

Colchester City Council Adaptation Report

Organisation introduction

Colchester City Council declared a climate emergency in July 2019, committing the Council to become carbon neutral as an organisation by 2030. Attempts to reduce the Council's greenhouse gas emissions are focussed on mitigating, or reducing the effects of climate change and the impacts it will have on society. However, we know the impacts of climate change are being seen now and, regardless of any action that is taken, some degree of impact will continue to be experienced. This is where the need for adapting to the impacts of climate change emerges; changing and modifying services we deliver in order to cope with a changing environment.

As a district council, Colchester City Council is responsible for many functions. These include:

- Waste collection
- Management of a wide estate including historic buildings, parks and green space, leisure centres, offices and more
- Management of the Council's housing stock
- Local Plan and planning applications
- Parking
- Council tax collection
- Benefits and resident welfare guidance
- Environmental health including pest control, air quality, food hygiene
- Licensing of business operations including taxi licensing, gambling and betting facilities, animal licensing and more
- Private Sector housing enforcement
- Homelessness

The report considers the impact climate change could have on some of these functions in Colchester. The Colchester City Council electoral boundary is being taken as the geographic focus in this report, however there are some locations that are focussed on more than others given the nature and spread of services being delivered in Colchester, alongside where climate risks are likely to be experienced most.

Who we work with

The Council works with many partners to deliver services in Colchester, including community groups, town and parish councils and other public service organisations.

With relevance to climate impact and risk, and responding to events like extreme weather events, the Council works with others in the [Essex Resilience Forum](#). The Essex Resilience Forum is a partnership of organisations who work together to prepare plans in the case of major emergencies and incidents. Organisations that are part of this forum include NHS Integrated Care Boards across Essex, Essex Police, Essex County Fire and Rescue, Met Office.

Essex County Council (ECC) is the Lead Local Flood Authority, responsible for managing local flood risk and works in partnership with other organisations like the Environment Agency to develop the Essex and South Suffolk Shoreline Management Plan which outlines approaches to coastal management and flooding. We liaise with ECC regularly on a variety of issues, particularly including management of highways and transport which ECC lead on.

The Council also works with many bodies such as the Environment Agency and Essex Wildlife Trust on management and protection of green spaces that may be impacted by a changing climate.

The Council's response to climate change

Since declaring a climate emergency, the Council has embedded consideration of this into the Council's Strategic Plan, the most recent one being the [2023-2026 Strategic Plan](#). The Council also has a [Climate Emergency Action Plan](#), which illustrates climate action across Colchester and was created with, and monitored by, staff across Colchester City Council. The Council does have a separate sustainability team that take action on environmental issues, but that also encourage and support staff throughout the Council to consider the environmental impacts of the projects and decisions they work on.

The Council's Chief Executive has given approval for creating this report on how climate change poses risks to the organisation. It was flagged in an organisational audit in 2023 that risks from climate change was a key area missed from the Council's strategic risk register. In order to reflect the importance of climate change within the Council, it was figured that assessing potential climate risks and actions to combat these would bring this topic to greater prominence.

The Council is at the beginning of its journey in considering how it can adapt to climate change. Developing an understanding of the impacts and risks posed by climate and weather events in the coming years has been useful for understanding how the Council's operations may be impacted. The aim is that starting this learning on climate adaptation can enable the Council to consider ways to alter project and service delivery to cope with the changing environment.

To produce this report we have used the [Local Partnerships Climate Adaptation toolkit](#) and the [UK's 2022 Climate Change Risk Assessment](#) in order to assess the climate risks that are most likely to affect Colchester. We have also used other tools and data provided by a wide variety of organisations listed later in the report, including the Environment Agency, Met Office and others. We have not benchmarked against adaptation ISO standards for the report at this stage.

