Local Authority Climate Service

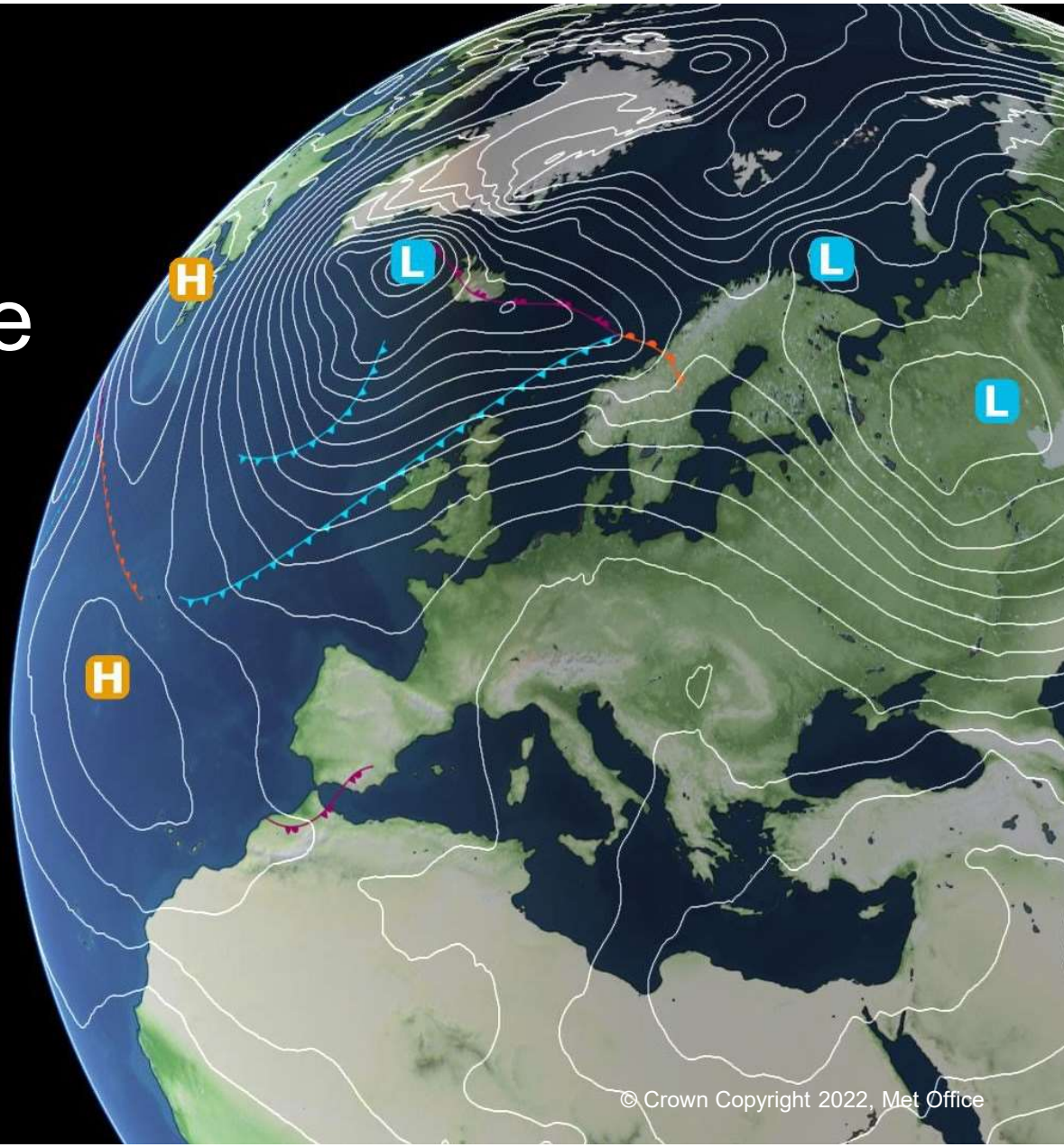
LGA Adaptation Virtual Event

14/03/2024

Victoria Ramsey

Government Strategic Account Manager

Project Team: Alex Woods, Tim Mitchell, Katie Hodge, Mike Sanderson, Ant Veal, Mathew Richardson, Josh Macholl, Emily Wallace, Natalie Garrett, Lizzie Fuller and colleagues at Esri UK



