Met Office

Department for Environment Food & Rural Affairs

Climate Report for Bolsover

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Introduction

This Climate Report provides high level, non-technical summaries of climate change projections for a local authority area. It uses scientific research to provide robust climate information to help decision makers plan for the future, enabling local authorities to become more resilient to climate change.

Each local authority experiences its own unique challenges from climate change. For example, urban areas are affected by the urban heat island effect resulting in higher urban temperatures compared with rural surroundings, whereas low-lying coastal areas may be at greater risk of flooding from rising sea levels.

What affects the region's weather?

Bolsover is located within the Midlands climate region. The types of weather that Midlands experiences across a year include:

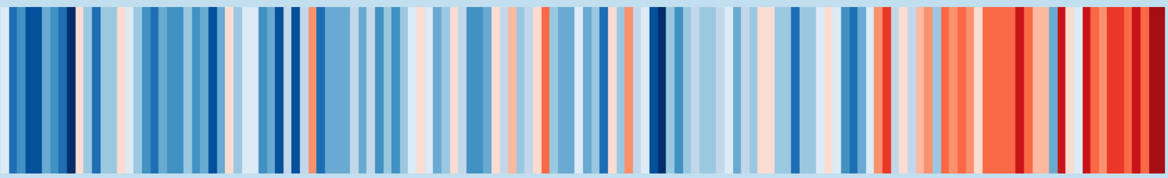
Due to the relative distance of the Midlands from the sea, the annual average temperature range is relatively large. Sharp winter frosts are common and very hot days may also occur in summer. Winter mean daily minimum temperatures are between 0°C and 2°C, whilst summer mean daily maximum temperatures can reach above 21°C in many areas.

Large-scale frost hollows may occur within river valleys in the western parts of the Midlands in winter. The lowest temperature recorded for England (-26.1°C) occurred in Newport (Shropshire) in 1982.

Rates of rainfall across the Midlands are variable. Rainfall rates are highest at high altitude close to the Welsh border, and parts of the Peak District receive more than 1000 mm per year. The region is drier in the lee of the mountains (South and East Midlands as low as 600 mm per year).

Snow across the Midlands is variable, from about 5 days of lying snow per year in the lower Severn valley to over 20 days in upland areas.

How has the climate changed in Midlands?



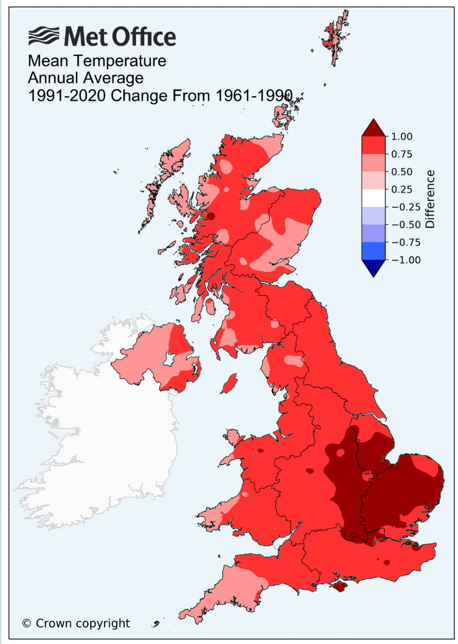
Temperature Difference (°C)
Data: HadUK-Grid
Concept: Ed Hawkins

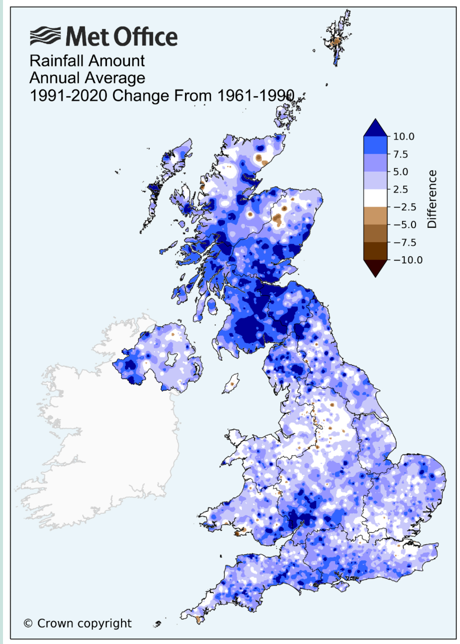
Bolsover is located within the Midlands climate region, where temperatures have increased (1884-2023), with many of the hottest years occurring in the last few decades