This report covers:

- An introduction to the typical climate of Colchester and East of England, along with recorded climate hazards that have affected the region in recent years.
- Explanation of climate risk and the factors which affect this
- Climatic projections for Colchester
- Climate hazards that may impact Colchester and their possible impacts
- A note on climate vulnerability
- Identifying climate risks, and which ones are most likely to impact Colchester and the Council's key functions and services.
- Climate Risk Assessment and Action Plan for some of the Council's services and operations informed by discussions with staff from key service areas impacted by climate change.

Introduction to climate change and its hazards

Colchester City Council declared a climate emergency in July 2019, acknowledging the need for urgent action to reduce the production of greenhouse gas emissions and reduce our environmental impact in order to tackle climate change. It is important to note that climate change is **not** a future problem, its impacts are already being felt in the present.

Scientific evidence from the Met Office has reflected that the 10 hottest years in the UK since records began in 1884 have all occurred in the 21st Century¹. The number of days above 28°C and 30°C between 2014-2023 have doubled and trebled in occurrence since 1961-1990 respectively². 2022 and 2023 were the first and second hottest years on record respectively since records began in 1884³. 2023 was also wetter than average, with many months being in the top 10 wettest months since 1884³ with Winters becoming particularly wetter, with those between 2014-2023 being 24% wetter than during 1961-1990⁴.

Storms have become increasingly frequent with 10 storms hitting the UK between September 2023 and January 2024, noticeably more than previous years, contributing to more impacts on coastal flooding and damage to property and buildings due to strong winds⁵.

Climate changes in Colchester and East of England

These national trends have been echoed in the East of England with extremely high temperatures recorded in Summer 2022 with several heatwaves taking place in Colchester (a heatwave is defined as a daily maximum temperature above 27°C for 3 or more days consecutively⁶). This was accompanied by long periods of dry weather, with areas close to Essex declaring hosepipe bans alongside a wildfire taking place on Middlewick Ranges⁷.

Contrastingly 2023 was much wetter, particularly in the Autumn of 2023 with the trend continuing into early 2024 leading to river flooding in many locations such as Fordham and Dedham alongside temperatures being milder than normal, with February 2024 being the warmest and wettest in East Anglia on record⁸.

This mixed picture does reflect the overall expected climatic changes for the East of England and much of the UK, with warmer and wetter winters expected alongside hotter and drier summers. However, when rainfall does come it may be more intense, particularly during the summer, which has the potential to lead to serious flooding, particularly when the ground is either hard during dry periods or when it is already saturated with water during wetter periods⁹.

The degree to which these climatic changes occur will depend on the level of greenhouse gases produced in the present and near future. However, even if we were to stop all emissions today the Earth will continue to warm and climatic changes will occur regardless due to the volume of greenhouse gases already present in the atmosphere.

Therefore, it is important to understand the climatic changes that are likely to occur in Colchester so we can prepare appropriately for these and **adapt** how we carry out daily activities.

This report covers climatic projections for Colchester and the East of England and uses these to consider what the likely impacts from changes in climate could be on the operations of the Council.

What is climate adaptation and climate risk?

Climate adaptation is about altering the way we conduct daily activities in order to cope with consequences of a changing climate. A changing climate can pose **risks** to the ways society functions (e.g. by flooding causing building damage) but can also bring about new **opportunities** (for example warmer winters meaning people require less heating to keep their homes warm).

The process of adaptation can involve making changes to our lifestyles, the buildings in which we live and the wider environment which we occupy. Examples could include:

- Working earlier in the morning to avoid working at high temperatures
- Installing water savings measures in the home like water butts to cope with drought
- Installing flood barriers or purposefully flooding land as a way to protect homes and buildings from flood damage
- Increasing the areas of green space in urban areas to create shade and cooler spaces to counter the urban heat island effect.