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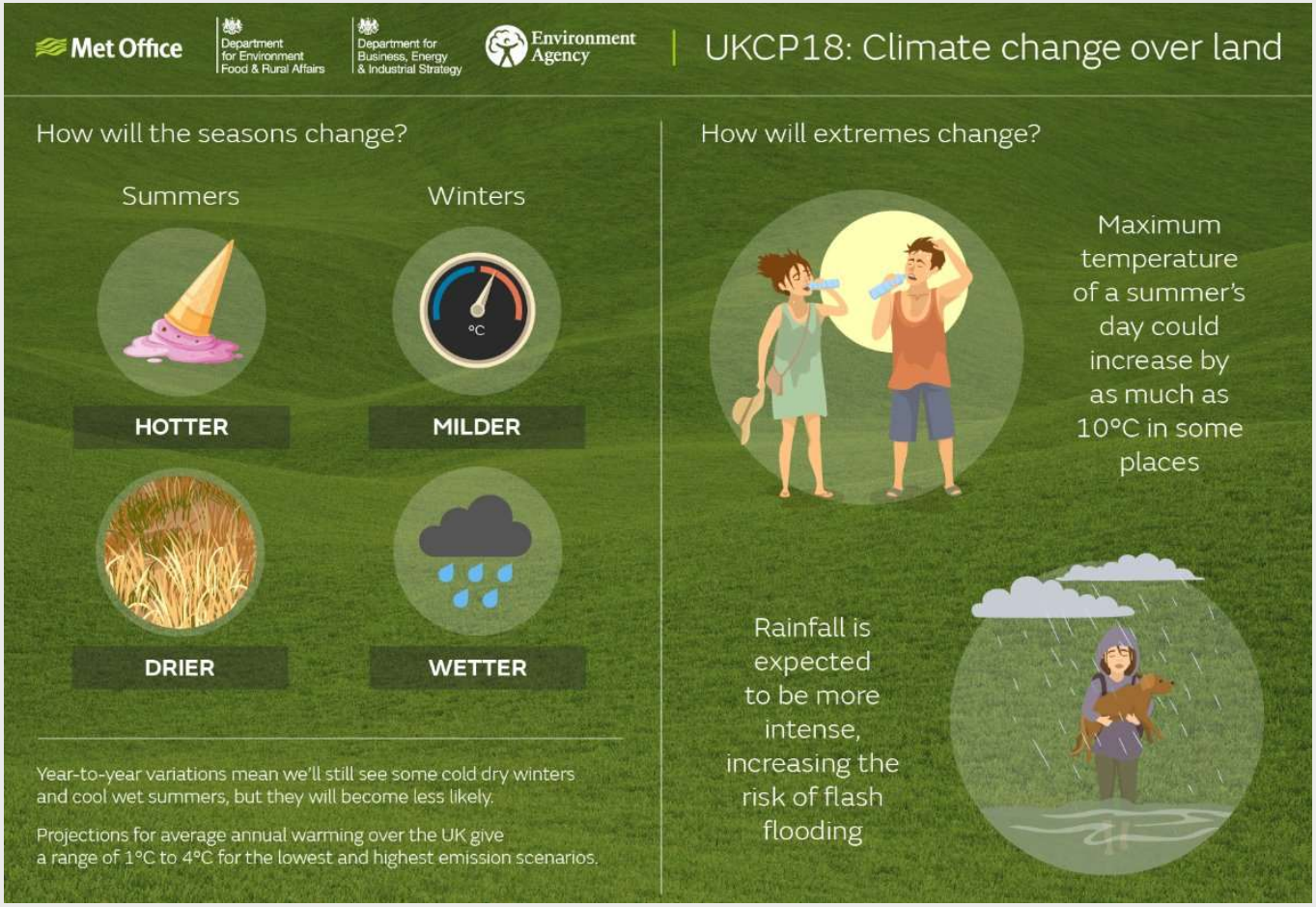
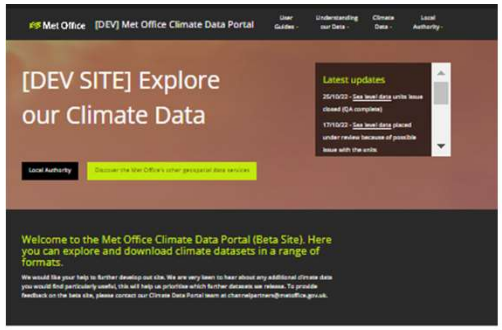
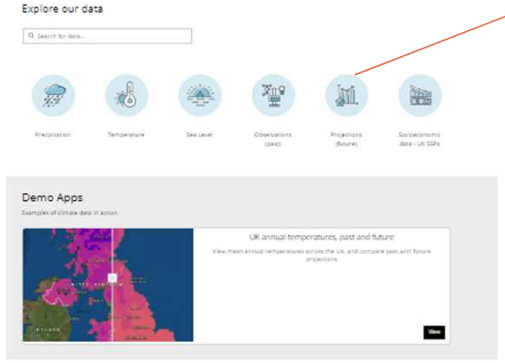

Met Office
Department for Environment Food & Rural Affairs
Department for Business, Energy & Industrial Strategy
Environment Agency
UKCP18: Climate change over land
How will the seasons change?
Summers
Winters
°C
HOTTER
MILDER
DRIER
WETTER
Year-to-year variations mean we'll still see some cold dry winters and cool wet summers, but they will become less likely.
Projections for average annual warming over the UK give a range of 1°C to 4°C for the lowest and highest emission scenarios.
How will extremes change?
Maximum temperature of a summer's day could increase by as much as 10°C in some places
Rainfall is expected to be more intense, increasing the risk of flash flooding

