete and will be developed in collaboration with our partners, including identifying regional leads or the best routes for filling these gaps. Areas already identified as needing further investigation include climate change impacts on food systems, soil health, pests & diseases, agricultural land, supply chains & infrastructure interdependencies.

Step 3 - high-level screening of preparedness using a regional lens

The MCA, Unitary Authorities, other regional partners, and national bodies are collectively building regional **climate resilience** through their activities - some statutory duties, some voluntary commitments. Our preparedness as a region is a function of the ability to cope with extreme weather emergencies, build longer-term resilience as risks increase, and bridging the gap in the medium-term to reduce impacts. Nature-based solutions provide opportunities to mitigate climate risks and help with nature recovery e.g., urban cooling, natural flood management green infrastructure.

This **high-level review** is an initial exercise and not an assessment of current preparedness levels and is a simplification of a complex landscape. For example, national bodies like the Environment Agency have multiple responsibilities across national flood strategy, flood warnings & emergencies, funding flood schemes, and longer-term planning for the natural environment.

We will build-up a more comprehensive picture over the coming months. Future work will include critiquing the adequacy of these plans in preparing the region for climate change including identifying key evidence & policy gaps plus use of resilience standards. For example, many water companies are future-proofing their supplies to cope with a 1 in 500-year drought^{69,70} by 2040.

⁶³ Adverse Weather and Health Plan: Supporting evidence - UKHSA

⁶⁴ About Drought

⁶⁵ DRY Project

⁶⁶ UK Centre for Ecology & Hydrology (ceh.ac.uk)

⁶⁷ UK and Global extreme events - Wind storms - Met Office

⁶⁸ UKCP18 Factsheet: Storms

⁶⁹ Meeting our Future Water Needs: a National Framework for Water Resources - Environment Agency

⁷⁰ A summary of England's revised draft regional and water resources management plans - Environment Agency

We have included a summary on action to tackle coastal inundation and flooding but limited commentary on other climate risks. We also still have lessons to learn from how we are planning for extreme cold which is a known and familiar threat.

Emergency response

National emergencies over the past twenty years or so, have triggered significant changes to civil contingency arrangements (2000-2001 foot & mouth disease, fuel protests, & floods), flood risk management (2007 floods) and heatwave planning (2003 heatwave) as they have highlighted our exposure to risk and inadequacies in preparedness levels. The UK Covid-19 inquiry was set to examine the UK's response to and impact of the Covid-19 pandemic including lessons learned for the future. These changes cover both emergency response e.g., operational plans and medium to longer-term resilience building, e.g., strategic plans. Reports like the Fire Brigade Union's Scorched⁷¹ flag the growing pressure of extreme weather risks like wildfire on emergency services.

The Civil Contingencies Act 2004 defines roles & responsibilities for **civil emergencies** and the national lead is the Cabinet Office. Emergency planning activity includes plans for response & recovery, warning & informing, business continuity planning and working with communities to build resilience. These work alongside the Met Office's

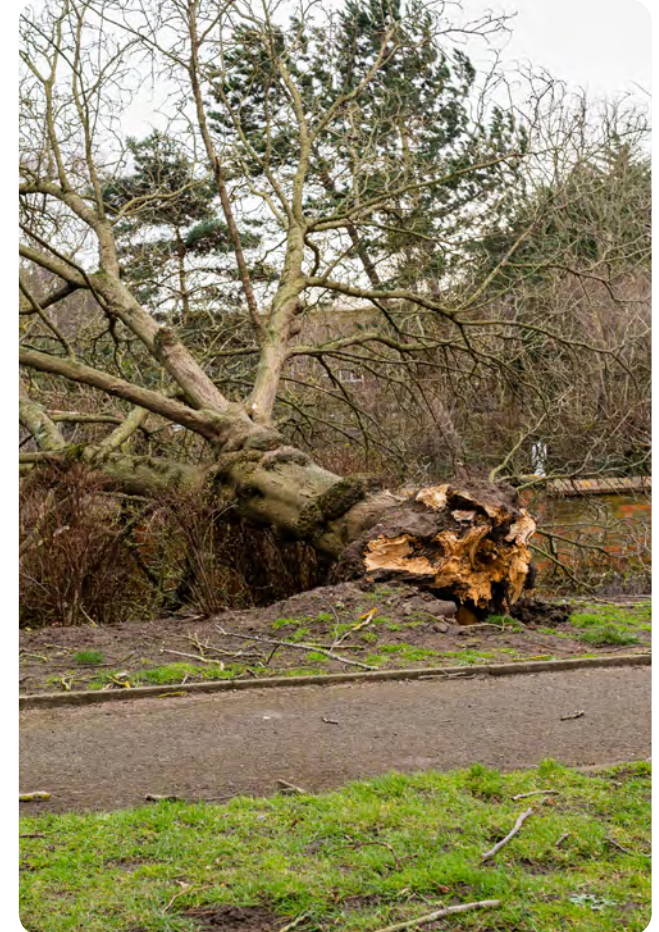
national severe weather warning system, EA flood warnings and the UKHSA's heat-health warning system.

The Avon & Somerset Local Resilience Forum (ASLRF) is responsible for **multi-agency co-ordination** across the West of England MCA region, North Somerset, and the County of Somerset. The Community Risk Register⁷² sets out the top 10 risks for this area including flooding, adverse weather, transport incidents and critical infrastructure. At a local level the Unitary Authorities are Category 1 emergency responders alongside fire, police, and ambulance services, with their own emergency planning duties. The MCA is starting to build links with the ASLRF although we do not have a statutory emergency response duty unlike some MCA's.

For example, following the Storm Eunice major incident the Environment Agency and ASLRF recently tested emergency response arrangements for a major tidal flood event along the Severn Estuary coastline through **Exercise King Canute**.

Extreme weather events tend to be treated in isolation, but often multiple events of varying magnitudes and significance happen in a typical year - back-to-back, at the same time/concurrent and possibly alongside other stresses. For example, London had a heatwave, drought, and flood warnings all on the same day in July 2022, alongside wildfires. During the pandemic, the UK also experienced a severe heatwave during

a Covid-19 lockdown when people were allowed limited time outdoors. Other non-weather concurrent or cascading incidents could happen while emergency services are already stretched - meaning building increased capacity into their planning.



⁷¹ Scorched: Firefighters and Resilience to Wildfires - FBU

⁷² Notes - [Community Risk Register | Avon and Somerset Police](#) (this is currently being updated)

Coastal inundation & flooding

The **Flood & Water Management Act 2010** sets out roles and responsibilities for flood risk management where the Environment Agency is the national lead and is responsible for flood risk from the sea and main rivers. The West of England region sits within the EA's Wessex administrative area⁷³.

The Wessex Regional Flood & Coastal Committee⁷⁴ (RFCC) brings together the EA and Lead Local Flood Authorities (LLFAs) to i) build understanding of flood and coastal erosion risks, ii) facilitate targeted investment and iii) enable coherent plans for identifying, communicating, and managing risks across catchments and shorelines. Currently the MCA is not represented on the RFCC committee. The MCA is in discussions with the EA about setting-up a Regional Water Group to facilitate joint working across the region (see Workstream 5 RWG case study).

At a local level our Unitary Authorities are statutory LLFAs responsible for local flood risk management with local plans setting out risks, priorities, and actions. Other key regional partners are the Lower Severn Internal Drainage Board⁷⁵ (land drainage), Wessex Water (wastewater & drainage infrastructure), the Bristol Avon Catchment Partnership (water environment) and the Severn Estuary Partnership⁷⁶. (See Appendix for the Unitary Authorities local flood risk management plans).

At a wider scale, the Severn Estuary Coastal Group⁷⁷ developed the non-statutory Shoreline Management Plan in partnership with local authorities, regulators, and other stakeholders to assist long-term management of flood and coastal risk over the next 100 years. The EA's Severn River Basin District⁷⁸ covers over 25 LLFAs including all 3 of our constituent UA areas.

The Avonmouth Severnside **Enterprise Area (ASEA) Ecology Mitigation & Flood Defence Project**⁷⁹ is the biggest project of its kind in the West of England's history. Jointly funded by the Environment Agency, South Gloucestershire, and Bristol Unitary Authorities, £80m of investment has already created 80 hectares of wetland habitat and aims to unlock up to 12,000 new jobs by 2026-2027. (See Workstream 1 Severnside RAPA case study).

17km of coastal flood defences along the Severn Estuary from Lamplighter's Marsh (Bristol Unitary Authority) to Aust (South Gloucestershire Unitary Authority) is due for completion in 2024/25 (with a two-year maintenance period to follow), providing protection to 2,500 homes and businesses for a 1 in 200-year flood event up to 2098. A combination of earth embankments, precast concrete units, sheet pile walls, glass panels, raised outfalls, road ramps and flood gates.

The **Bristol Avon Flood Strategy (BAFS)**⁸⁰ sets out a long-term plan to better protect homes and businesses in Bristol and neighbouring

communities from River Avon flooding. This regionally significant scheme is of critical importance for Bristol, and the wider region's growth and prosperity unlocking key regeneration sites and protecting existing communities. The BAFS's reached a key milestone by receiving EA Outline Business Case approval. An anticipated investment of £293m would deliver an estimated £7bn of regional benefit and £2.3bn nationally. Delivered in two phases with increasing levels of protection due to climate change, the scheme will provide protection for a 1 in 200 annual chance flood event. (See Workstream 4 - BAFS case study.)

The MCA has both rural and urban communities which presents different challenges and opportunities for warning and informing, and engaging residents on **community resilience**. For example, South Gloucestershire is working with the EA on getting flood wardens in place in high flood risk communities including Severn Beach, Swineford, and Hanham. B&NES works with the EA to support local events and flood wardens in the Chew Valley, where upgraded river gauges provide local alerts. Bristol's community places of safety network⁸¹ provide temporary shelter during emergencies such as a flood or gas leak. Residents can also sign-up to the UK-wide Priority Services Register⁸² which includes advice and support for any interruptions in electricity, gas and water supplies.

