Sheffield's current and future climate

Sheffield and the changing climate

The climate is changing globally, and Sheffield's climate is changing with it.

Climate is the term used to describe the average pattern of weather in a place over a long period, typically 30 years and more. Weather refers to short term atmospheric conditions - like rain, temperature or wind – that change hourly or daily.

The annual UK State of the Climate Report is based on observations from a network of several hundred weather stations, with temperature and rainfall data extending back to the 19th Century. The most recent (2024) State of the UK Climate report shows that baselines are shifting, and that temperature and rainfall extremes are becoming the norm with weather records becoming more frequent.

- **The UK is warming:** Since the 1980s the UK climate has been warming at a rate of approximately 0.25°C per decade. The last three years have all been in the UK's top five warmest on record. The average global temperatures for the three-year period 2023-2025 exceeded 1.5°C above the pre-industrial average (1850-1900) for the first time.
- **Extremes are increasing:** Over recent decades, temperature extremes have increased, becoming more frequent and more intense. For example, the hottest summer days have warmed around twice as much as average summer days in some UK areas when comparing the latest decade to 1961-1990.
- **Sea level rise is accelerating:** UK sea levels have risen 19.5cm since 1901 with the last three years the three highest on record for annual mean sea level.
- **Winters are getting wetter:** October 2023 to March 2024 was the wettest winter half-year on record. In a series from 1767, six of the ten wettest winter half-years (October to March) for England and Wales have been in the 21st century so far.
- **Reduction in frost days:** Air and ground frosts have reduced by around a quarter since the 1980s.

Sheffield's northerly location means it is, and will continue to be, less affected by heat than some areas of the UK, but we are already seeing significant changes to our climate, with more frequent extreme weather events, including hot weather.

Urban heat island effects

Increased heat is likely to be experienced more acutely in Sheffield's more urban areas where a combination of heat generation from human activity, trapping of solar heat by buildings and infrastructure and fewer trees, greenery and water (known as green and blue infrastructure) mean that the temperatures are higher than less built-up areas. This is known as an "urban heat island (UHI)" effect.

Looking to the future

In 2025 the UK's Climate Change Committee recommended that the UK should prepare for at least 2°C increase by the middle of the century (±10 years), and to consider risks for between 2°C and 4°C by the end of the century. In 2022, the Met Office modelled potential temperature and precipitation changes for Sheffield.

	2030s	2050s	2080s	
Summer Average Air Temperature (°C)	+1.0 to +2.1	+1.6 to +3.5	+2.7 to +6.5	↑
Summer Maximum Air Temperature (°C)	+1.1 to +2.4	+1.8 to +4.1	+3.0 to +7.6	↑
Winter Average Air Temperature (°C)	+0.8 to +1.7	+1.2 to +2.7	+1.8 to +4.8	↑
Winter Minimum Air Temperature (°C)	+0.8 to +1.8	+1.3 to +3.0	+1.8 to +5.2	↑
Annual Average Air Temperature (°C)	+0.8 to +1.5	+1.2 to +2.5	+2.0 to +4.8	↑
Summer Precipitation Rate (%)	-3 to -25	-12 to -40	-18 to -56	↓
Winter Precipitation Rate (%)	+3 to +11	+4 to +17	+9 to +30	↑

Figure 1 (Source: Sheffield Climate Pack, Met Office) shows the predicted changes in temperature and rainfall due to climate change as we move through the 21st century.

A medium-emission pathway is currently considered most likely, so by the 2030s possible summer average air temperature increases of around 1.5°C and maximum air temperature increases of around 2°C, or around 2.5°C average summer air temperature, and 3°C maximum increase by 2050.

Uncertainties and tipping points

There remains a high level of uncertainty about the exact trajectory as international climate action policy and delivery continues to be uncertain and inconsistent. Both policy and social action, and short or longer-term changes temperature and water cycle changes can trigger tipping points which may slow or accelerate further changes.