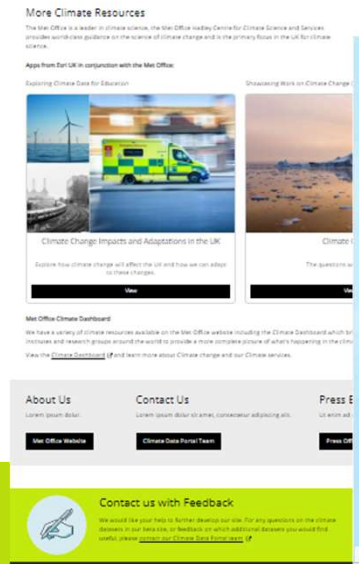
Met Office

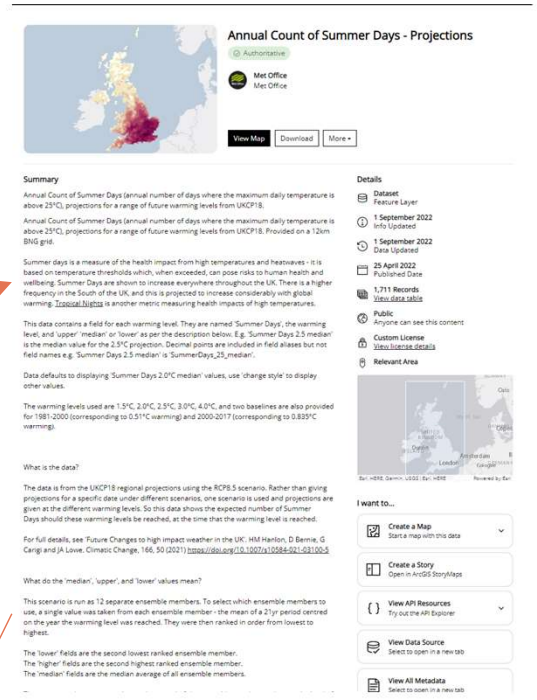
Climate Data Portal

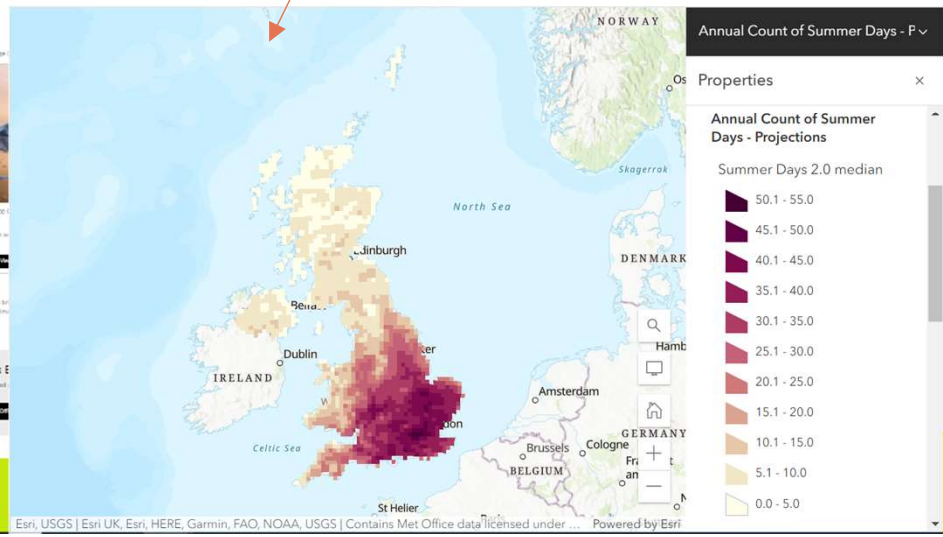
- Open access, currently in BETA: https://climate-themetoffice.hub.arcgis.com/
- User friendly way of viewing and downloading a selection of climate data in a range of formats
- Uses ArcGIS online via web-browser making it easy to overlay with your own data (point locations, gridded data or shapefiles)





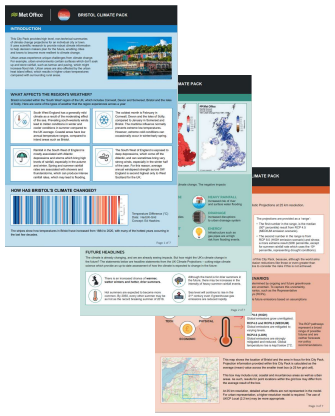


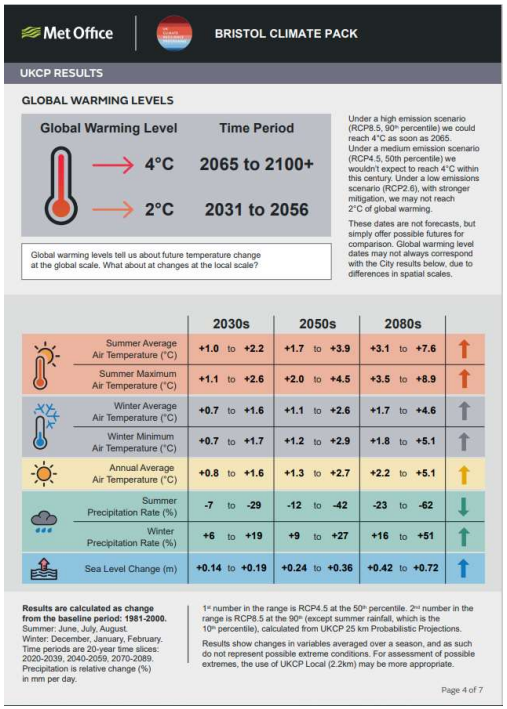




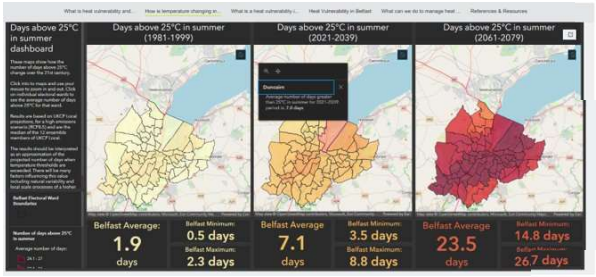
Working in partnership

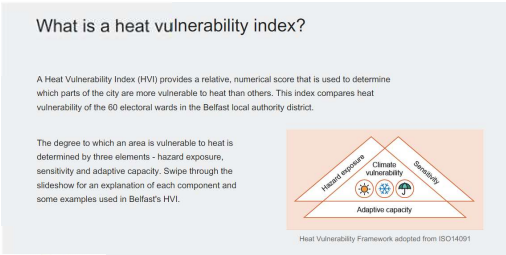
City Packs





Urban Heat Service





Making climate data more accessible & usable

BRISTOL CITY COUNCIL

MANCHESTER CLIMATE CHANGE AGENCY

MANCHESTER CITY COUNCIL

Belfast City Council

Climate Northern Ireland

UKRI UK Research and Innovation

UK CLIMATE RESILIENCE PROGRAMME

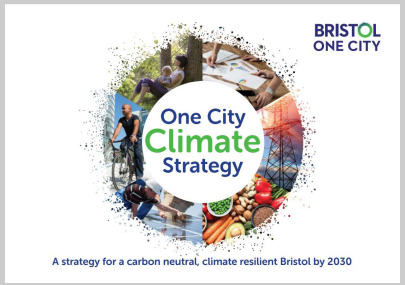
Local authorities are key players in the national response to climate change

Local impacts

(Source: MyLondon)

Local response

(Source: Carbon Literacy Project)

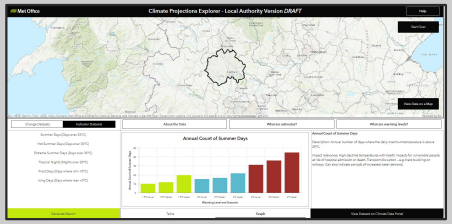


Local solutions

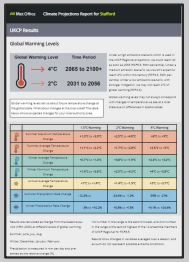
(Source: Sheffield City Council)