⁷³ [Environment Agency areas map 2022 \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

⁷⁴ [Wessex Regional Flood and Coastal Committee \(RFCC\) - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

⁷⁵ [Our strategy - Lower Severn Internal Drainage Board](#)

⁷⁶ [About - Severn Estuary Partnership](#)

⁷⁷ [Severn Estuary Coastal Group](#)

⁷⁸ [Severn River Basin District Flood Risk Management Plan 2021 to 2027 - Environment Agency](#)

⁷⁹ [Avonmouth and Severnside Enterprise Area - Ecology Mitigation and Flood Defence Project](#)

⁸⁰ [Bristol Avon Flood Strategy - Bristol City Council](#)

⁸¹ [Community places of safety - Bristol City Council](#)

⁸² [The Priority Services Register](#)

Table 1: Examples of flood risk management projects

Completed
<p>Bristol's Metrobus Cumberland Road flood wall was designed to protect properties from River Avon tidal flooding (Bristol City Council & EA partnership).</p> <p>Bath Quays Waterside flood mitigation scheme created a new riverside park designed to flood through a widened riverbank.</p>
Ongoing
<p>Bristol's Bedminster Green⁸³ River Malago restoration project includes bringing the culverted river back above ground reducing flood risk, enhancing biodiversity, and improving public spaces.</p> <p>See Workstream 5 South Gloucestershire case study for natural flood management schemes including the cross-boundary Resilient Frome⁸⁴ project.</p>
Future
<p>The Bristol Avon Rivers Trust (BART) are working with South Gloucestershire & B&NES on natural flood management schemes - the former in more rural locations in partnership with the Farming & Wildlife Advisory Group (FWAG), and the latter on trial Natural Flood Management (NFM) locations to alleviate property/highway flooding.</p>

Planning for extreme weather & building longer-term climate resilience

The National Adaptation Programme⁸⁵ is the overarching framework for **adapting the UK** to climate impacts, setting out responsibilities across government departments, aiming to '*drive effective join-up across government and with our delivery partners, working together to realise our vision*' with action across infrastructure, natural environment, health, communities & the built environment, business & industry, and international dimensions.

Another key national document is the UKHSA's, Adverse Weather & Health Plan⁸⁶ which aims to protect individual and communities from the **health impacts** of severe weather and to build community resilience, covering heat, cold, drought and flood risks. Focused largely on incident response, the vision is to move towards prevention and long-term adaptation (see their appendix 1 for delivery groups).

Our preparedness as a region is a **complex jigsaw**. Tables 2 and 3 below show a few examples of longer-term planning across a variety of scales, timescales and organisations which are helping to build regional climate resilience. See the Appendix for documents included in these tables.

We will work with our partners to build more comprehensive picture for the region including reviewing strategies and plans which address regional health and social inequalities, as they are also adaptation measures that protect vulnerable people and build community resilience (see Workstream 2 evaluating regional activity, ongoing impacts & preparedness levels). Again, this is a high-level review, and not a health check of preparedness.



⁸³ [Bedminster Green regeneration - Bristol City Council](#)

⁸⁴ [Resilient Frome | Engage Environment Agency \(engagementhq.com\)](#)

⁸⁵ [Third National Adaptation Programme \(NAP3\) - GOV.UK](#)

⁸⁶ [Adverse Weather and Health Plan - GOV.UK \(www.gov.uk\)](#)

Table 2: Regional planning for climate resilience - MCA, Unitary Authorities & partner examples

	<p>The West of England Climate & Ecological Strategy & Action Plan will be updated in 2025 to reflect our new climate resilience work programme. All three Unitary Authorities have dedicated climate strategies - B&NES Climate Emergency Strategy, Bristol One City Climate Strategy and South Gloucestershire Climate & Nature Emergency Action Plan.</p>
	<p>The West of England Joint Green Infrastructure (GI) Strategy & Action Plan is supported by our new Local Nature Recovery Toolkit which helps target Biodiversity Net Gain investment. This works alongside Natural England's GI Framework, West of England Nature Partnership's (WENP) Strategy, the Bristol Avon Catchment Partnership's Catchment Plan and UA's individual GI, parks, nature recovery, and green space strategies.</p>
	<p>The West to England Placemaking charter aims to shape places to be future ready, healthy & biodiverse. All Unitary Authorities local plans include specific policies on adaptation & climate risks. Other relevant plans helping to create climate resilient places include Unitary Authorities local flood risk management strategies and Bristol's Keep Bristol Cool Framework for urban heat resilience.</p>



Table 3: Regional planning for climate resilience - infrastructure examples

	<p>National Highways is working on a number of fronts to manage the effects of climate change on their strategic road network of motorways and major A roads. The MCA region includes the M32, M4 and M5 plus the Prince of Wales & Severn Bridge crossing into South Wales.</p>		<p>Wessex Water have a 25-year Drainage & Wastewater Management Plan which sets their long-term plan to maintain robust and resilient drainage and wastewater systems. They provide sewerage services across the whole of the MCA region.</p>
	<p>Network Rail has local level weather resilience and climate change adaptation plans. The MCA region includes the Great Western Main line and the major stations of Bristol Temple Meads and Bath Spa. The region is covered by the Wales & Western region and the Western route plan.</p>		<p>Western Power Distribution joined National Grid Group in 2021. National Grid Electricity Distribution is the regional electricity distribution division of National Grid. They provide electricity across the whole of the MCA region.</p>
	<p>Bristol Water has a 25-year Water Resources Management Plan which sets out their long-term plan to maintain secure, sustainable water supplies for customers while also protecting the environment (they also have a Drought Plan). The MCA region is supplied with water by Bristol Water (now part of South West Water) and Wessex Water.</p>		<p>Wales & West Utilities has a network of gas pipes supplying homes and businesses across Wales and the south west of England. They provide gas supply across the whole of the MCA region.</p>

Step 4 - high-level screening of opportunities using a corporate lens

Our new **Regional Strategy Framework**⁸⁷ sets out the MCA's aspiration for the West of England by 2040, growing our region, communities, and economy. Our priorities offer many opportunities for embedding climate resilience into our work, but these are dependent upon key enablers such as national policy framework, funding & organisational capacity (see Asks for Government). The MCA's Business Plan 2024/2025⁸⁸ has an additional priority on improving organisational capacity to deliver for our communities and businesses.

Our priorities for MCA delivery all present significant opportunities (and in some instances requirements) for building climate resilience. We will undertake a comprehensive review of these opportunities, for feeding into the climate resilience strategy and action plan development and the MCA's ongoing work (see Workstream 4 Building climate resilience into the region's fabric).

Priority - creating a **better-connected region**, working towards a world-class transport system:

Example - delivering a climate resilient transport network through strategic transport plans and transport infrastructure schemes, reducing disruption from extreme weather (plus knock-on impacts) and future-proofing long-term investments.

Priority - delivering **net zero & nature recovery**:

Example - integrating climate resilience and nature-based solutions into energy performance improvements of buildings and the retrofit of homes, protecting residents and citizens from extreme weather, and reducing pressure on emergency services, health, and social sectors.

Priority - creating the jobs and **training** our region needs now and in the future:

Example - integrate climate resilience into employment and skills programmes, to increase skills in key growth sectors and support more young people into these roles.

Priority - supporting **sustainable communities** that people are proud to call home:

Example - future-proof regional growth through climate resilient communities which address the needs of the most vulnerable, at risk communities, addressing existing inequalities which amplify the negative impacts of extreme weather.

Priority - putting the West of England on the map for **national and global success**:

Example - harness the ideas, energy and creativity of residents, communities, and businesses to create innovative solutions for tackling the climate emergency, boosting regional awareness, capability, and capacity with opportunities to export innovation.

Priority - improving our **organisational capacity** to deliver for our communities and businesses:

Example - integrate climate resilience into our social value framework to maximise opportunities for tackling climate risks, maximising opportunities to build resilience (short-term and longer-term).

We also recognise the cross-cutting need to evolve how **we work together** as a region to deliver our ambitions. Benefits could include addressing the significant climate resilience funding gap through new investment models, making the case to government for longer-term investment & building climate resilience into our next set of regional devolution priorities, and exploring gaps where co-ordinated regional action is needed e.g., health inequalities or food systems.

⁸⁷ Our strategy - West of England Combined Authority

⁸⁸ West of England Mayoral Combined Authority Business Plan 2024/25 (westofengland-ca.gov.uk)

Step 5 - synthesis - identifying MCA immediate near-term priorities

We have used this high-level exercise to identify the MCA's immediate priorities for taking forward through our climate resilience work programme and the organisation's core activities. These priorities reflect our current understanding of:

1. Major regional risks and vulnerabilities which require urgent action now;
2. High-impact resilience-building opportunities e.g., spending capital investment well, and;
3. Key enablers which will stimulate and unlock greater change.

We have identified **six priority areas for action** set out in Table 4 and **two key enabling conditions** to support these actions:

1. Scaling regional investment to attract funding to deliver climate resilience priorities

2. Growing organisational capacity and confidence to consider climate resilience across our functions

As this implies, we have made a start in getting this work underway but significant funding is needed above and beyond resources already committed through the Green Recovery Fund to deliver all of the actions set out below.

In identifying these immediate priorities, the following themes have emerged:

- **Co-benefits of an integrated approach to climate resilience alongside net zero, nature recovery and sustainability,**
- **Urgent need to fill a significant funding/finance gap to deliver at scale & pace,**
- **Putting people at the heart of our work, protecting the most vulnerable in our society and the necessity of a just transition which ensures adaptation benefits are fairly distributed to address existing inequalities, and**
- **Nature as a problem-solver to mitigate climate risk e.g., natural flood management.**

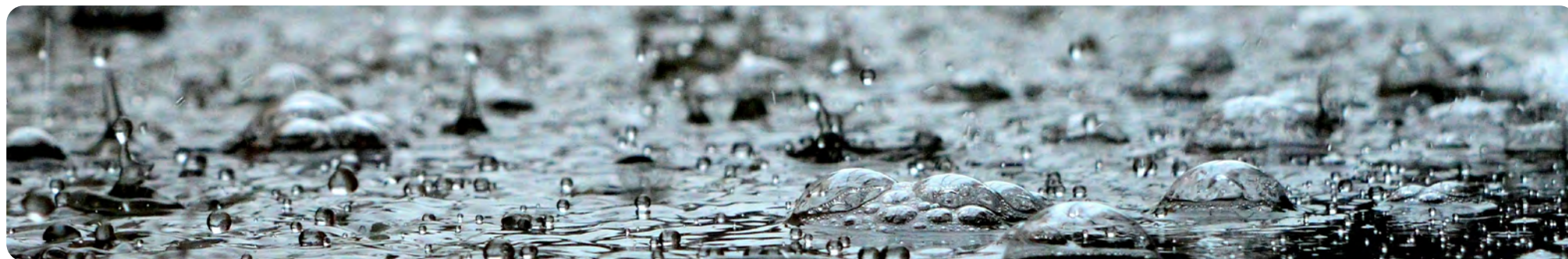
Our programme of work has been designed across five workstreams which will enable our immediate priorities to be addressed in a cross-cutting, integrated way. Each workstream will progress activity across all six priority areas for action.