Climate risk results from the interaction between 3 main factors; existence of a climate **hazard** (such as flooding, extreme temperatures), **exposure** of a population, service or asset (e.g. their proximity to a river or sea) that could be affected by a hazard and **vulnerability** of the population, service or asset to the hazard. Climate risks ultimately then produce impacts (e.g. damage to property, disruption to transport infrastructure) which can harm people and services. This is summarised in figure 1. This representation is simplistic; in reality other factors will impact on the level of climate risk such as the level of climate response already being taken in an area, alongside how other climate risks could interact together to worsen or mediate the impacts produced from each. Consideration of 'cascading' or 'knock-on' impacts and risks is complex and the full analysis of these is not considered within the scope of this report.

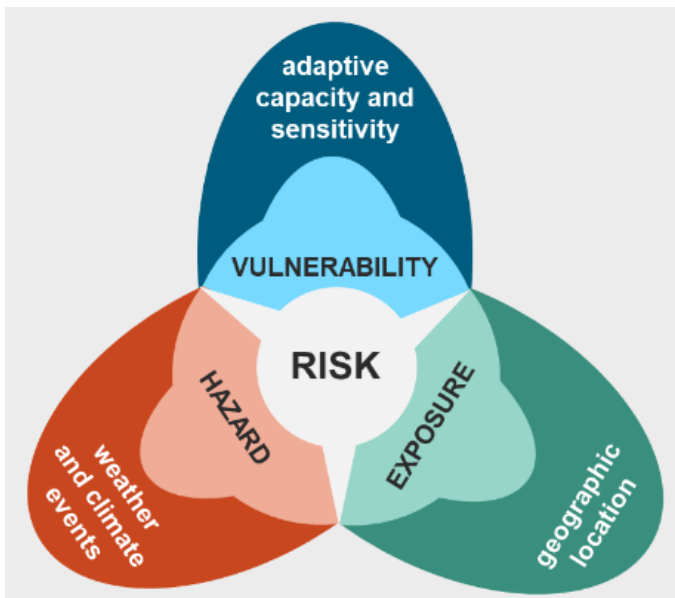


Figure 1: Diagram showing the interactions between different factors affecting climate risk. Source: Met Office Local Authority Climate Service¹⁰

The UK 2022 Climate Change Risk Assessment identifies a list of 61 risks and opportunities possible from a changing climate, all of which have been assessed for the degree of urgency of future action required to respond to them¹¹.

Some of these risks will impact, and be of greater relevance to some local authorities than others. In order to consider these, a review of climatic projections has been considered for Colchester and the East of England to identify the types of climate hazard and thus risks that could impact the Council and its operations. This is interpreted alongside knowledge of past climatic hazards that have impacted Colchester, and the Council specifically. This is explored later in the report.

Climate Hazards in Colchester

Overview for Colchester

There are likely to be many climate impacts (e.g. property damage) affecting Colchester resulting from different types of climate hazards (e.g. flooding). Impacts could occur as a direct result of the hazard (for example the occurrence of a heatwave leading to people experiencing heat related illness such as heatstroke), along with cascading impacts that occur as a result of a chain of impacts coinciding with one another.

Climate projections

Understanding potential climate risks and impacts is informed by using climatic projections for Colchester that give information on future changes in climate. Much of this information has been derived from that produced within the UK Climate Risk Indicator Explorer¹² developed by the University of Reading and other partners, the Local Climate Adaptation Tool¹³ developed by University of Exeter and other partners and the Met Office Local Authority Climate Service¹⁴.

These climatic projections have been made based on a range of potential levels of greenhouse gas emissions production and their impact on the trapping of infra-red radiation which causes increased temperatures and thus climatic variability. Based on the varying emission production rates, there have been several models called representative concentration pathways (RCPs) developed. In this report, several of these RCPs have been considered for their impact on climate; a best case scenario (RCP 2.6) based on a 1.5°C global temperature rise, a middle range scenario (RCP 6.0) based on a 2°C global temperature rise and a worst case scenario (RCP 8.5) based on a 4°C global temperature rise. These will be referenced throughout, but more information on the RCPs can be found on the Met Office website¹⁵. Different climate models are based on these RCPs that have been developed and are referenced within the UK Climate Risk Indicator Explorer and Local Climate Adaptation tool, which take into account uncertainty variance in possible climatic changes. By using multiple climate projections and multiple climate models, uncertainty can be managed to some degree but is still very much present in the climatic projections being forecast.