Local Authority Climate Service

Climate Projections Explorer



Local Authority Climate Report



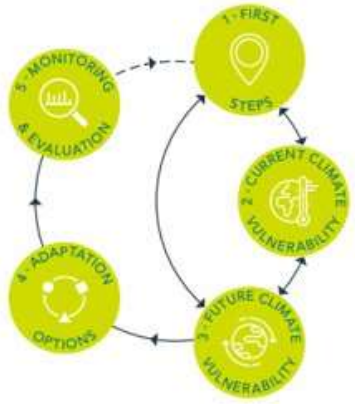
Local Authority Community Site

Engaging networks to facilitate uptake through training and support

Met Office Civil Contingencies

LOCAL PARTNERSHIPS

ADAPTATION TOOLKIT

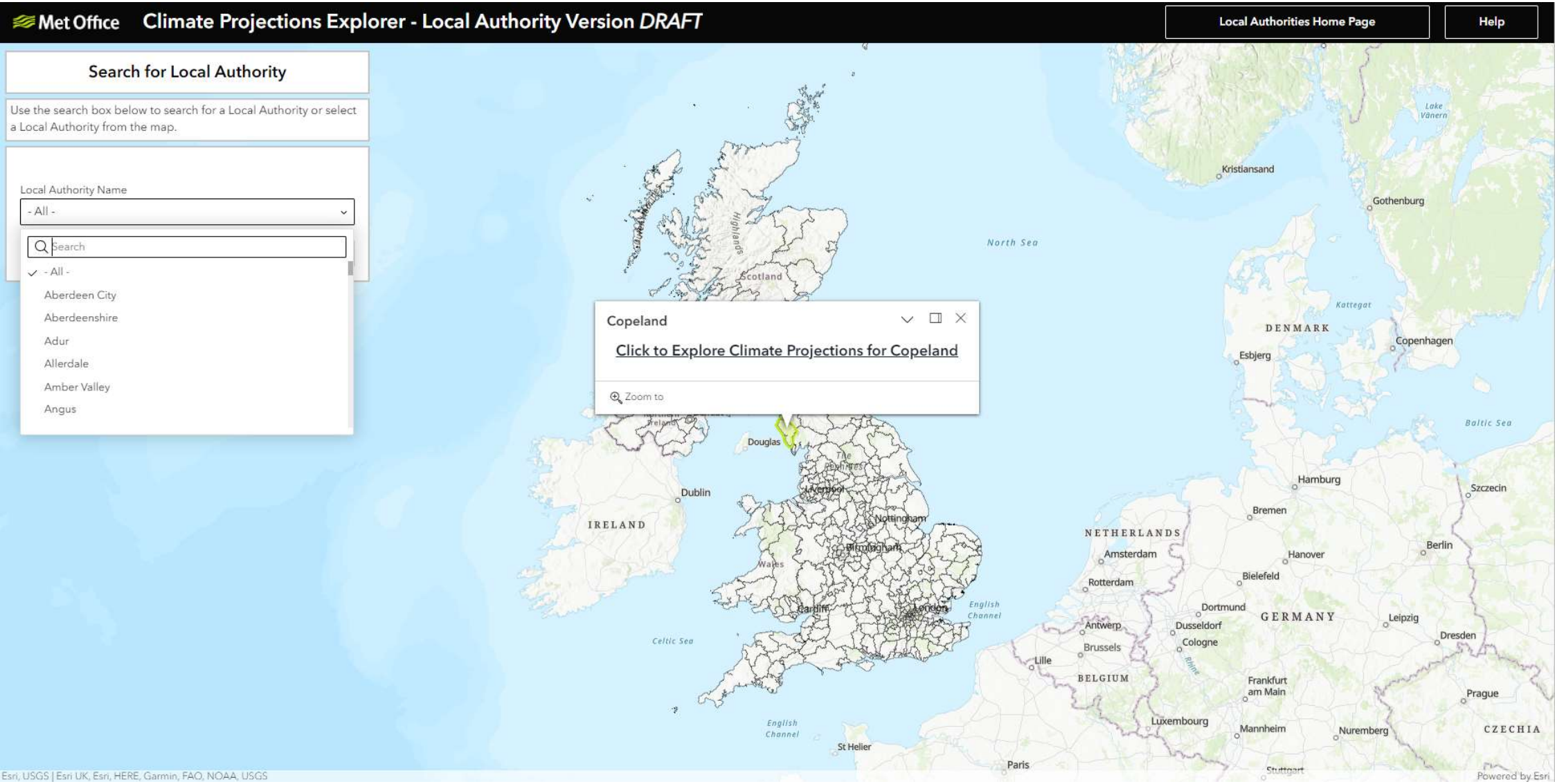


Climate Northern Ireland

sniffer
knowledge brokers
for a resilient Scotland

*This service is in a development phase - it is not currently a live tool.

Met Office


Met Office
Climate Projections Explorer - Local Authority Version DRAFT
Local Authorities Home Page
Help
Search for Local Authority
Use the search box below to search for a Local Authority or select a Local Authority from the map.
Local Authority Name
- All -
Search
- All -
Aberdeen City
Aberdeenshire
Adur
Allerdale
Amber Valley
Angus
Copeland
Click to Explore Climate Projections for Copeland
Zoom to
North Sea
Scotland
Highlands
Kristiansand
Gothenburg
Lake Vänern
Kattegat
DENMARK
Copenhagen
Esbjerg
Baltic Sea
Douglas
Dublin
IRELAND
Liverpool
Nottingham
Birmingham
Wales
Cardiff
London
English Channel
Celtic Sea
Hamburg
Szczecin
Bremen
NETHERLANDS
Amsterdam
Hanover
Berlin
Rotterdam
Bielefeld
Dortmund
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Leipzig
Antwerp
Dusseldorf
Dresden
Brussels
Cologne
Lille
BELGIUM
Frankfurt am Main
Prague
Luxembourg
Mannheim
Nuremberg
CZECHIA
St Helier
Paris
Esri, USGS | Esri UK, Esri, HERE, Garmin, FAO, NOAA, USGS
Powered by Esri