Table 4: MCA immediate priority areas for action

Priority Area for Action	Why is this important?
<p>1. Risks from flooding</p>	<p>The MCA region faces significant flood risks from coastal, tidal, fluvial, and surface water sources with potentially serious impacts for people, economy, public services, and nature.</p> <p>Flood risk mitigation measures are being progressed at a variety of geographical scales, from coastal defences, to protecting river corridors to local interventions. Significant funding gaps still exist as do systemic barriers to deliverable regionals schemes & local solutions at scale.</p> <p>MCA functions - for example: strategic planning, funder, regional convenor, capital schemes & regeneration projects.</p>
<p>2. Risks from extreme heat</p>	<p>The MCA region faces regionwide heat risks during extreme heatwaves, with vulnerable communities and groups in dense, urban areas the most affected during heatwaves due to greater levels of exposure and less capacity to adapt to the impacts. Poor air quality will exacerbate the impact of heatwaves.</p> <p>Although local initiatives are championing urban heat resilience, extreme heat risk lacks a national framework equivalent to flood risk management.</p> <p>MCA functions - for example: strategic planning, regional convenor, capital schemes & regeneration projects.</p>
<p>3. Risks to transport infrastructure</p>	<p>Multiple threats affecting the West of England's transport infrastructure due to extreme weather events, changing climatic conditions and sea level rise.</p> <p>Interdependencies exist both within the transport network itself e.g., railway and bus links, and with other infrastructures e.g., energy and digital, amplifying impacts within the region and beyond.</p> <p>Transport is a key enabler of growth and prosperity, and a key factor holding the region back. Climate change impacts will threaten the viability of an already struggling network.</p> <p>MCA functions - for example: strategic transport planning, capital schemes, place-making & regeneration projects.</p>

Priority Area for Action	Why is this important?
<p>4. Risks to vulnerable communities</p>	<p>Multiple threats affecting the health and wellbeing of communities through exposure to extreme weather events and coastal change.</p> <p>Disproportionate impacts for vulnerable communities & groups, where people, place and hazard combine alongside existing inequalities. Exposure to hazards such as flooding and extreme heat can affect people at home, work and in their local neighbourhood.</p> <p>MCA functions - for example: strategic planning, regeneration projects, place-making, & domestic retrofit.</p>
<p>5. Risks to businesses</p>	<p>Multiple threats affecting regional businesses due to the impact of climate risks on premises, key infrastructures, supply chains, goods & services, workforce productivity and access to finance, investment & insurance.</p> <p>Climate change impacts (both within the UK and overseas) will amplify impacts across supply chains.</p> <p>MCA functions - for example: business support, skills development, & strategic innovation.</p>
<p>6. Risks to the natural environment</p>	<p>Multiple threats affecting the region's natural environment due to coastal change, extreme weather events, changing climatic conditions, pests, pathogens and invasive species, risks to soil health and disruption to nature's seasonal timings.</p> <p>Nature's resilience to climate impacts is important in itself and for continued delivery of vital ecosystem services including urban cooling and flood mitigation.</p> <p>MCA functions - for example: strategic planning, funding, nature recovery, & green infrastructure.</p>



**WORKSTREAM 1:
STRATEGIC PLANNING FOR BUILDING
RESILIENCE & ADAPTING TO CLIMATE
CHANGE IMPACTS**

**Short-term actions
(started 2024 to end 2025)**

Action 1.1 ARP4 report dissemination

Produce accessible, online resources summarising key information from our ARP4 report for a variety of different audiences.

Progress: We will be producing a Non-Technical Summary of the ARP4 report using Plain English.

Action 1.2 Strategy development

Continue co-development of an adaptation strategy & action plan. Topic specific plans may also be developed to address regional priorities.

Progress: The learnings and outputs from the ARP4 reporting process will be used to inform MCA strategy and action plan development. Following the Rapid Adaptation Pathways Assessment (RAPA) Severnside pilot (see below) we will adopt the use of an adaptive pathways approach in our work with colleagues and partners.

Case Study - Rapid Adaptation Pathways Assessment (RAPA) Severnside Pilot

South Gloucestershire & the MCA successfully won funding to pilot a Rapid Adaptation Pathways Assessment, which ADEPT and the Environment Agency have developed, on the Severnside area. Using adaptation pathways were originally developed to explore flood risk in the Thames Estuary and Thames Barrier improvements due to rising sea levels.

A one-day workshop brought together over 20 stakeholders from business, industry, infrastructure, councils, and community representatives to look at rising sea level and coastal flood risks in Severnside. Workshop facilitators set the scene with flood data and maps, then explored with stakeholders' thresholds, tipping points and actions this century, and issues such as insurability which could impact land use.

The workshop objective was to co-create a pathway or roadmap with key stakeholders to allow effective decision-making today on coastal flood risk. The process helped explore the inherent uncertainties of future climate change, looked into the future beyond usual planning horizons and allowed dialogue on current levels of preparedness.

**Short to medium-term actions
(start 2025 to end 2026)**

Action	Description
Strategy development	Ongoing development of an adaptation strategy and action plan. Topic specific plans may also be developed to address regional priorities. Timescale: 2025-2026
Adaptation pathways	Investigate the adaptation pathways for preparing the region for different global warming scenarios (from a minimum of 2°C to 4°C+), bringing together key partners in the region to articulate the challenge and appraise different routes for building longer-term resilience. Timescale: Mid-2025 onwards
Adaptation investment	Investigate regional investment needs to accelerate the transition to a climate ready region and the routes to unlocking investment, identifying barriers to delivery, and areas for targeted action (e.g., financial mechanisms and adaptation goods & services). Timescale: Mid-2025 onwards

WORKSTREAM 2: EVALUATING REGIONAL ACTIVITY, ONGOING IMPACTS, & PREPAREDNESS LEVELS

Short-term actions (started 2024 to end 2025)

Action 2.1 High-level review

Undertake the first stocktake of action already underway which is building our regional resilience to major climate hazards, producing good practice case studies for sharing, inspiration, and inclusion on our website.

Progress: Our preliminary stocktake is covered in our cross-cutting high-level screening exercise above. We will be building on this process and creating a regional baseline assessment.

Action 2.2 Regional stories

Collect and share regional stories on extreme weather events and adaptation action bringing to life the challenges and innovation across our diverse region, through engagement with residents and businesses, especially vulnerable communities.

Progress: Our regional engagement with residents and businesses is currently focused on the theme of nature. We're planning a water-themed engagement for 2025 to align with the Festival of Nature's plans⁸⁹, where we'll build in engagement on climate resilience.

Short to medium-term actions (start 2025 to end 2026)

Action	Description
Progress tracker	Periodic refresh and updating of adaptation action, continuing to demonstrate the region's innovation in this area and telling the story of regional change. Timescale: Ongoing
Regional stories	Periodic refresh and updating of regional stories, continuing to demonstrate the region's innovation in this area and telling the story of regional change. Timescale: March to November 2025

WORKSTREAM 3: DEVELOPING REGIONAL DATA, METRICS & MAPPING RESOURCES

Short-term actions (started 2024 to end 2025)

Action 3.1 High-level review

Undertake a high-level review of data, metrics & mapping resources describing the region's exposure to major climate hazards, producing a selection of maps for inclusion on our open data portal.

Progress: Our preliminary review is covered in our cross-cutting high-level screening exercise above. We will be building on this process and creating a regional baseline assessment. The Environment Agency have provided all regional flood model outputs, and we are undertaking a flood risk review with our Unitary Authorities. We are also reviewing the newly launched Met Office Local Authority Climate Service⁹⁰.

Action 3.2 Roadmap

Produce a roadmap for developing a regional climate mapping tool which will explore climate risks, vulnerabilities, and opportunities - working with end users and mapping experts to test and shape ideas.

⁸⁹ Festival of Nature | The Natural History Consortium

⁹⁰ Local Authority | The Met Office climate data portal

Progress: Conversations are ongoing with our Unitary Authorities to understand local needs better. We have also been reaching out to industry leaders and other MCAs to hear different approaches which we can learn from. The Bristol Advisory Committee on Climate change (BACCC) has also offered to bring together experts to look at data sources. The current aim is to use our open data portal to host regional mapping⁹¹.

**Short to medium-term actions
(start 2025 to end 2026)**

Action	Description
Mapping tool	Deliver a regional climate mapping tool for hosting on our environmental data portal. Timescale: 2025-2026

WORKSTREAM 4: BUILDING CLIMATE RESILIENCE INTO THE REGION'S FABRIC

**Short-term actions
(started 2024 to end 2025)**

Action 4.1 High-level review

Undertake a high-level review of MCA activity to investigate the embedding of climate resilience across the authority's day-to-day operations, running of a large organisation/corporate processes and service delivery/core functions.

Progress: Limited progress. A new Climate Resilience Project Officer has been recruited to support the Climate Resilience Manager, building capacity to progress this action further.

The corporate risk management process includes some coverage of climate risks, but further work is needed to integrate it better. Regarding MCA decision-making processes, all MCA papers for the corporate leadership team, specific boards, and funding applications require consideration of climate change, however this tends to focus on carbon impacts. We will review current practices and work with colleagues to integrate consideration of climate risk into decision-making better and develop officer guidance to address this gap.

Currently Heads of Service are responsible for preparing business continuity plans (BCPs). As part of the annual review process, recommendations will be made to the Governance Board on maturing the MCA's approach to business continuity planning, including severe weather planning.

Good progress has been made in rolling out Carbon Literacy training⁹² which covers climate impacts and local extreme weather events. The MCA aims to become a Gold Level Carbon Literate Organisation by the end of 2025, with over 100 staff now officially Carbon Literate. The West of England Scrutiny Committee also received 6 hours of training on the CESAP, including a dedicated two-hour session on climate resilience.

Action 4.2 Priority functions

Progress action in priority areas/live projects including – development of regional strategies, support for major flood schemes, local nature recovery, & major regeneration projects – showcasing best practice within the region.

Progress: Progress has been made in a number of key areas (see case studies below - Transport directorate, Bristol Avon Flood Strategy, and investing in nature recovery to deliver climate resilience). A new Climate Resilience Project Officer has been recruited to support the

⁹¹ [Homepage – West of England MCA-open-data](#)

⁹² [Carbon literacy training - West of England Combined Authority \(westofengland-ca.gov.uk\)](#)

Climate Resilience Manager, building capacity to progress this action further. However significant organisational change, new posts and additional resources will be needed to embed climate resilience across the board. This will be a common challenge for any local authority.

The new West of England Strategic Framework sets the ambitions that the region will economically and socially resilient by 2040 with infrastructure that is built to last into the future and is prepared for changes in climate. The Strategic Framework is clear that this will be delivered through climate resilience measures like flood defences and cooling urban areas, using nature-based solutions, and supporting people, communities, and businesses to be resilient.