Climate Change in the UK

Observed changes

How have temperature and rainfall changed across the UK? These maps show changes in annual mean temperature (left) and rainfall (right) from 1991-2020 compared to a baseline period of 1961-1990. Temperatures have risen in all areas across the UK. Whilst some areas have become drier, more areas have become wetter. Some places that have become wetter over the year as a whole have also become drier in summer.

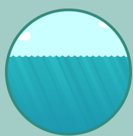




Impacts

Urban, rural and coastal regions across the UK are already experiencing the impacts of climate change. The negative impacts of climate change may include:

Heat
Increased energy demand for summer cooling

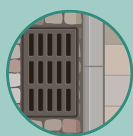


Sea Level Rise
Increased risk of coastal flooding

Heavy Rainfall
Increased risk of river and surface water flooding

Health
Increased risk to health from heat stress

Drought
Risk to water supplies from drought



Drainage
Increased disruption to urban drainage systems

Transport
Increased disruption to transport due to heat e.g. rail buckling

Environment
Increased risk to biodiversity (plants and animals)

Energy
Infrastructure such as gas pipes are at high risk from flooding events

Future headlines

The climate is already changing, and we are already seeing impacts. But how might the UK's climate change in the future? The amount of future climate change will depend on how much greenhouse gas the world emits. However, even in the most optimistic scenario we are locked in to some further climate change.

There is an increased chance of **warmer, wetter winters and hotter, drier summers**.

Although the trend is for drier summers in the future, there may be increases in the intensity of heavy summer rainfall events.

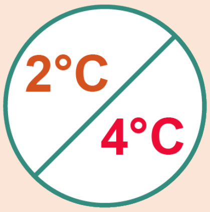
Hot summers are expected to become more common. By 2050, every other summer may be as hot as the record breaking summer of 2018.

Sea level will continue to rise in the 21st century even if greenhouse gas emissions are reduced rapidly.

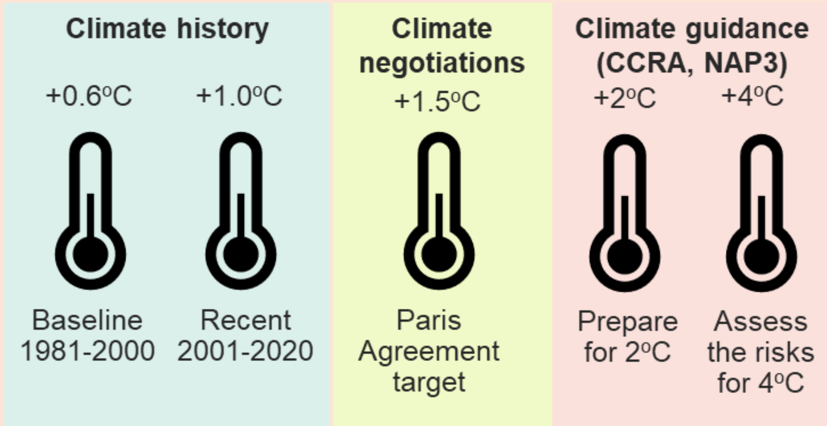
Local changes in the global context

Global Warming Levels

Global Warming Levels (GWLs) are a simple way to represent climate change at the global scale, which then drives local changes. They allow us to explore different strands of climate hazard information consistently. Changes are relative to the pre-industrial baseline (1850-1900). We have already reached +1.2°C.