Climate Projections Explorer

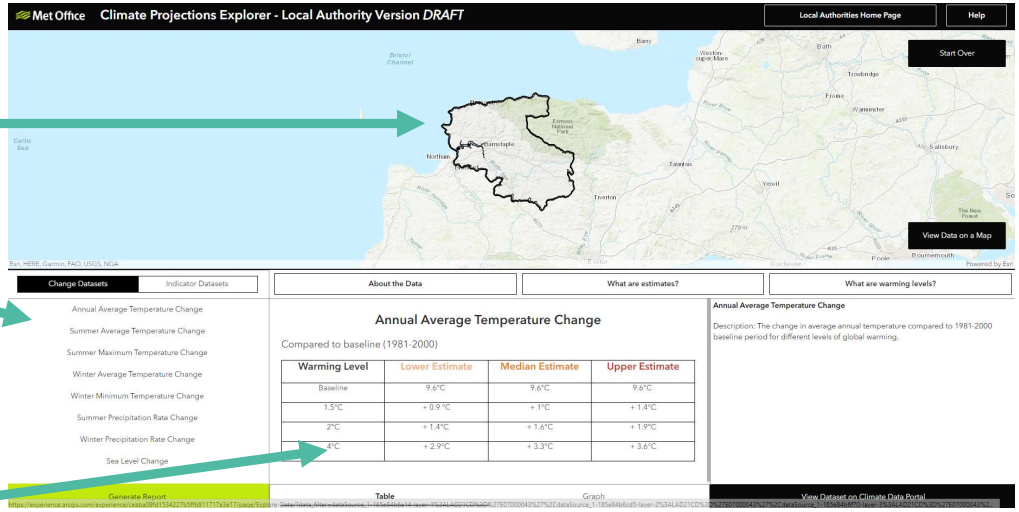
- Key climate variables calculated over your Local Authority area:
  - **Change indicators:** e.g. summer average temperatures, winter rainfall, sea level rise.
  - **Impact relevant indicators:** e.g. Summer Days (Days over 25°C).

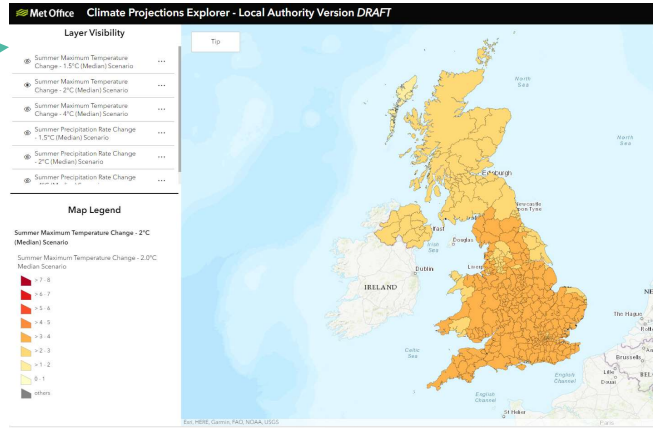
- Information presented for a range of global warming levels consistent with adaptation guidance.

- View data as a table, graph or on a map.

- Based on UKCP Regional (12km resolution) data.

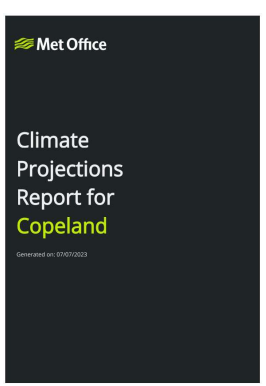
*Does not include sub-local authority level information.

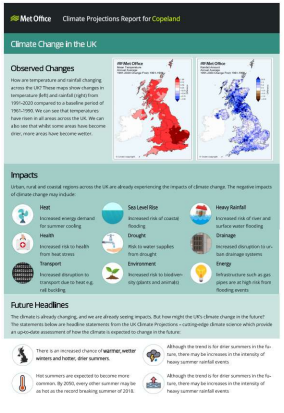


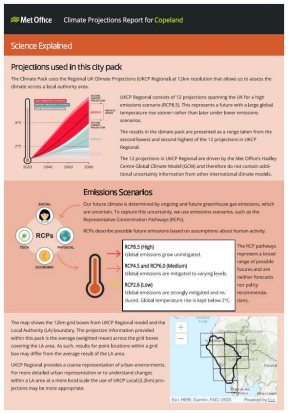


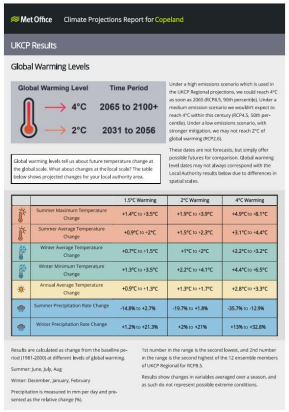
Local Authority Climate Report

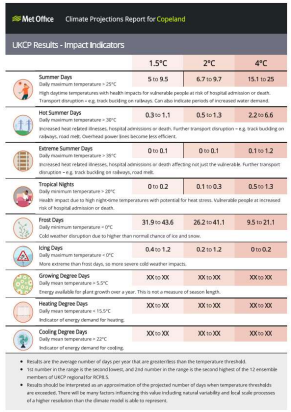
- Summarises data for the Local Authority area in a PDF printable, shareable and easy to understand format.
- Summarises change and impact indicators in tables.
- Sea level rise page for coastal LA's

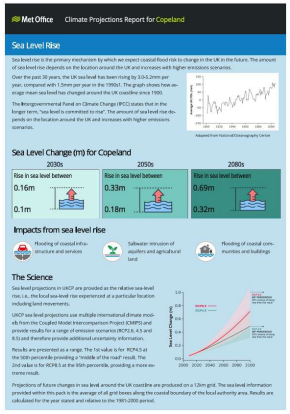


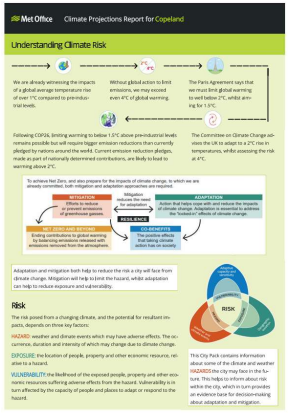












Met Office

Climate Projections Report for Copeland

Generated on: 07/07/2023

Introduction

This climate pack 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, low-lying coastal areas may be at greater risk of flooding from rising sea levels.

What affects the region's weather?

The local authority area of Copeland is located within North West England. Here are some of the types of weather that North West England experiences across a year:

The range of topography and altitude in North West England provides a varied climate, which includes both the coldest (Cross Fell) and wettest (Lakeland fells) locations in England. In low-lying areas where most urban areas are found, mean annual temperatures are around 10°C.

North West England includes some of the wettest places in the UK although this is localised to upland areas which are exposed to westerly maritime air masses. Areas in the lee of these uplands receive significantly less rainfall, including the large urban areas of Manchester which receive around 800 mm per year.

Sunshine hours in North West England range from around 1200 hours in the higher Pennines to around 1500 hours at the coast, with values up to 1550 reached on the Isle of Man.