Conversations have also been kicked-off with colleagues working on net zero projects, specifically heat from mines, low carbon business support, and retrofit projects (see Actions 4.3 and 4.4). The Heat From Mines project is funded by the West of England Combined Authority and presents an opportunity to provide innovative low carbon heating and cooling for buildings.

Bristol Temple Quarter⁹³ (BTQ) is the biggest regeneration project in the MCA region, and the second largest scheme in the country. The MCA has been working with the BTQ team to create a sustainability strategy which includes climate resilience. This strategy will inform the scheme's master planning and the subsequent detailed design.

The MCA also actively engages with government consultation on major policy changes, facilitating a policy framework which is geared-up to deliver its ambitious goals on climate and nature. For example, we submitted detailed feedback on the Department for Transport's Fit for a changing climate? Adapting the UK's transport system' consultation⁹⁴ including the unique role our MCA could play as a regional test bed.

Case Study - Transport Directorate

The MCA's Environment Directorate are working alongside colleagues in the Transport Directorate on embedding of the MCA's environment ambitions into £540m of capital delivery, including climate resilience.

A first step in this process was commissioning consultants Arup to produce an Environment Reference Guide to support MCA Project Managers, with a focus on transport infrastructure projects. This guide provides examples of best practice and innovation when embedding environmental considerations into infrastructure projects, across their lifecycle. To complement the guide, the MCA are running a series of sessions to bring case studies to life, bringing in partners from across sectors to connect, learn and take away new approaches of embedding environment in their own projects.

The aim is to influence all stages of the transport project lifecycle. A Task and Finish Group (T&FG) will help accelerate the embedding of environment across four topic areas - contaminated land and ground conditions, Biodiversity Net Gain and nature recovery, waste & circular economy, and flooding & climate resilience. This T&FG will work closely with the Green Infrastructure, Climate Resilience, Nature & Health team.

Embedding environment into the Transport Directorate will create important transferable lessons for other MCA directorates.

Case Study - Bristol Avon Flood Strategy (BAFS)

The Bristol Avon Flood Strategy⁹⁵ is the largest flood risk management project in the MCA region, with the potential to deliver many co-benefits for society alongside vital life-saving flood protection for at risk communities. (See cross-cutting high-level screening exercise).

The MCA sits on the Bristol Avon Flood Strategy Board and recognises the regional importance of this scheme and the significant scale of funding required to deliver the project. New or improved flood defences along the River Avon corridor are crucial for ongoing regional economic success and are a catalyst for regeneration. A co-ordinated approach to flood risk management

⁹³ [Bristol Temple Quarter – One of the UK's largest urban regeneration projects, in the centre of Bristol](#)

⁹⁴ [Fit for a changing climate? Adapting the UK's transport system - Department for Transport](#)

⁹⁵ [Bristol Avon Flood Strategy - Bristol City Council](#)

will safely unlock strategic sites including Bristol Temple Quarter and Western Harbour - delivering new homes, employment opportunities and future-proofed infrastructure.

The BAFS Outline Business Case (OBC) has recently been approved by the Environment Agency and will now progress to Full Business Case (FBC). The MCA supported Bristol City Council in securing OBC approval, and £10m Revolving Infrastructure Fund (upfront funding to enable development) has been committed to support FBC development.

Case Study - Investing in West of England nature recovery to deliver climate resilience

Investment in nature recovery is helping the region's natural environment cope better with growing climate change impacts, while also delivering nature-based solutions which reduce our exposure to climate risks for example through urban cooling or natural flood management. The MCA's Green Recovery Fund has funded £12.5m of projects to benefit Green Infrastructure and nature recovery, including with our Unitary Authorities (plus an additional £6.5m match-funding). Examples include Pollinator Pathways (local delivery of Buglife's national b-lines project⁹⁶), Common Connections⁹⁷

(connecting historic commons and 'nature-hubs') and Great Avon Wood⁹⁸ (planting 40,000 trees, heart of two regionally important landscapes) which create vital strategic connections or 'climate space' that increases species' ability to adjust to the changing climate.

We will be working with our colleagues and partners to build climate resilience objectives into our commissioning/funding processes to better quantify benefits, monitor outcomes, aggregate impact, and target future investment.

The MCA was the first UK region to launch its local nature recovery strategy⁹⁹ (covering the MCA region and neighbouring North Somerset). Our online map highlights priority areas for nature recovery, with measures across rural areas e.g., wetland, woodland and floodplain restoration, and natural flood management (e.g., Frome catchment), and urban areas e.g., sustainable urban drainage, street tree planting, and green roofs/walls. This helps target investment e.g., through Biodiversity Net Gain to the areas which most need it. Although climate resilience was not the primary driver for these measures, the prioritisation process favoured those delivering co-benefits. The toolkit's State of Nature & Opportunities for Nature Recovery document has a section on climate change impacts¹⁰⁰.

Our regional engagement programme is currently focused on nature conversations, with plans to extend this into climate resilience.

Action 4.3 Climate ready retrofit

Develop a climate ready retrofit demonstrator to learn lessons and catalyse innovation in retrofitting homes for improved climate resilience. Our regional engagement with communities will feed into the selection of locations for the demonstrator project.

Progress: The Regional Low Carbon Delivery team are responsible for domestic retrofit projects, including funding the Retrofit West homeowners advice service and the Innovative Housing Retrofit Scheme (testing approaches for 'hard to treat' homes).

Currently retrofit projects are largely focused on net zero and supporting the supply chain and green skills. The PAS2035 retrofit standard does require some checks on overheating risk. Other climate risks e.g., flood risks are not currently addressed by these retrofits.

We will work with the MCA's Retrofit Strategic Steering Group and other partners to scope out a demonstrator project. Further resources will be needed to take forward this action.

⁹⁶ B-Lines - Buglife

⁹⁷ Common Connections | BETA - South Gloucestershire Council

⁹⁸ Great Avon Wood - Avon Needs Trees

⁹⁹ Local Nature Recovery Strategy & Toolkit - West of England Combined Authority

¹⁰⁰ Local Nature Recovery Toolkit: The State of Nature and Opportunities for Nature Recovery.pdf (naturerecoverywest.co.uk)

Action 4.4 Climate ready businesses

Develop a climate ready business demonstrator to learn lessons and catalyse innovation in businesses adapting to climate change. Our regional engagement with businesses will feed into the selection of locations for the demonstrator project.

Progress: The Low Carbon Business Support (LCBS) team provide support on low carbon cooling and are gathering data on overheating risks through their building surveys and grant support.

The MCA website includes the Jam Inn's Ice Delivery case study¹⁰¹, showcasing the support given to the region's largest producer and supplier of ice for businesses and events. The combination of a Carbon Survey and Green Business Grant, successfully identified and enabled interventions so that the warehouse no longer overheats, including an insulated roller shutter, and replacing fluorescent lighting with LEDs. A Stay Cool campaign over the summer advertised the benefits of our Carbon Surveys to businesses.

We will work with the Growth Hub and other partners to scope out a demonstrator project. Further resources will be needed to take forward this action.

Short to medium-term actions (start 2025 to end 2026)

Action	Description
Priority functions	Continue to embed climate resilience into priority areas/ live projects across the MCA. Timescale: Ongoing
Climate ready retrofit	Deliver the climate ready retrofit demonstrator, assembling the necessary resources and project partners for implementation of the project and follow-up activity to facilitate wider scale-up. Timescale: End 2026
Climate ready business	Deliver the climate ready business demonstrator, assembling the necessary resources and project partners for implementation of the project and follow-up activity to facilitate wider scale-up. Timescale: End 2026

WORKSTREAM 5: DEVELOPING REGIONAL PARTNERSHIPS TO ACCELERATE PROGRESS

Short-term actions (started 2024 to end 2025)

Action 5.1 Regional ecosystem

Begin mapping the regional 'ecosystem' – exploring how current roles & responsibilities, governance structures and ways of working to address climate risks across key sectors - emergency response, natural environment, place-making, infrastructure, and economy.

Progress: Our preliminary mapping is covered in our cross-cutting high-level screening exercise above. We will be continuing this process through strategy development and engagement with regional partners. We are building on existing connections with local, regional, and national bodies to facilitate delivery of the MCA's climate resilience work programme, developing important knowledge infrastructure.

The West of England Nature Partnership¹⁰² is a collaboration of organisations working together to deliver nature recovery in the region. The Bristol Climate and Nature Partnership works with our 1,300+ member organisations towards a shared vision of a zero carbon, socially just region where all communities and nature thrive. The MCA is the secretariat for the UK Mayors group, and

¹⁰¹ [Low Carbon Business Support: Jam Inn's Ice Delivery - West of England Combined Authority \(westofengland-ca.gov.uk\)](https://www.westofengland-ca.gov.uk/)

¹⁰² [West of England Nature Partnership](https://www.westofengland-ca.gov.uk/)

we belong to an informal officers group sharing learning on climate resilience across combined authorities. We also participate in a range of forums including the Local Adaptation Advisory Panel, UK Green Building Council, South West Infrastructure Partnership, IOAF (Infrastructure Operators Adaptation Forum) and Ashden Adaptation Network. The Bristol Advisory Committee on Climate Change is providing independent advice and feedback to steer development of our climate resilience work programme.

Action 5.2 Funding bids

Support regional funding bids which accelerate delivery of our climate resilience vision, building relationships with our regional universities to help align research opportunities with major climate resilience challenges, and drawing in resources to build regional and local capacity and capabilities.

Progress: The MCA region is a world-class innovation cluster, home to four top universities - the University of Bristol, the University of the West of England (UWE), the University of Bath and Bath Spa University. Working alongside public and private sector partners the universities have built a rich portfolio of centres of excellence, test beds and joint projects.

Our five-year Plan for Innovation¹⁰³ sets out the role innovation can play in new and better products, services and systems for climate and nature.

A consultant supported the MCA and Unitary Authorities to submit an application to the Horizon Europe Pathways2Resilience call designed to assist regions in developing transformative pathways to climate resilience. Although this bid was unsuccessful, working together on this application helped shape the early stages of work programme development, building relationships and insights on regional climate resilience. We learned from this process, successfully securing funding from ADEPT and the EA for a Rapid Adaptation Pathways Assessment pilot (see RAPA Severnside case study).

The MCA plays an important role supporting universities, research institutions, and businesses to bid for RD&I funding from a range of sources, such as central Government grants distributed by UKRI, and funders often require bidders to show support from local leadership. By supporting bids which align with our strategic objectives, we can help bring significant funding into the region and help solve regional and national challenges. The MCA also brings together our regional universities to join-up on strategy and delivery, including engagement on the development of the Local Growth Plan.