The following climate scenarios have been used as the independent guidance used for the UK Government Climate Change Risk Assessment is to prepare for a 2°C rise in global temperature and to assess the risks for a 4°C global temperature rise. This is also occurring alongside The Paris Agreement where nations around the world came together to aim to keep warming 'well below 2°C, whilst aiming for 1.5°C'.

For each of the climatic hazards a list of generic risks and impacts are considered which may affect Colchester, informed by the climatic projections.

Heatwaves/Extreme heat

The definition of a heatwave varies across the UK depending on the average temperature of regional climates, but for the East of England a heatwave is declared if the temperature is 27°C or greater for 3 or more consecutive days⁶.

In the near term till 2030, Colchester could see temperature rises of 1°C annually (compared to 1990 levels), with temperatures rises more significant in Summer than Winter when using the RCP 2.6 projections (UKCRI). However, using the RCP 6.0 and 8.5 scenarios for 2050 and then progressing towards 2070, average summer temperatures could increase by 3-5°C and winter temperatures by 2-4°C depending on the climate model used^{12,13}. This could mean summer temperatures reaching 40°C could become more of a regular occurrence, alongside winter temperatures of 20°C¹⁶.

The potential for heatwaves is likely to increase with 5 days on average being above 25°C per summer month on average between 1991-2019 but with predictions based on RCP 8.5 scenarios, 19 days on average could be above 25°C. Table 1 outlines the projections identified based on the different RCPs and projection timeframes.

Alongside warmer summers, warmer winters are also expected with the number of days below 0°C decreasing from 30 in the recent past to 25 in a 2°C world and 9 in a 4°C world¹⁷.

Table 1: Changes in average annual temperature, summer temperature and winter temperature for different RCP scenarios across varying timescales

RCP scenario	Timeframe range for predictions	Average annual temperature increase (°C)	Summer temperature increase (°C)	Winter temperature increase (°C)
RCP 2.6	2001-2030	0.46 - 0.85 [^] (relative to 1990 levels)	0.6 - 0.96 [^] (relative to 1990 levels)	0.32 - 0.67 [^] (relative to 1990 levels)
	2041-2070	1.18 - 1.66 [^] (relative to 1990 levels)	1.5-2 [^] (relative to 1990 levels)	0.94 - 1.2 [^] (relative to 1990 levels)
	2071-2100	1.3 - 1.85 [^] (relative to 1990 levels)	1.7 - 2 [^] (relative to 1990 levels)	1.06 - 1.4 [^] (relative to 1990 levels)
RCP 6.0	2041-2070	2.1 - 2.9* (relative to 1980 levels)	2.6 - 3.5* (relative to 1980 levels)	1.5 - 2 * (relative to 1980 levels)
	2070-2100	2.65 [^] (relative to 1990 levels)	3.51 [^] (relative to 1990 levels)	1.91 [^] (relative to 1990 levels)
RCP 8.5	2041-2070	2.5- 4.4* (relative to 1980 levels)	2.9-5.3* (relative to 1980 levels)	1.9-3.5* (relative to 1980 levels)
	2071-2100	3.8 - 5 [^] (relative to 1990 levels)	5 - 6.5 [^] (relative to 1990 levels)	3.1 - 4.1 [^] (relative to 1990 levels)

*Using predictions from the LCAT

[^]Using predictions from the UKCRI Explorer

Alongside increasing temperatures, comes an increased chance of frequency and length of heatwaves. The likelihood of Colchester experiencing a heatwave each year will be 98.5% by 2040-2070, compared to a 48.3% chance between 1981-2010¹⁸.