North West England is one of the more exposed parts of the UK and may experience strong winds associated with the passage of deep lows. The frequency and strength of these depressions is greatest in the winter half of the year, with the strongest winds coming in off the Irish Sea from the SW to WNW.

How has the climate changed in North West England?

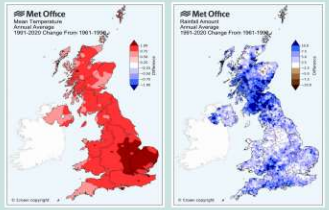
Temperature Difference (°C)
Data: HadUK-Grid
Concept: Ed Hawkins

The stripes show how temperatures in North West England have increased, with many of the hottest years occurring in the last few decades.

Climate Change in the UK

Observed Changes

How are temperature and rainfall changing across the UK? These maps show changes in temperature (left) and rainfall (right) from 1991-2020 compared to a baseline period of 1961-1990. We can see that temperatures have risen in all areas across the UK. We can also see that whilst some areas have become drier, more areas have become wetter.



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

Health
Increased risk to health from heat stress

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

Sea Level Rise
Increased risk of coastal flooding

Drought
Risk to water supplies from drought

Environment
Increased risk to biodiversity (plants and animals)

Heavy Rainfall
Increased risk of river and surface water flooding

Drainage
Increased disruption to urban drainage systems

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 statements below are headline statements from the UK Climate Projections – cutting-edge climate science which provide an up-to-date assessment of how the climate is expected to change in the future:

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

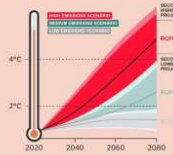
Hot summers are expected to become more common. By 2050, every other summer may be as hot as the record breaking summer of 2018.

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

Science Explained

Projections used in this city pack

The Climate Pack uses the Regional UK Climate Projections (UKCP Regional) at 12km resolution that allows us to assess the climate across a local authority area.



UKCP Regional consists of 12 projections spanning the UK for a high emissions scenario (RCP8.5). This represents a future with a large global temperature rise sooner rather than later under lower emissions scenarios.

The results in the climate pack are presented as a range taken from the second lowest and second highest of the 12 projections in UKCP Regional.

The 12 projections in UKCP Regional are driven by the Met Office's Hadley Centre Global Climate Model (GCM) and therefore do not contain additional uncertainty information from other international climate models.

Emissions Scenarios

Our future climate is determined by ongoing and future greenhouse gas emissions, which are uncertain. To capture this uncertainty, we use emissions scenarios, such as the Representative Concentration Pathways (RCPs).

RCPs describe possible future emissions based on assumptions about human activity.

RCP8.5 (High)
Global emissions grow unmitigated.

RCP4.5 and RCP6.0 (Medium)
Global emissions are mitigated to varying levels.

RCP2.6 (Low)
Global emissions are strongly mitigated and reduced. Global temperature rise is kept below 2°C.

The RCP pathways represent a broad range of possible futures and are neither forecasts nor policy recommendations.

The map shows the 12km grid boxes from UKCP Regional model and the Local Authority (LA) boundary. The projection information provided within this pack is the average (weighted mean) across the grid boxes covering the LA area. As such, results for point locations within a grid box may differ from the average result of the LA area.

UKCP Regional provides a coarse representation of urban environments. For more detailed urban representation or to understand changes within a LA area at a more local scale the use of UKCP Local (2.2km) projections may be more appropriate.

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Met Office Climate Projections Report for Copeland

UKCP Results

Global Warming Levels

Global Warming Level	Time Period
4°C	2065 to 2100+
2°C	2031 to 2056

Under a high emissions scenario which is used in the UKCP Regional projections, we could reach 4°C as soon as 2065 (RCP8.5, 90th percentile). Under a medium emission scenario we wouldn't expect to reach 4°C within this century (RCP4.5, 50th percentile). Under a low emissions scenario, with stronger mitigation, we may not reach 2°C of *global warming (RCP2.6)*.

Global warming levels tell us about future temperature change at the global scale. What about changes at the local scale? The table below shows projected changes for your local authority area.

These dates are not forecasts, but simply offer possible futures for comparison. Global warming level dates may not always correspond with the Local Authority results below due to differences in spatial scales.

	1.5°C Warming	2°C Warming	4°C Warming
Summer Maximum Temperature Change	+1.4°C to +3.5°C	+1.9°C to +3.9°C	+4.9°C to +8.1°C
Summer Average Temperature Change	+0.9°C to +2°C	+1.5°C to +2.3°C	+3.1°C to +4.4°C
Winter Average Temperature Change	+0.7°C to +1.5°C	+1°C to +2°C	+2.2°C to +3.2°C
Winter Minimum Temperature Change	+1.3°C to +3.5°C	+2.2°C to +4.1°C	+4.4°C to +6.5°C
Annual Average Temperature Change	+0.9°C to +1.3°C	+1.3°C to +1.7°C	+2.8°C to +3.3°C
Summer Precipitation Rate Change	-14.8% to +2.7%	-19.7% to +1.8%	-35.7% to -12.9%
Winter Precipitation Rate Change	+1.2% to +21.3%	+2% to +21%	+13% to +32.8%

Results are calculated as change from the baseline period (1981-2000) at different levels of global warming.

Summer: June, July, Aug

Winter: December, January, February

Precipitation is measured in mm per day and presented as the relative change (%).

1st number in the range is the second lowest, and 2nd number in the range is the second highest of the 12 ensemble members of UKCP Regional for RCP8.5.

Results show changes in variables averaged over a season, and as such do not represent possible extreme conditions.