Action 5.3 Integrated water management

Support the development of an integrated approach to regional water management (bringing together flood, drought, and nature recovery) covering institutional and governance arrangements, unlocking funding for priority projects, and enabling conditions for change.

Progress: Ongoing discussions with the Environment Agency, the Unitary Authorities and senior management in the MCA on taking a regional approach to water management (see case study below). Further resources will be needed to take forward this action.

Case Study - Regional Water Group

The EA have agreed in principle to chair a regional flood steering group, following discussions with the MCA on how best to overcome existing barriers and accelerate regional flood resilience.

We have also explored governance approaches in other MCA's, London and further afield on tackling flood risk and the water system as a whole. For example, the Greater Manchester Combined Authority¹⁰⁴ has taken an integrated water management (IWM) approach in partnership with the EA and United Utilities to deliver improvements in sustainable water management, enhancement of the natural environment, and ensure future development and critical infrastructure are resilient to flooding and climate change impacts.

¹⁰³ Plan for Innovation - West of England Combined Authority ([westofengland-ca.gov.uk](https://www.westofengland-ca.gov.uk))

¹⁰⁴ [Integrated Water Management Plan - Greater Manchester Combined Authority](#)

We recognise the breadth of challenges facing our water environment, the multiple roles active in the region, and how investment in a functioning water system is fundamental for growth. An IWM approach enables a joined-up approach to flood, drought, carbon storage and nature recovery.

The regional flood steering group is likely to focus initially on surface water flood risk, then we'll work with regional partners to develop the remit and priorities for this group.



Action 5.4 Supporting local councils

Support the local councils in the delivery of climate resilience through regional training workshops, shared learning, adaptation health checks, and building a business case for local action.

Progress: Good progress is being made on working with our Unitary Authorities on climate resilience. A new Climate Resilience Project Officer has been recruited to support the Climate Resilience Manager, building capacity to progress this action further. However, resources within the Unitary Authorities to actively support this process and deliver local level resilience are constrained due to ongoing financial pressures and budget cuts.

Case Study - Joint Working with West of England Unitary Authorities

The MCA convenes three working groups to facilitate joint working with our three constituent Unitary Authorities South Gloucestershire, Bristol, and B&NES on climate, natural environment & green infrastructure. Neighbouring North Somerset is also a member of these groups.

The Climate Resilience Manager set-up a dedicated Task & Finish Group (T&FG) to facilitate co-development this ARP4 report with officers from all four Unitary Authorities. This

T&FG will become the new climate resilience working group to support delivery of the MCA's work programme. A Teams Channel and Sharepoint site has been set-up to enable more efficient information sharing across this group, starting with a mini-flood review.

The T&FG identified a number of core areas needing increased joint working on climate resilience across shared/aligned functions & common ground. Prioritising collaboration will help accelerate the region's progress in adaptation to climate change impacts and building resilience:

1. **Shared/aligned functions** - strategic planning, transport, place-making, homes and tackling the climate & ecological emergency.
2. **Common ground** - communications, corporate leadership, two-way information exchange/learning, operationalising/embedding resilience, climate scenario planning & use of data.

The following section showcases work in our 3 constituent Unitary Authorities which is building regional climate resilience. (See Interdependencies section for neighbouring North Somerset).

Bath & North East Somerset - investing in green infrastructure

The Green Infrastructure & Nature Recovery team¹⁰⁵ in B&NES Council is developing and delivery strategic Green Infrastructure (GI projects) with benefits for communities, nature, and place. Green infrastructure is seen as a route for securing genuine co-benefits including urban cooling and water management and protecting the most vulnerable from extreme weather events. Creating nature recovery networks and green infrastructure are crucial for giving wildlife space to adapt as the climate changes and protect ecosystem health.

- **Strategy:** sitting alongside a hierarchy of national, regional, and local plans - work is underway to produce the **Green Infrastructure Framework** for Bath and North East Somerset 2025-2030. This will enable targeted investment in GI to deliver multiple benefits across a range of topics including climate resilience.
- **Programmes: seven projects** across the UA - Bathscape (25 projects in the City of Bath National Lottery Heritage Fund), Bath River Line (10km linear park & greenway along River Avon), Chew Valley Reconnected (connect & improve wildlife, water & wellbeing), Landscape City (MCA funding delivering nature recovery on council-owned sites), Limestone Landscape Link (landscape



connectivity between Mendip Hills National Landscape & Cotswolds National Landscape), Somer Valley Rediscovered (MCA funding improving habitat and access green spaces in Radstock, Midsomer Norton & Westfield), & WaterSpace Connected (large-scale green & blue infrastructure project following the River Avon from Bath to Bristol).

- **Research collaboration:** the **Slow the Flow pilot** is a collaboration between B&NES Council, the MCA, and the University of Bath focused on reducing surface water run-off and conserving water across the region. Using the university's innovative Vertically Integrated Project¹⁰⁶ approach, staff, and students (under- and post-graduates) work together on applied research tackling live 'real-world' issues.

- **Community engagement:** the '**Our Blue Spaces**'¹⁰⁷ programme was a range of community engagement and citizen science projects run by Bristol Avon Rivers Trust (BART) (funded by B&NES Council and the Bristol Avon Catchment Partnership). BART worked with local residents in the Radstock, Midsomer Norton, and Paulton areas activities to reconnect them with their local rivers. A dedicated SuDS (Sustainable Drainage Schemes) event was designed to inspire residents to incorporate sustainable drainage practices in their homes & gardens and installed a new community rain planer at Radstock Football Club.

¹⁰⁵ Investing in Green Infrastructure and Nature's Recovery - Bath & North East Somerset Council

¹⁰⁶ Vertically Integrated Projects - University of Bath

¹⁰⁷ Radstock residents connect with their river - Bristol Avon Rivers Trust

Bristol - tackling urban heat risks

The **Keep Bristol Cool** initiative (funded by the UK Climate Resilience Programme), developed an evidence base and strategic plan for tackling urban heat risks, filling an evidence, and policy gap identified in the Bristol One City Climate Strategy - Preliminary Climate Resilience Assessment¹⁰⁸:

1. **Online mapping tool** showing how current urban heat vulnerability varies across the city and future climate projections for extreme heat.
2. **Policy framework** that sets out our goals and focus areas for managing urban heat risks.

To create the mapping tool Bristol City Council worked with experts from the Met Office and the Tyndall Centre for Climate Change Research, University of Manchester to map urban heat risk. The mapping tool developed a Heat Vulnerability Index (HVI), which brings together 34 factors relating to: i) Bristol's population, ii) people's homes & iii) the local environment.

The index enables the ranking of wards in Bristol by their vulnerability to heat. The mapping tool also includes climate maps, with information on possible temperature rises in the 2030s (2021 to 2039) and 2070s (2061 to 2079). Bristol City Council used the information in the mapping tool to develop the **Keep Bristol Cool Framework** which sets out their plan for managing heat related risks to the city's



population, public services, and assets. It covers 4 areas of focus needed to increase our resilience:

1. Protecting people's health and wellbeing during heatwave events including maintenance of critical public services.
2. Building urban heat resilience into new pieces of city, city infrastructure and new developments.
3. Tackling overheating risk in people's homes.
4. Using blue and green infrastructure for cooling streets and public spaces

Examples of how the mapping tool and framework have already been used to inform the council's policies, strategies, and plans, are:

- The **Bristol Tree and Woodland Strategy** is prioritising tree planting in areas identified as most vulnerable to heat.
- The **Frome Gateway regeneration area** is located in one of the most vulnerable areas of the city. Consequently, the spatial regeneration framework for the area proposes 1ha of pocket parks and a new 0.9Ha public park to improve the area's resilience to heat.
- Bristol City Council are developing a **cool space network** to provide shelter during heatwaves, building on our existing welcoming spaces network.

¹⁰⁸ Bristol One City Climate Strategy – Preliminary Climate Resilience Assessment

South Gloucestershire - integrated approaches to nature & climate

The following three projects demonstrate how South Gloucestershire Council are taking an integrated approach to tackling the climate and nature emergencies, across a number of different geographic scales:

- **Council-owned assets: The Investing in Climate and Nature (ICaN) scheme** is a new scheme which manages a portfolio and pipeline of 'investment ready' projects for assets to reduce emissions, deliver nature recovery and climate resilience. Securing funding from multiple sources, the scheme enables targeted investment in council-owned assets including public open space. Local community benefit - improved green spaces with health, well-being, and social value benefits, wider benefits - increased 'ecosystem services' including flood and drought resilience, air quality improvement, temperature moderation and carbon sequestration.
- **Cross-boundary river corridor improvements: The Resilient Frome**¹⁰⁹ partnership (South Gloucestershire Council, Bristol City Council, Environment Agency, and Wessex Water) is supporting management of flood risk in the Bristol Frome catchment by implementing innovative measures in both urban and rural areas to enhance the catchment's resilience. This knits together with traditional flood risk management measures.

Within Bristol City Centre, improvements to the River Frome corridor are being delivered through Riverside Park. Within South Gloucestershire, the partnership is working with local farmers to implement Natural Flood Management (NFM) with co-benefits for improved soil health, crop productivity, wildlife habitat creation, and enhanced water quality (see short video¹¹⁰), through:

- Enhancing soil management to increase infiltration and water retention in fields.
- Creating storage areas to capture runoff before it reaches rivers.
- Installing leaky dams in rivers to hold back water and allow it to spill onto floodplains.

Retrofitting pilot Sustainable Drainage Systems (SuDS) in various settings like schools and public spaces is reducing flood risk, creating green spaces, improving water quality, and enhancing biodiversity. Additional monitoring equipment has been installed on the River Frome to help with its management, keeping check of rainfall, river levels and flows.

- **Landscape-scale partnership work: Linking the Levels**¹¹¹ is a landscape-scale nature recovery partnership project working for restored, connected, thriving and resilient nature within the internationally important Severn Estuary European Marine Site¹¹² which supports some of our most valuable marine & coastal species and habitats. Contributing



to the delivery of major partner strategies for this area, partners include Bristol Avon Rivers Trust, Bristol Zoological Society, the MCA, the Environment Agency, Natural England, the Severn Estuary Partnership and West of England Nature Partnership.

With MCA Green Recovery Fund and match-funding from SGC and partners, engagement with landowners and communities alongside ecological surveys will identify opportunities to develop and deliver nature-based solutions to improve biodiversity, flood, and drought resilience.