Independent guidance, adopted by the UK government for the Climate Change Risk Assessment (CCRA) and 3rd National Adaptation Plan (NAP3), is to prepare for a 2°C rise in global temperature, whilst assessing the risks for 4°C.

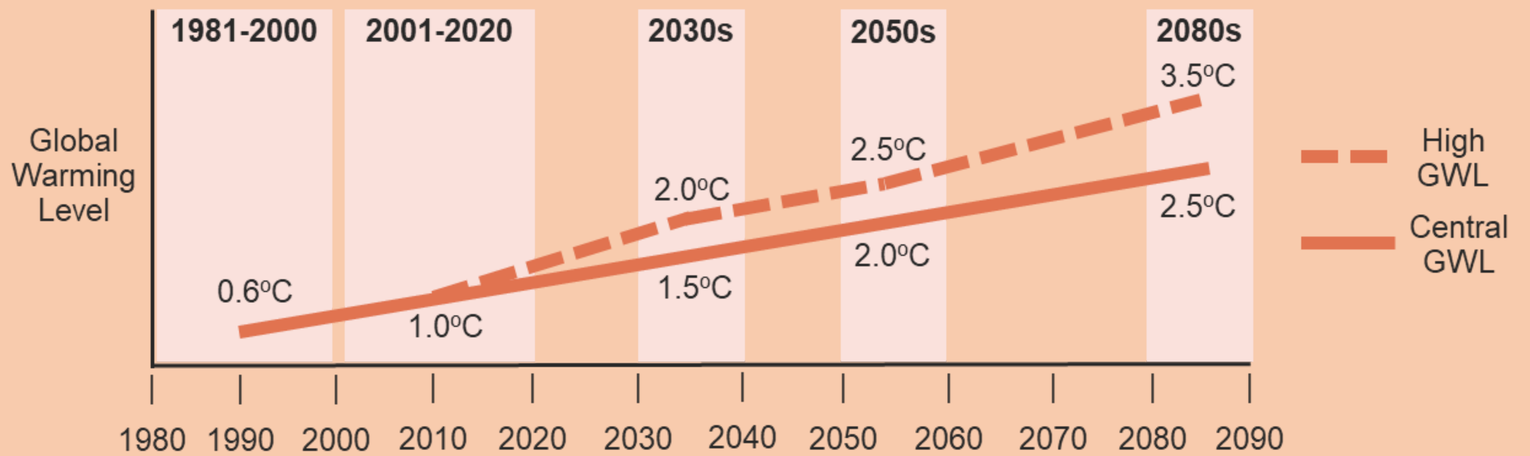


The Paris Agreement says that we must limit global warming to well below 2°C, whilst aiming for 1.5°C.

Limiting warming to below 1.5°C above pre-industrial levels will require bigger emission reductions than currently pledged by nations around the world. Current emission reduction pledges, made as part of nationally determined contributions, are likely to lead to warming above 2°C.