The impacts caused by heatwaves are multiple, including:

- **increasing chance of wildfires** – Colchester has less land and habitat types vulnerable to wildfires (like heathland, meadows etc.) than many areas throughout the UK, but it has still experienced wildfires across the city, for example on Middlewick Ranges in Summer 2022. Wildfires are more likely in conditions of high temperatures and drought (which are typical for Colchester based on the climate) and can themselves have impacts on local air quality as well as damage to property and green space. According to the UK Climate Risk Indicator Explorer, Essex is the 2nd most at risk county to wildfires in the UK so it is a serious hazard to be aware of. This partially reflects the dry and high temperature climate meaning grassy environments can catch light very easily.
- **Drought conditions** – Instances of drought are explored separately, but commonly occur during periods of high temperatures which can cause waterbodies (e.g. reservoirs, rivers) to dry out due to higher evaporation rates. This in turn can favour the introduction of more heat tolerant invasive species in those waterbodies which could cause harm to biodiversity in those bodies.
- **People's health and wellbeing** – Deaths related to heat stress could triple in the UK by the 2050s¹⁸, and increasingly people are experiencing discomfort or difficulty regulating suitable body temperature during extreme periods of high temperatures, impacting sleep which can in turn impact wellbeing and work productivity.
- **Disruption to public transport** – High temperatures can cause the warping of train tracks or sagging of power lines which can impact the operation of public transport.

Extreme cold is still a possible hazard, although the frequency of these events is likely to reduce. Preparations and support services to help people cope with extreme cold are more developed and these can continue to be rolled out as needed.

Flooding and Drought

As described, Colchester's climate is drier than most of the UK and is predicted to experience even drier summers. Despite no hosepipe bans being declared in Essex since 2012, Essex is still classed as a 'severely water stressed area' and only 60% of the drinking water consumed in Essex comes from within the county¹⁹. There will be an increasing need to reduce water use across Essex in order to provide public water supplies and not worsen public water quality, especially given the increasing population in the region that will drive up water demand. Currently the average water use in Essex is 155-160 litres per person/per day, which is far above the UK average of 144 litres per person/per day²⁰. The Government's Environment Act is imposing a legally binding target of 110 litres per person/per day by 2050 and Colchester is already enforcing this as a standard for homes that are part of new housing developments within planning policy.

Anglian Water have already outlined plans to ensure water demand is met in the East of England, including plans for 550km of transfer infrastructure to move water from areas of supply to areas of demand²¹. Specifically in Colchester, there are plans to build a 'water reuse plant' between 2025-2029. The plant will take water discharged from the water recycling centre (where sewage water is treated) and, rather than release into rivers, will treat the water using membrane technology and then release it and store in Ardleigh reservoir to mix with river and rainwater. It will then go through the same treatment process the reservoir water typically goes through before it is piped for public water supply.

However, flooding is likely to still cause a serious issue, particularly during winter periods when rainfall is predicted to increase and become more intense. This could cause serious damage, especially when combined with high winds in storm conditions. When rainfall intensity is higher, the potential for flash flooding increases considerably, particularly during Winter as the ground is already saturated with water, or in summer when the rain is more likely to runoff hard, dry ground and not be absorbed.

Heavy rain and flooding also have the potential to impact water quality, by mobilising pollutants and nutrients in the soil and on highways which can then runoff into nearby watercourses leading to water becoming polluted and potentially unsafe to biodiversity and humans. Only 5 out of 91 water bodies (5%) in Essex are achieving 'good' quality status and 18/91 are rated poor. This is compared to 16% of water bodies in England achieving 'good' status²⁰.

There are different types of flooding:

Pluvial or surface water flooding: Parts of Colchester are more at risk to surface water flooding than others, particularly those that are more built up and have less natural green space to help absorb water and prevent it running off the land. There are known areas that are at greater flood risk or are on floodplain land. The flood risk of areas across Essex are shown in figure 2 and can be viewed in more detail on the Essex County Council website²².