¹⁰⁹ Resilient Frome | Engage Environment Agency

¹¹⁰ How natural methods are being trialled to reduce flood risk - South Gloucestershire Council

¹¹¹ Funding secured to help restore nature along the Severn Estuary | Newsroom

¹¹² European Marine Site - ASERA

**Short to medium-term actions
(start 2025 to end 2026)**

Action	Description
Regional ecosystem	Work with partners to shape the regional 'ecosystem' across roles & responsibilities, governance structures and ways of working in order to accelerate progress tackling climate risks. Timescale: Ongoing
Funding bids	Continue support for regional funding bids. Develop research areas of interest with our regional universities, helping to align research opportunities and funding bids with major climate resilience challenges. Timescale: Ongoing

Action	Description
Pipeline projects	Work with partners to identify pipeline projects that will advance climate resilience in the region. Timescale: Ongoing
Integrated water management	Produce an integrated water management plan, working with key partners across the region and learning from similar approaches within the UK, Europe and globally. Timescale: 2025-2026

Action	Description
Supporting local councils	Continued support for the local councils in the delivery of climate resilience at a local level. Timescale: Ongoing



5. Interdependencies & cascading risks

5. Interdependencies & cascading risks

We recognise the pervasive and interconnected nature of climate risk and the significant challenges this presents for its management. Investigating interacting risks is a complex area. We need to understand better the MCA's role in this space in terms of regional resilience and exploring measures to reduce likely significant impacts affecting our key functions.

Climate risks can escalate and build to regional significance due to physical interdependencies e.g., infrastructure's functional reliance on digital and energy services, or weather-related transport disruption (within or outside the region) affecting regional travel which in turn impacts work, school pick-up etc. These connections can cause domino effects, with impacts spreading across multiple sectors or organisations.

Similarly, a major flood within the region (or in neighbouring areas) might be limited to a one geographic location but the cumulative impacts would be felt much further afield. For example, mounting an emergency response and dealing with recovery, will reduce the capacity of the emergency services, healthcare system and affected Unitary Authorities to maintain their critical functions and deal with other emergencies (unless additional support is secured). Dispersed, localised events also have the potential to become regionally significant if they exceed certain thresholds.



Non-climate related factors influence our vulnerability to climate risks for example how land is managed within water catchments to address flood risk, or future-proofing infrastructure networks to reduce cascading impacts. Other shocks and stresses e.g., a cost-of-living crisis or pressures on public services, interact with climate risks to amplify impacts.

Many different geographies and risk owners are at play, e.g., the Avon & Somerset Local Resilience Forum cover the West of England region, North Somerset, and the County of Somerset. Through our work with the Unitary Authorities and in our role as convenor, we can bring key organisations together to better understand our regional interdependencies and cascading risks. This includes identifying clear

leads in specific areas including the MCA (which may relate to existing functions or potentially filling gaps). Key activities are captured under 'Workstream 5 - developing regional partnerships to accelerate progress' described above.

The Bristol Advisory Committee on Climate Change are also providing the MCA with ongoing expert advice on regional climate resilience, and we are reaching out to projects like CReDO¹¹³ (Climate Resilience Demonstrator) so we can learn from best practice approaches to infrastructure interdependencies.

¹¹³ [Climate Resilience Demonstrator - Digital Twin Hub](#)

NEIGHBOURING AREAS

Working with our neighbouring authorities is a vital part of building climate resilience across our region and beyond. We're working with neighbouring organisations in a number of ways in order to reduce our collective risks. This includes our plans to work with business and skills sectors to identify and reduce future shocks, identifying and reducing vulnerabilities to future climate scenarios. We are also exploring links and joint working with our Local Resilience Forum, who's geography extends beyond the West of England and includes North Somerset and the county of Somerset. Our area also includes two Integrated Care Boards, who we will engage with on the health impacts of climate change.

Preparing the Local Nature Recovery Strategy has enabled us to work both with North Somerset Council, and our neighbouring Responsible Authorities of Somerset, Wiltshire, and Gloucestershire. Through this work we can identify opportunities to join up with a national nature recovery network that will allow nature to thrive and survive, helping both to mitigate and adapt to climate change.

Our work on the Western Forest will look to create a unified new landscape of trees and woodlands across Wiltshire, Gloucestershire, and the West of England, and contribute to reducing flood risk through tree-planting. This, and our planned work to identify and reduce flood risks, will require working at a catchment scale to identify opportunities to intervene in high-risk areas, particularly using nature-based solutions.

We have worked with neighbouring North Somerset Council to identify the many interdependencies with the West of England MCA region due to its physical proximity and the cross-boundary linkages between built and natural environments, infrastructure networks and resident populations. Many organisations also cover a geography which includes the MCA region and North Somerset, affecting both incident management and longer-term resilience building.

North Somerset has a population of about 220,000 with a coastline on the Severn Estuary, Portbury Dock, Bristol Airport, and the seaside resort of Weston-Super-Mare. On the edge of the Mendips, it's also home to a large rural community and includes Leigh Woods on the eastern border with Bristol. The M5 motorway, A370 and A38 are major links into the West of England region, as well as plans to re-open the Portishead railway for passenger services.

The most **significant source of flooding** comes from the sea and tidal estuaries flooding low-lying land. The 1981 winter storm caused extensive flooding along the North Somerset coast flooding hundreds of hectares of land and over 1,000 homes and commercial properties, with floodwater reached the M5 motorway. Improvements were made to coastal defences following this major event.

Without defences in place, approximately a quarter of North Somerset is at risk of flooding. However, the tidal defence network is well-developed and extensive therefore flooding rarely occurs due to high tidal levels alone. Today about 4,300 properties are at risk of flooding from a 1 in

100-year event (between 1% and 3.3% chance of happening each year). Climate change and associated sea level rise will increase flood risk. By 2080, without improvements to flood defences, this could rise to about 63,000 properties being at risk.

The EA is delivering a Flood Action Campaign¹¹⁴ in partnership with council to help local residents in Weston-super-Mare on preparing for flooding and accessing support.

North Somerset Council's **Climate Change Adaptation Strategy** and action plan is part of the council's broader commitment to future-proofing essential services, infrastructure, and communities, against the growing impacts of climate change.

Two key areas of progress concern transport networks and communications. The council has prioritised assessing the vulnerability of transport networks, with 80% of the A-roads mapped for climate-related risks such as flooding, extreme heat, and subsidence. They have also begun to integrate climate adaptation into their broader communications strategy. Through this process and working with key partners such as the NHS and local skills providers, the council is raising awareness and fostering collaborative action.

The council acknowledges that it is still in the early stages of implementing its Climate Change Adaptation Strategy and action plan. They are committed to accelerating progress and exploring innovative ways to enhance the strategy's impact, including identifying new funding opportunities, leveraging partnerships, and refining actions based on evolving data and emerging best practices.

¹¹⁴ [Weston-super-Mare - Flood Action](#)

6. How well are we doing?

6. How well are we doing?

The MCA is in the **early stages** of our regional climate resilience journey, but we are building on the strong foundations of our Unitary Authorities and other regional partners. Our £60m Green Recovery Fund was created to help us deliver our CESAP goals. However, we recognise significantly more investment & resources are needed to deliver our essential climate resilience work programme.

Local government has many **crucial roles** it can play in building climate resilience, but the sector is also very reliant on areas where it has no or little control. For example, the 'upstream' integration of climate resilience at a national level, how high the adaptation challenge or bar is set in terms of future global warming levels, and key enablers creating the fertile ground for regional change.

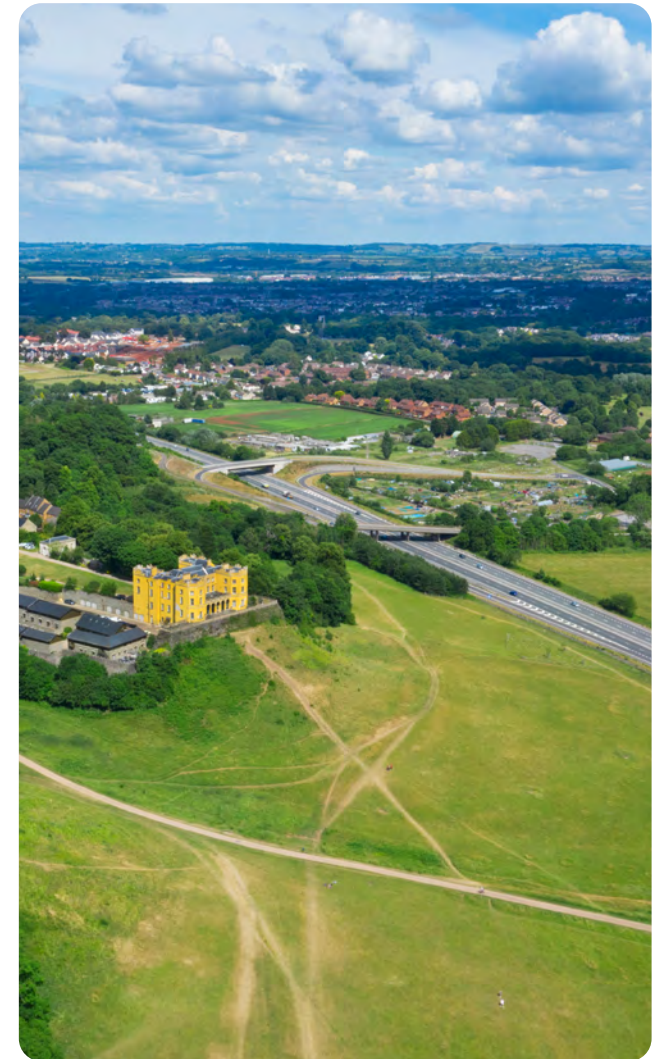
The **scale of the challenge** of adapting to the climate change impacts we are already experiencing and escalating future impacts, is a significant one. We currently are not prepared nor sophisticated enough in the way we deal with climate risk across the region, and in how we manage that risk and continue to thrive and grow.

Risks include:

1. To **health and wellbeing**, particularly in communities with higher levels of deprivation;
2. To the **economy**, as we risk 'locking in' future costs and fail to futureproof growth, and;
3. To the **environment**, with climate change one of the biggest threats to nature.

This position as a region is not unusual. The government's independent advisory body the Committee on Climate Change, says that the UK is currently unprepared for climate change impacts¹¹⁵.

We feel **uniquely placed as a regional body** to take on this challenge as well as recognising the successes and progress which are already being made in tackling climate risk. There is a challenging road ahead, where evolving our way of working to help the region flourish is essential and this is being reflected in our West of England Strategic Framework ambitions and business plan. We recognise the economic necessity of taking action now including reducing the inequalities of those least able to adapt.