Timing of changes

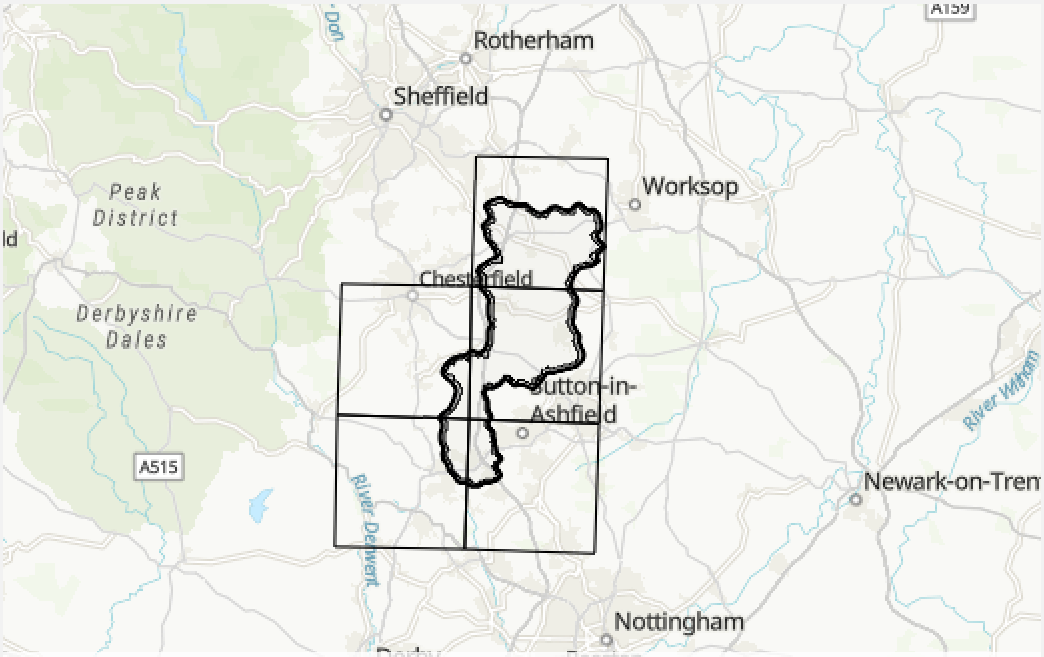
The time when a particular GWL is reached will depend on future global emissions and the sensitivity of the climate system. The two futures present Central and High estimates of global warming over the 21st century. Both are consistent with current-policy global emissions reductions. They have been selected by the Climate Change Committee (CCC) for exploration for the fourth Climate Change Risk Assessment (CCRA4). These futures show the times when particular GWLs may be reached; 4°C may be reached by the end of the century under the High GWL future, but has a low likelihood. The uncertainty in these futures increases over the course of the 21st century.



Local climate changes

The table shows projected **changes in climate** for the Local Authority area for a number of Global Warming Levels (GWLs). In each case there is a central projection (the Median) and an uncertainty range (the Lower and Upper values are the 10th and 90th percentiles). Changes are relative to 1981-2000.

The underlying science is explained in the Scientific Detail (QR Code).



The map shows the Local Authority area. The overlaid grid shows the 12km grid boxes from the climate model used for these projections.

		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	**28.7** 28.4 to 29.1	**31.0** 30.1 to 32.1	**+2.8** +1.1 to +3.7	**+3.1** +2.0 to +5.3	**+6.8** +6.1 to +8.4
	Summer Average Temperature	**15.3** 15.2 to 15.3	**16.3** 16.0 to 16.7	**+1.3** +1.0 to +2.0	**+2.0** +1.4 to +2.6	**+4.2** +3.6 to +5.0
	Winter Average Temperature	**3.9** 3.9 to 3.9	**4.5** 4.2 to 5.1	**+1.0** +0.5 to +1.4	**+1.3** +0.6 to +1.7	**+2.7** +1.7 to +3.3
	Winter Minimum Temperature	**-7.8** -8.2 to -7.2	**-6.0** -7.4 to -4.7	**+2.5** +0.5 to +3.8	**+2.9** +1.7 to +4.9	**+5.1** +3.8 to +7.0
	Annual Average Temperature	**9.3** 9.3 to 9.3	**10.1** 10.0 to 10.3	**+1.1** +0.9 to +1.3	**+1.7** +1.2 to +1.8	**+3.3** +2.8 to +3.8
	PRECIPITATION	mm/day	mm/day	% change	% change	% change
	Summer Precipitation Rate	**1.75** 1.73 to 1.76	**1.68** 1.53 to 1.79	**0** -13 to +5	**-8** -22 to -1	**-23** -41 to -15
	Winter Precipitation Rate	**2.00** 1.97 to 2.00	**2.09** 1.94 to 2.32	**+6** -5 to +19	**+6** 0 to +14	**+18** +7 to +26

Local climate indicators

The table shows projected **climate indicators** for the Local Authority area for a number of Global Warming Levels. For each these are annual totals: a central projection (the Median) and an uncertainty range (the Lower and Upper values are the 10th and 90th percentiles). See also the Scientific Detail (QR Code).