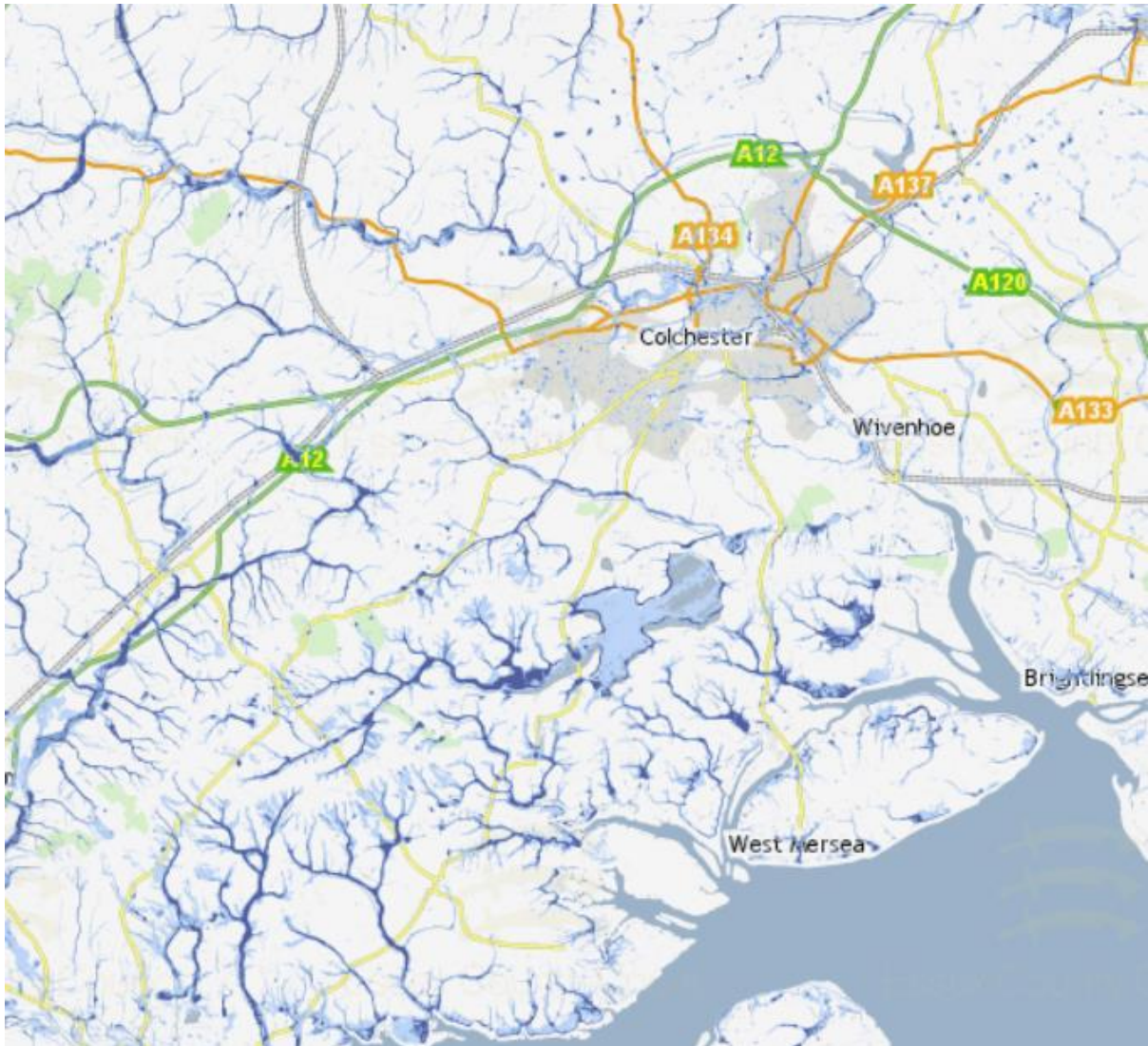


Figure 2: Flood risk maps for Colchester district, showing areas vulnerable to flooding. The darker the shade of blue, the more at risk the area is to flooding. As can be seen, most of the areas at risk of flooding are distributed around existing watercourses. Source²²

Fluvial or river flooding: Areas situated along the River Colne in Colchester can be at particular risk from river flooding. In recent years, the river has burst its banks particularly in central Colchester. This can then contribute to worsen surface water flooding in neighbouring areas.