¹¹⁵ Progress in adapting to climate change - 2023 Report to Parliament - Climate Change Committee

7. Asks for government

7. Asks for government

The MCA is committed to **working alongside Government** to support the delivery of the National Adaptation Programme, bringing to life the challenges facing our region and working together to unlock the support we need. This includes supporting Government to develop a clear framework of responsibilities for different levels of government for both urgent adaptation responses and building longer-term resilience. We will also consider the role, for example UK Mayors can take to further these ambitions.

Defra's five core priorities¹¹⁶ present clear opportunities for embedding climate resilience:

1. Cleaning-up Britain's rivers, lakes, and seas
2. Creating a roadmap to move Britain to a zero waste economy
3. Supporting our farmers to boost Britain's food security
4. Ensuring nature's recovery
5. Protecting communities from flooding

We will need **additional funding** from central government to help us deliver the significant changes required across the West of England, including significant capital investment required to build climate resilience on the ground across a broad range of partners, sectors, and stakeholders. To support this, Government could develop specific funding mechanisms for adaptation and resilience including dedicated 'pots' for: capital investment, capacity development/technical resources for combined and local authorities, and funding for research and evidence building.

At the same time **multiple enablers** are needed to create the right conditions for change, including the national policy framework, to pave the way for the transformative changes which are urgently needed at both UA and regional level. We will have specific asks including embedding national resilience standards through regulatory frameworks and can offer ourselves as a test bed.

We identified the two **key enabling conditions** of scaling regional investment and growing organisational capacity as fundamental to delivery of our six priority areas for action - risks from flooding, risks from extreme heat, risks to transport infrastructure, risks to vulnerable communities, risks to businesses and risks to natural environment.

To support work on Climate Resilience, Government should provide Mayoral Combined Authorities with a **statutory responsibility** (that is funded) to monitor, evaluate and have strategic overview of climate resilience within the region. Following this ARP4 pilot, an adaptation reporting duty should be a statutory responsibility and allow regions to evaluate and take action if climate resilience is not being adequately taken into account across the region.

We shall ensure that climate resilience is included in our conversations on **devolution, funding & powers**.

¹¹⁶ Defra Secretary of State at Summer Stakeholder Reception - GOV.UK

8. Next steps

8. Next steps

Climate resilience is something we are taking very seriously in the West of England, including how we support our local authorities to embed resilience into their decision making. Growing our capacity and confidence to deliver our climate resilience work programme is a priority.

To maintain momentum following the publication of our ARP4 report:



We will strengthen our regional evidence base to support decision-making and the delivery of change.



We will work in partnership with key teams across the organisation and the region to build resilience for our residents and businesses.



We will futureproof our regional growth to take account of our changing climate.



We will look to convene key partners to help support our work to build climate resilience into everything we do.



We will work with partners to enable a just transition in how the region adapts to climate impacts, protecting vulnerable communities and reducing inequalities.



We will build on our region's strong track record in innovation working with partners, including businesses, and our universities to deliver climate resilience solutions benefiting the region and the UK.



We will monitor & evaluate progress including against our work programme, working with partners.



Appendix

Appendix

SUPPORTING ORGANISATIONS

We'd like to thank all our partners that have helped create this report. This report was written in collaboration with Bath & North East Somerset Council, Bristol City Council, and South Gloucestershire Council. We'd also like to thank North Somerset Council for their input, helping to explore our dependencies with other areas outside of the West of England. We're also grateful for guidance and feedback from the Bristol Advisory Committee on Climate Change, the Environment Agency, the Met Office, the Greater London Authority, and the Avon & Somerset Local Resilience Forum. We also would like to thank Emma Howard Boyd CBE for her independent foreword which frames the crucial national context for our work.

GLOSSARY¹¹⁷

Adaptive capacity

The **ability** of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Adaptive pathways

The analysis of adaptation options over time to changing risk levels.

Adaptation Reporting Power

The Climate Change Act 2008 allows the Government to invite infrastructure providers and bodies with functions 'of a public nature' to provide reports on how they are managing climate risk. This is known as the Adaptation Reporting Power or ARP for short.

Climate adaptation

The **process** or adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Climate preparedness

State of 'readiness' of a region, organisation, community, sector etc (at any point in time) to cope with actual or expected climate and its effects. Being 'climate ready' can be used as a longer-term target.

Climate resilience

The **capacity** of individuals, communities, institutions, businesses, and systems within the region to survive, recover, adapt, & grow in the face of worsening climate impacts including more extreme weather, rising sea level, & changing seasonal and weather patterns.

Emissions scenarios

Emissions scenarios are different pathways for how greenhouse gas emissions may change in the future, resulting in different levels of global warming and climate change.

Lock-in

Early actions or decisions that involve long lifetimes or path dependency, which will potentially increase future risk or vulnerability and that are difficult or costly to reverse later.

Nature-based solutions

Designing with nature to support healthy ecosystems and mitigate the negative impacts of climate change delivering co-benefits.

Representative Concentration Pathways¹¹⁸

When modelling and predicting **future climate** it's necessary to make assumptions about how the economy, society and physical environment may change, as this will have an influence on climate change. Examples include population growth, economic development, technological innovation, and attitudes to environmental sustainability.

¹¹⁷ Draws on selected definitions used in the [CCRA3 Glossary - UK Climate Risk](#)

¹¹⁸ UKCP18 Guidance: Representative Concentration Pathways - Met Office

RCPs are a method for capturing these assumptions for a range of scenarios and modelling future outcomes. They span a range of plausible 'emissions scenarios', with different concentrations of greenhouse gases specified. Modelling each pathway results in different increases in global mean temperature. For example, RCP 8.5 corresponds to a high-emissions or high-end climate scenario where efforts to control emissions fail and global warming exceeds 4°C.

Vulnerability

The propensity or predisposition to be adversely affected, a function of hazard exposure, sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

DEFRA ARP4 LOCAL GOVERNMENT GUIDANCE - RECOMMENDED CONTENT

Elements for inclusion	Recommendation
Conducting a risk assessment	<ul style="list-style-type: none"> • Explain use ISO14092 or similar • Explain use climate adaptation best practice
Preparing to assess risks & opportunities (pre-planning)	<ul style="list-style-type: none"> • Top management commitment • Organisational adaptive capacity • Access to information & expertise
Risk assessment scope	<ul style="list-style-type: none"> • Local authority functions • Overlaps with other authorities • Present day & predicted impacts • Learning to inform NAP & CCRA

Elements for inclusion	Recommendation
Risk assessment scenarios	<ul style="list-style-type: none"> • Timeframes & global warming levels • Climate scenarios & proxies • Use of national or local information • Dealing with uncertainty
Hazard identification & risk screening	<ul style="list-style-type: none"> • Identify/screening relevant risks • Updating risk shortlist • Filter CCRA risks • Identify new or emerging risks
Risk analysis & evaluation	<ul style="list-style-type: none"> • Risk likelihood, impact & overall risk • Highlight 10 highest risks • Financial impacts • Highlight CCRA gaps/inadequacies
Risk management	<ul style="list-style-type: none"> • Business management systems • Monitoring & evaluation • Auditing risk management • Reporting progress
Action plans & implementation	<ul style="list-style-type: none"> • Risk prioritisation • Adaptation measures • Implementation timescale
Reporting on interdependencies	<ul style="list-style-type: none"> • Explain approach • Integrate into risk assessment • Actions on interdependencies

UK CLIMATE CHANGE RISK ASSESSMENT (CCRA3) ^{119 120}

The latest UK Climate Change Risk assessment (2022) identified sixty-one climate risks which will impact the country's economy, society, and natural world due to the changing climate. The most significant of these were grouped together into 8 priority areas for action, using expert judgment around four criteria:

1. Risks or opportunities given the **highest urgency score** - 'more action needed' in response to three questions:
 - What is the current and future level of risk or opportunity?
 - Is the risk or opportunity being managed, taking account of government action and other adaptation?
 - Are there benefits of further action in the next five years, over and above what is already planned?
2. Risks or opportunities with the **biggest adaptation deficit** in terms of policy or action,
3. Risks becoming **increasingly urgent** because of national and global change,
4. Risks or opportunities where the **largest opportunities for integrating adaptation** into key policies are likely to arise over the next 12 months and where missing opportunities could cause 'lock-in' or increase vulnerability to climate impacts.

In addition, two further risk areas were identified - flooding & coastal erosion due to the potential estimated costs and damages (six risks) and public health and other social services (4 risks) due to the difficulty in evaluating the cost of these risks. We have had to interpret Table 1 of the UKCCRA Government report to identify the priority 'most action needed' risks for flooding & coastal erosion as no list was provided.

Table 4: Natural environment risks

Highest priority areas for next 5 years	Individual risks	All other risks
1. Risks to the viability & diversity of terrestrial and freshwater habitats and species from multiple hazards.	N1: Risks to terrestrial species & habitats from changing climatic conditions & extreme events, including temperature change, water scarcity, wildfire, flooding, wind & altered hydrology (including water scarcity, flooding & saline intrusion)	N3: Opportunities from new species colonisations in terrestrial habitats N9: Opportunities for agricultural and forestry productivity from new/ alternative species becoming suitable
	N2: Risks to terrestrial species & habitats from pests, pathogens & invasive species	N10: Risks to aquifers & agricultural land from sea level rise, saltwater intrusion
	N11: Risks to freshwater species & habitats from changing climatic conditions and extreme events, including higher water temperatures, flooding, water scarcity and phenological shifts	N13: Opportunities to freshwater species & habitats from new species colonisation
	N12: Risks to freshwater species & habitats from pests, pathogens & invasive species	N14: Risks to marine species, habitats, and fisheries from changing climatic conditions, including ocean acidification and higher water temperatures

¹¹⁹ UK Climate Change Risk Assessment 2022 (publishing.service.gov.uk)

¹²⁰ Independent Assessment of UK Climate Risk - Committee on Climate Change

Highest priority areas for next 5 years	Individual risks	All other risks
2. Risks to soil health from increased flooding & drought.	N4: Risks to soils from changing climatic conditions, including seasonal aridity and wetness	N15: Opportunities for marine species, habitats, and fisheries from changing climatic conditions
3. Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions.	N5: Risks & opportunities for natural carbon stores, carbon sequestration & GHG emissions from changing climatic conditions, including temperature change & water scarcity	N16: Risks to marine species and habitats from pests, pathogens, and invasive species N17: Risks and opportunities to coastal species and habitats due to coastal flooding, erosion, and climate factors
4. Risks to crops, livestock, and commercial trees from multiple hazards.	N6: Risks to & opportunities for agriculture & forestry productivity from changing climatic conditions & extreme events, (including temperature change, water scarcity, wildfire, flooding, wind, coastal erosion, wind & saline intrusion) N7: Risks to agriculture from pests, pathogens & invasive species N8: Risks to forestry from pests, pathogens & invasive species	N18: Risks & opportunities from climate change to landscape character