Indicator	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
Summer Days* Daily maximum temperature > 25°C	10 10 to 11	20 17 to 25	22 19 to 29	28 23 to 34	53 47 to 68
High daytime temperatures with health impacts for vulnerable people at risk of hospital admission or death. Transport disruption – e.g. track buckling on railways. Can also indicate periods of increased water demand.					
Hot Summer Days* Daily maximum temperature > 30°C	1 0 to 1	2 1 to 3	3 2 to 5	4 2 to 7	15 12 to 24
Increased heat related illnesses, hospital admissions or death. Further transport disruption – e.g. track buckling on railways, road melt. Overhead power lines become less efficient.					
Extreme Summer Days* Daily maximum temperature > 35°C	0 0 to 0	0 0 to 1	0 0 to 1	0 0 to 1	2 1 to 4
Increased heat related illnesses, hospital admissions or death affecting not just the vulnerable. Further transport disruption – e.g. track buckling on railways, road melt.					
Tropical Nights Daily minimum temperature > 20°C	0 0 to 0	0 0 to 0	0 0 to 0	0 0 to 0	1 0 to 2
Health impact due to high night-time temperatures with potential for heat stress. Vulnerable people at increased risk of hospital admission or death.					
Frost Days Daily minimum temperature < 0°C	51 51 to 52	39 34 to 46	35 29 to 42	29 25 to 42	11 6 to 22
Cold weather disruption due to higher than normal chance of ice and snow.					
Icing Days Daily maximum temperature < 0°C	3 2 to 3	1 0 to 3	1 0 to 2	1 0 to 2	0 0 to 0
More extreme than frost days, so more severe cold weather impacts.					
Growing Degree Days+ Daily mean temperature: °C > 5.5°C	1,711 1,708 to 1,714	1,941 1,881 to 2,028	2,020 1,951 to 2,078	2,178 2,051 to 2,242	2,682 2,568 to 2,846
Energy available for plant growth over a year. This is not a measure of season length.					
Heating Degree Days+ Daily mean temperature: °C < 15.5°C	2,431 2,429 to 2,433	2,224 2,193 to 2,253	2,136 2,103 to 2,181	1,999 1,958 to 2,146	1,631 1,539 to 1,761
Indicator of energy demand for heating.					
Cooling Degree Days+ Daily mean temperature: °C > 22°C	20 19 to 21	39 34 to 48	43 38 to 58	53 42 to 70	127 110 to 173
Indicator of energy demand for cooling.					

* Summer days above the stated temperature thresholds can occur at any time of year

+ Degree Days are not a number of days, but the number of degrees the daily average temperature exceeds the threshold, each day, added up over a year.

How to use the local climate projections

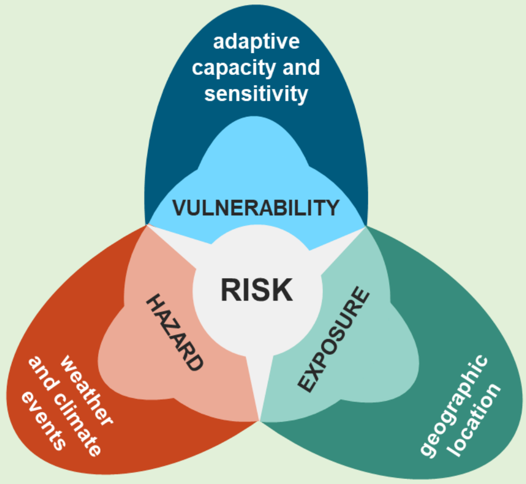
We are all at different points on our climate risk and adaptation journey. These projections may be used to build awareness, contribute to a risk assessment, or inform adaptation planning or reporting.