Met Office Climate Projections Report for Copeland

UKCP Results - Impact Indicators

	1.5°C	2°C	4°C
Summer Days Daily maximum temperature > 25°C 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.	5 to 9.5	6.7 to 9.7	15.1 to 25
Hot Summer Days Daily maximum temperature > 30°C 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.	0.3 to 1.1	0.5 to 1.3	2.2 to 6.6
Extreme Summer Days Daily maximum temperature > 35°C Increased heat related illnesses, hospital admissions or death affecting not just the vulnerable. Further transport disruption – e.g. track buckling on railways, road melt.	0 to 0.1	0 to 0.1	0.1 to 1.2
Tropical Nights Daily minimum temperature > 20°C Health impact due to high night-time temperatures with potential for heat stress. Vulnerable people at increased risk of hospital admission or death.	0 to 0.2	0.1 to 0.3	0.5 to 1.3
Frost Days Daily minimum temperature < 0°C Cold weather disruption due to higher than normal chance of ice and snow.	31.9 to 43.6	26.2 to 41.1	9.5 to 21.1
Icing Days Daily maximum temperature < 0°C More extreme than frost days, so more severe cold weather impacts.	0.4 to 1.2	0.2 to 1.2	0 to 0.2
Growing Degree Days Daily mean temperature > 5.5°C Energy available for plant growth over a year. This is not a measure of season length.	XX to XX	XX to XX	XX to XX
Heating Degree Days Daily mean temperature < 15.5°C Indicator of energy demand for heating.	XX to XX	XX to XX	XX to XX
Cooling Degree Days Daily mean temperature > 22°C Indicator of energy demand for cooling.	XX to XX	XX to XX	XX to XX

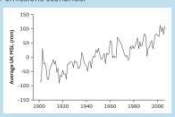
- Results are the *average number of days per year that are greater/less than the temperature threshold.*
- 1st number in the range is the second lowest, and 2nd number in the range is the second highest of the 12 ensemble members of UKCP regional for RCP8.5.
- Results should be interpreted as an approximation of the projected number of days when temperature thresholds are exceeded. There will be many factors influencing this value including natural variability and local scale processes of a higher resolution than the climate model is able to represent.

Met Office Climate Projections Report for Copeland

Sea Level Rise

Sea level rise is the primary mechanism by which we expect coastal flood risk to change in the UK in the future. The amount of sea level rise depends on the location around the UK and increases with higher emissions scenarios.

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 1990s1. The graph shows how average mean sea level has changed around the UK coastline since 1900.



Adapted from National Oceanography Centre

The Intergovernmental Panel on Climate Change (IPCC) states that in the longer term, "sea level is committed to rise". The amount of sea level rise depends on the location around the UK and increases with higher emissions scenarios.

Sea Level Change (m) for Copeland

2030s	2050s	2080s
Rise in sea level between 0.16m and 0.1m	Rise in sea level between 0.33m and 0.18m	Rise in sea level between 0.69m and 0.32m

Impacts from sea level rise

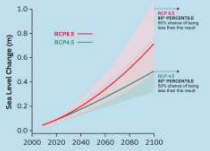
- Flooding of coastal infrastructure and services
- Saltwater intrusion of aquifers and agricultural land
- Flooding of coastal communities and buildings

The Science

Sea level projections in UKCP are provided as the relative sea-level rise, i.e., the local sea-level rise experienced at a particular location including land movements.

UKCP sea level projections use multiple international climate models from the Coupled Model Intercomparison Project (CMIP5) and provide results for a range of emission scenarios (RCP2.6, 4.5 and 8.5) and therefore provide additional uncertainty information.

Results are presented as a range. The 1st value is for RCP4.5 at the 50th percentile providing a "middle of the road" result. The 2nd value is for RCP8.5 at the 95th percentile, providing a more extreme result.



Projections of future changes in sea level around the UK coastline are produced on a 12km grid. The sea level information provided within this pack is the average of all grid boxes along the coastal boundary of the local authority area. Results are calculated for the year stated and relative to the 1981-2000 period.

Met Office Climate Projections Report for Copeland

Understanding Climate Risk

We are already witnessing the impacts of a global average temperature rise of over 1°C compared to pre-industrial levels.

Without global action to limit emissions, we may exceed even 4°C of global warming.

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

Following COP26, limiting warming to below 1.5°C above pre-industrial levels remains possible but 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.

The Committee on Climate Change advises the UK to adapt to a 2°C rise in temperatures, whilst assessing the risk at 4°C.

To achieve Net Zero, and also prepare for the impacts of climate change, to which we are already committed, both mitigation and adaptation approaches are required.

MITIGATION
Efforts to reduce or prevent emissions of greenhouse gasses.

Mitigation reduces the need for adaptation

ADAPTATION
Action that helps cope with and reduce the impacts of climate change. Adaptation is essential to address the "locked-in" effects of climate change.

RESILIENCE

NET ZERO AND BEYOND
Ending contributions to global warming by balancing emissions released with emissions removed from the atmosphere.

CO-BENEFITS
The positive effects that taking climate action has on society

Adaptation and mitigation both help to reduce the risk a city will face from climate change. Mitigation will help to limit the hazard, whilst adaptation can help to reduce exposure and vulnerability.

Risk

The risk posed from a changing climate, and the potential for resultant impacts, depends on three key factors:

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

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

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

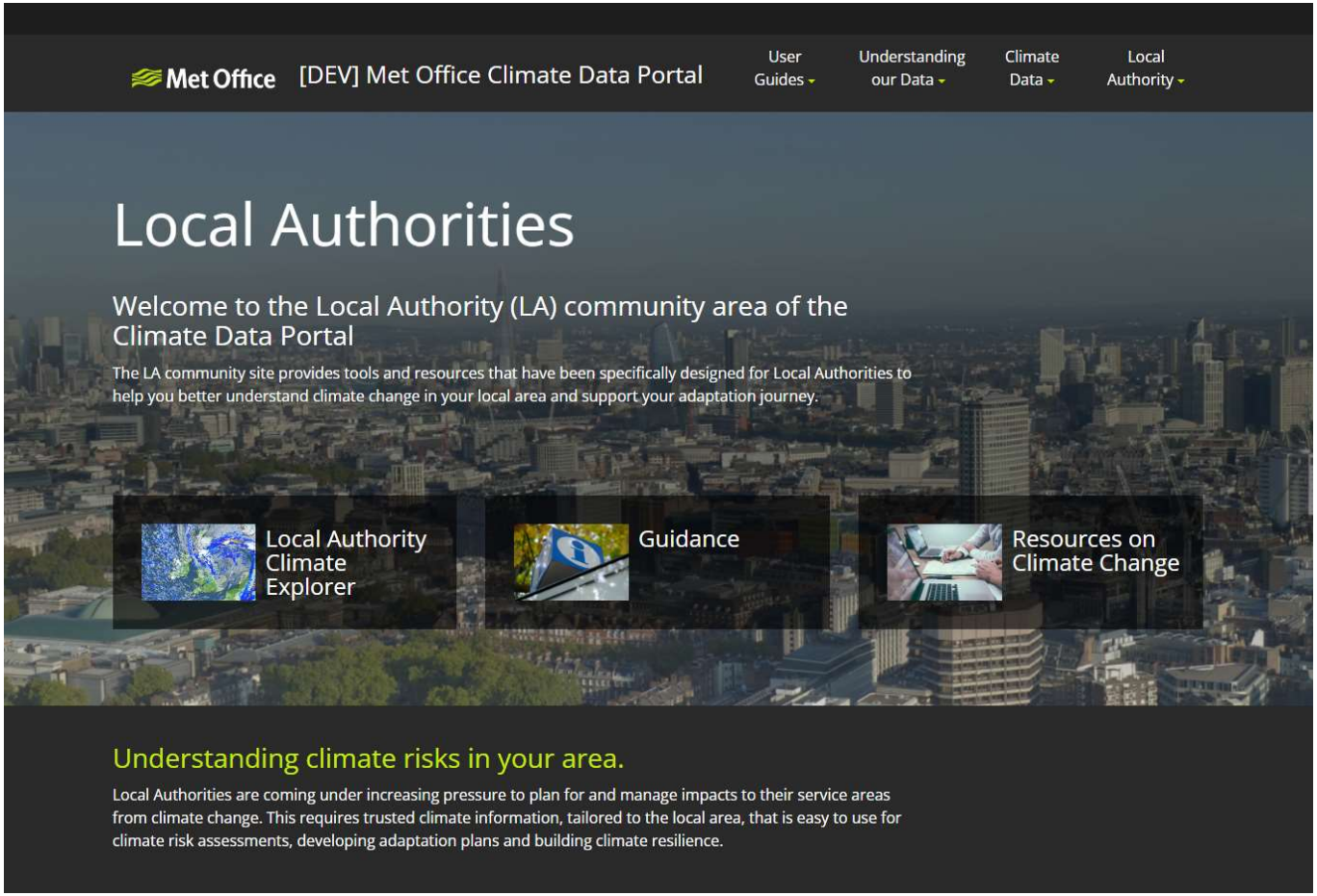
This City Pack contains information about some of the climate and weather HAZARDS the city may face in the future. This helps to inform about risk within the city, which in turn provides an evidence base for decision-making about adaptation and mitigation.

*Preliminary results for illustration only

Local Authority Community Site

Quick access to:

- Key infographics for awareness raising
- Case studies and links to helpful resources
- Explainer videos
- Enquiries link and where to find further support



Feedback

This type of information is “worth its weight in gold” reducing time spent on data processing.

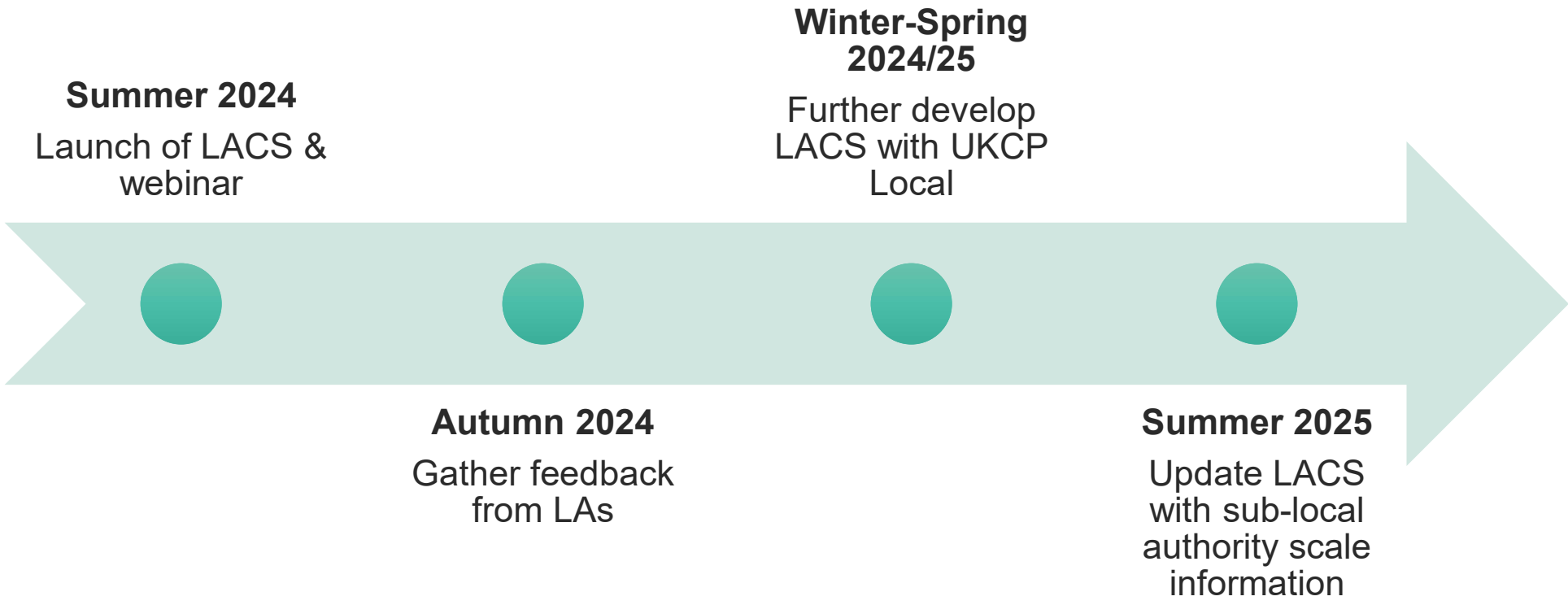
The product gives Local Authorities a tool to communicate.

This is a very helpful way of CCA’s providing LAs a guide of what the impact might look like. We could certainly advocate for this tool. (CCA’s)

This sits really nicely between the UKCP UI and Scottish national summary (AS Benchmarking Group)

- Inclusion of other impact indicators – extreme rainfall/storms/wind (NSWWS), and drought, wildfires
- More granular, spatial detail within the LA boundary
- Information for different boundaries
- Integrate hazard information with impact information e.g. rainfall to flooding
- Case Studies

Timelines…



Met Office

Thank you