Table 5: Infrastructure risks

Highest priority areas for next 5 years	Individual risks	All other risks
6. Risks to people and the economy from climate-related failure of the power system.	I1: Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures I9: Risks to energy generation from reduced water availability I10: Risks to energy from high & low temperatures, high winds, lightning I11: Risks to offshore infrastructure from storms & high waves	I3: Risks to infrastructure services from coastal flooding & erosion I4: Risks to bridges and pipelines from flooding and erosion I6: Risks to hydroelectric generation from low or high river flows I7: Risks to subterranean & surface infrastructure from subsidence I8: Risks to public water supplies from reduced water availability
Flooding & coastal erosion	I2: Risks to infrastructure services from river, surface water and groundwater flooding I5: Risks to transport networks from slope & embankment failure	I12: Risks to transport from high & low temperatures, high winds, lightning I13: Risks to digital from high and low temperatures, high winds, lightning

Table 6: Business & industry risks

Highest priority areas for next 5 years	Individual risks	All other risks
5. Risks to the supply of food, goods, and vital services due to climate-related collapse of supply chains	B6: Risks to business from disruption to supply chains & distribution networks	B3: Risks to businesses from water scarcity B4: Risks to finance, investment & insurance including access to capital for businesses B7: Opportunities for business from changes in demand for goods & services
7. Risks to human health, wellbeing, and productivity from increased exposure to heat in homes & other buildings.	B5: Risks to business from reduced employee productivity due to infrastructure disruption & higher temperatures in working environments	
Flooding & coastal erosion	B1: Risks to business sites from flooding B2: Risks to business locations and infrastructure from coastal change from erosion, flooding, and extreme weather events	

Table 7: Health, communities & built environment risks

Highest priority areas for next 5 years	Individual risks	All other risks (*not selected as regionally relevant)
6. Risks to people and the economy from climate-related failure of the power system.	H6: Risks and opportunities from summer and winter household energy demand (a) opportunity – winter & (b) risk - summer	H2: Opportunities for health and wellbeing from higher temperatures H5: Risks to building fabric
7. Risks to human health, wellbeing, and productivity from increased exposure to heat in homes & other buildings.	H1: Risks to health & wellbeing from high temperatures H6: Risks and opportunities from summer and winter household energy demand (a) opportunity – winter & (b) risk - summer	H7: Risks to health & wellbeing from changes to air quality H9: Risk to food safety & food security H10: Risks to health from water quality & household water supply - (a) water quality & b) water quantity
Flooding & coastal erosion	H3: Risks to people, communities & buildings from flooding – a) river & surface flooding & b) coastal flooding H4: Risks to viability of coastal communities from sea level rise	H11: Risks to cultural heritage
Public health and other social services	H8: Risks to health from vector-borne diseases H12: Risks to health & social care delivery H13: Risks to education & prison services	

Table 8: International dimensions risks

Highest priority areas for next 5 years	Individual risks	All other risks
5. Risks to the supply of food, goods, and vital services due to climate-related collapse of supply chains	ID1: Risks to UK food availability, safety, and quality from climate change overseas ID7: Risks from climate change on international trade routes ID8: Risks to the UK financial sector from climate change overseas	ID2: Opportunities for UK food availability & exports from climate impacts overseas ID3: Risks & opportunities to the UK from climate-related international human mobility ID4: Risks to the UK from international violent conflict resulting from climate change on the UK
8. Multiple risks to the UK from climate change impacts overseas.	ID10: Risk multiplication from the interactions and cascades of named risks across systems and geographies	ID5: Risks to international law and governance from climate change overseas that will impact the UK
Public health and other social services	ID9: Risk to UK public health from climate change overseas	ID6: Opportunities from climate change (including arctic ice melt) on international trade routes

WEST OF ENGLAND CLIMATE AND ECOLOGICAL STRATEGY AND ACTION PLAN (2023) CLIMATE RESILIENCE PILLAR

The climate resilience actions set out below are taken from the MCA's 2023 strategy and action plan. These actions are now **superseded** by the work programme set out in Section 4 of this Climate Adaptation Report. The CESAP will be updated in 2025 to reflect these changes.

Short-term actions (next year) - working with partners, we will aim to:

- Work with Met Office to develop a regional 'Climate Pack' – identifying the anticipated future climate change for the region.
- Work with the local councils and Local Resilience Forum run by Avon & Somerset Police to strengthen regional public service resilience to climate change.
- Coordinate regional review and application of West of England Sustainable Urban Drainage guidance for new buildings and infrastructure with Unitary Authorities.
- Convene regional conversations and collect evidence to understand the impacts of climate change and adaptations needed, particularly focused on those communities most vulnerable and least able to adapt.
- Establish a regional steering group overseeing development of an Adaptation Plan distilling West of England priorities for early action from National Adaption Plan 3.
- Assess and ensure Combined Authority capital investments consider the impacts of and are integrating resilience to climate change impacts.
- Identify and embed opportunities within advice to businesses (in particular, low carbon surveys and grants provision) to support them to build resilience to climate impacts.
- Ensure the Retrofit Accelerator and other retrofit projects consider and improve buildings' climate resilience
- Deliver green and blue infrastructure and nature projects (in Nature Recovery section) to help address impacts of climate change.

- Support regional climate change risk assessments across the region's sectors to increase climate consideration & help standardise approach.
- Work with National Grid, Wessex Water, Bristol Water, and other local infrastructure providers to understand regional infrastructure resilience to the impacts of climate change.
- Develop a regionwide heat vulnerability assessment to show how risks vary across the region - learning from Bristol's approach to heat vulnerability mapping - to inform resilience-building measures [in communities, parks, and green spaces, and through tree planting] to reduce the impact of heatwaves.
- Build evidence on land used for food production in our region and how this could be impacted by climate change to develop a regional food production strategy.
- Support the Bristol Avon Flood Strategy feasibility work completed in last two years, commencing delivery of Phase 1 of flood defences, and coordinating a regional approach to flood defences and mitigations.
- Work with WENP and other partners to develop an approach to identify habitats and species at risk and the measures required to enable local threatened species to adapt.
- Continue to support flood defence work in the region, helping to ensure the incorporation of climate resilience, including use of natural flood management solutions.
- Work with partners to review coastal flooding threat and adequacy of current and planned defences to protect coastal communities.
- Work with partners to deliver the Bristol Avon Catchment Plan to deliver resilience and nature recovery across our river catchments and wetlands.
- Work to help ensure utility infrastructure in our region considers and is resilient to impacts of climate change.
- Target nature-based solutions, green and blue infrastructure, and tree planting works, linked to community volunteering and careers programmes such as Green Futures, to help protect people and the natural environment from the worst impacts of climate change.
- Work with partners to explore the opportunities for carbon sequestration in natural habitats, including wetlands.

Medium-term actions (2024-2028) - we will aim to:

- Collate evidence-base on the investment needed and economic opportunities arising from regional climate resilience – providing this in an accessible dashboard together with metrics and monitoring progress.
- Work with public health practitioners (NHS, Local Councils, not-for-profit organisations, etc) and retrofit programmes/supply-chains in targeting preventative measures for health impacts associated with climate change building on our social value work.
- Support development of regional emergency response plans for extreme climate events (flooding, droughts, heat waves, storms, etc).

Longer-term vision (2028-2030):

- Vulnerable people and businesses at most risk of catastrophic climate events (flooding and heat waves) are protected in emergency response plans.
- Help create a climate ready economy - businesses having emergency plans & business continuity plans to deal with extreme events, adaptation plan address climate risks while also being adaptive to ongoing change and uncertainties.
- Help create climate ready communities - West of England becomes a centre for excellence in climate resilience.

CLIMATE DATA

Further information on methods used to generate climate data, guidance on how the results should be interpreted as well as a summary of their limitations:

- [UCKP18 Science Overview Report](#)¹²¹
- [UKCP18 Guidance: Caveats & limitations](#)¹²²
- [Keep Bristol Cool Framework Technical Appendix](#)¹²³

ADDITIONAL REFERENCES

Step 3 - high-level screening of preparedness using a regional lens

Coastal inundation & flooding

[B&NES Local Flood Risk Management Strategy](#)

[Bristol Local Flood Risk Management Strategy](#)

[South Gloucestershire Local Flood Risk Management Strategy](#)

[North Somerset Local Flood Risk Management Strategy](#)

Planning for extreme weather & building longer-term climate resilience

Table 2: Regional planning for climate resilience - MCA, Unitary Authorities & partner examples

[West of England Climate & Ecological Strategy & Action Plan](#)

[B&NES Climate Emergency Strategy](#)

[Bristol One City Climate Strategy](#)

[South Gloucestershire Climate & Nature Emergency Action Plan](#)

[Local Nature Recovery Toolkit](#)

[Nature England's Green Infrastructure Framework](#)

[Joint Green Infrastructure strategy - Combined Authority](#)

[West of England Nature Partnership WENP Strategy 2021-2020](#)

[Catchment Plan 2022-2027 | Bristol Avon Catchment Partnership](#)

[B&NES Green Infrastructure Strategy](#)

[South Gloucestershire Green Infrastructure & Nature Recovery Action Plan to 2030](#)

[West of England Sustainable Drainage Designer Guide](#)

[West of England Placemaking Charter](#)

[B&NES Local Plan](#)

[Bristol City Council Local Plan](#)

[South Gloucestershire Local Plan](#)

[B&NES Local Flood Risk Management Strategy](#)

[Bristol Local Flood Risk Management Strategy](#)

[South Gloucestershire Local Flood Risk Management Strategy](#)

[Bristol City Council Keep Bristol Cool - A Framework for Urban Heat Resilience](#)

¹²¹ [UKCP18 Science Overview Report - Met Office](#)

¹²² [UKCP Guidance: Caveats and limitations - Met Office](#)

¹²³ [Keep Bristol Cool Framework Technical Appendix - Bristol City Council](#)

Table 3: Regional planning for climate resilience - infrastructure examples

Climate change and the strategic road network - National Highways

National Highways Strategic Road Network

Climate change adaptation - Network Rail

Network Rail Weather Resilience and Climate Change Adaptation Plan Wales & Western 2024-2029

Network Rail Weather Resilience and Climate Change Adaptation Plans Western 2019-2024

Bristol Water Climate Change Adaptation Report

Bristol Water Water Resources Management Plan

Bristol Water Drought Plan

Drainage and Wastewater Management Plan | Wessex Water

Climate change adaptation - Wessex Water

Wales & West Utilities Climate Change Adaptation Report

National Grid Climate Change Adaptation Report