Climate risk

Understanding the risks that climate change poses to your community, organisation or business is the first step to taking action. The **RISKS** from a changing climate and the potential for resultant impacts, depend on three factors:

HAZARD: weather and climate events which may have adverse effects. Their occurrence, duration and intensity may change due to climate change.

EXPOSURE: the location of people, property and other resources, relative to a hazard.



VULNERABILITY: the likelihood of the exposed people, property or resources suffering adverse effects from the hazard. Vulnerability is reduced by the capacity of people and places to adapt or respond to the hazard.

Selection of hazard values

The information in this report may be used to assess some of the climate and weather HAZARDS your local area may face, within a risk assessment procedure. It provides climate information for a range of Global Warming Levels (GWLs). The median and an uncertainty range is provided for each climate variable. A key step is to identify which you need for your risk assessment. The **SIMPLE** approach follows independent guidance, adopted by the UK government for the Climate Change Risk Assessment (CCRA) and 3rd National Adaptation Plan (NAP3). The **ARP** approach aligns with guidance for the local authority Adaptation Reporting Power pilot. In the **CUSTOM** approach you decide on the basis of your risk appetite and the relevant time horizon.

SIMPLE approach

Follow the guidance to prepare for a 2°C rise in global temperature, whilst assessing the risks for 4°C.

Use the Median value as a central estimate, and the Lower and Upper values as an uncertainty range.

ARP approach

For present day (near term): 1.5°C
For mid-century (medium term): 2°C
For end-century (long term): 2°C
For end-century (long term): 4°C

Use the Median value as a central estimate, and the Lower and Upper values as an uncertainty range.

CUSTOM approach

1. Select the climate hazard
choose a row in the tables (p5-6)

2. Select the climate future
choose Central if you have a normal risk appetite, or High if you have a low risk appetite (graph p4)

3. Select the time horizon
select 2030s, 2050s or 2080s (right) and read GWL from the graph (p4)

4. Select the statistic
for Central future use the Median, for High future use the most extreme value (Upper or Lower)

Read the value from the tables (p5-6).
The values for the 2.5°C and 3.5°C GWLs are at climatedataportal.metoffice.gov.uk

TIME HORIZON

The **2030s** represents the near future.

The **2050s** informs long-term resilience targets; it represents the end of the period of 'inevitable' climate change and rises in many hazards, regardless of global greenhouse emissions over the next few decades.

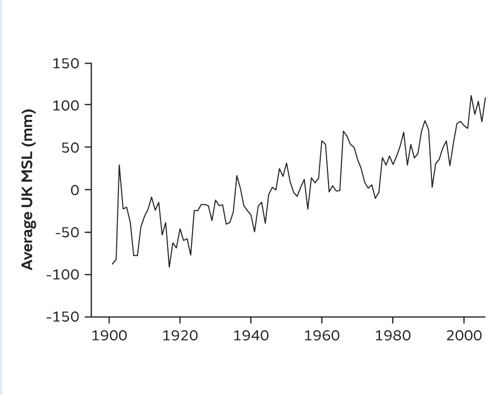
The **2080s** represents possible further climate change beyond the middle of the century, notably for long-lived assets.

Sea Level Rise

Around the UK

Sea level rise (SLR) is the primary way that coastal flood risk is expected to change in the UK in the future. Over the past 30 years, the UK sea level has been rising by 3.0-5.2mm per year, compared with 1.5mm per year in the 1990s.

Past and present emissions mean that sea levels will continue to rise. The amount of sea level rise depends on the location around the UK and increases with higher emissions scenarios.

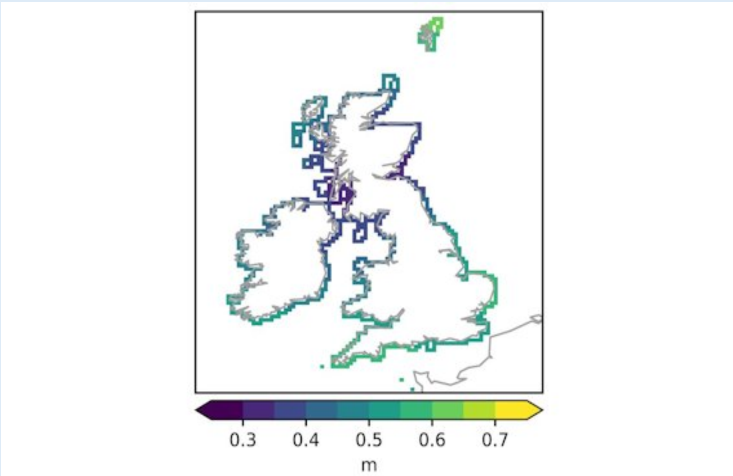


Bolsover

As Bolsover is not a coastal Local Authority, this Report does not provide any local sea level rise information.

Regional

Although Bolsover is not coastal, it may still be affected by sea level rise. For example, people and services in the Local Authority area may depend on vital infrastructure on the coast. The figure on the right shows the sea level rises around the British Isles projected under the Central future in 2100.



Impacts

Flooding of coastal infrastructure and services

Saltwater intrusion of aquifers and agricultural land

Flooding of coastal communities and buildings

Take action

Who is this for?

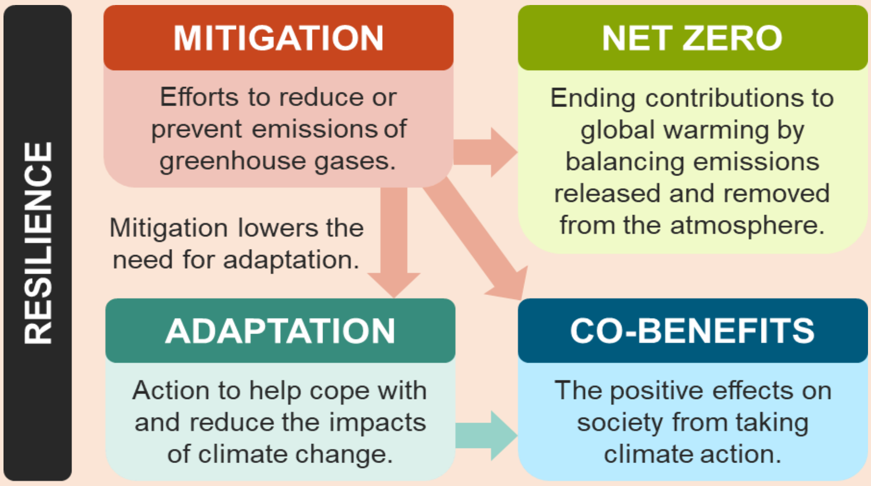
This Climate Report is intended to be useful to a wide range of people and organisations in the UK:

- **Local Authority officers** with service responsibilities who need information on how climate change is affecting their area
- **Councillors** who need briefings on how climate change may affect their Local Authority area
- **The public** who need to understand how climate change may affect their neighbourhood, business or organisation
- **Leaders** who need a summary of climate change to share with stakeholders and the public when raising awareness

#GetClimateReady

Tackling climate change will require both mitigation and adaptation. **Mitigation** reduces our carbon emissions with the goal of reaching **Net Zero**. **Adaptation** prepares us for the impacts of climate changes to which we are already committed.

You may be a concerned citizen, or have public influence or be responsible for multi-million pound budgets.



You can play a part in protecting our planet from the worst impacts of climate change and in adapting our lives to protect ourselves from the impacts that we will see. Let's get ready for tomorrow. **#GetClimateReady**

More information

The Local Authority Climate Service community site has more information.

The Met Office welcomes feedback on this service.

The Local Authority Climate Service team invites you to contact us at: lacs@metoffice.gov.uk. This is a Beta service.

This work has been supported by Defra as part of the commitments set out within the Third National Adaptation Programme.

Version 1.0