Coastal flooding: By 2050, Climate Central²³ predict that many areas of Colchester will be below the annual flood level (areas which statistically flood every year on average) including much of Mersea Island, parts of Wivenhoe and Rowhedge as well as urban areas along the River Colne due to increasing sea level rise (see figure 3). This flooding will cause coastal erosion and pose other impacts such as damage to property, restrict access and endanger lives. The problem of coastal flooding will become increasingly likely with sea level rise, which itself can cause other issues such as saltwater intrusion to groundwater, impacting on the water quality of public water supplies²⁴. The issue of sea level rise will particularly impact Mersea Island as it is connected to Colchester by the Strood crossing which floods regularly based on the tides. With sea level rise, the overall time for which the Strood will be impassable to vehicles will likely increase which will impact access to the island.

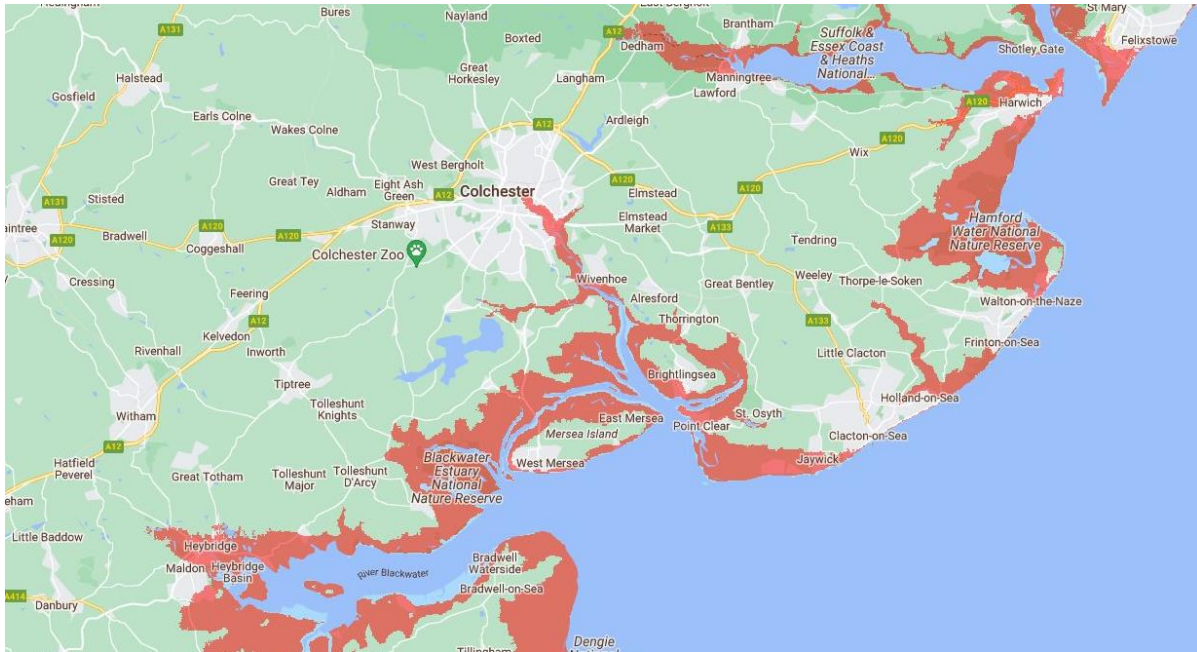


Figure 3: Map showing the land that is projected to be below the annual flood level in 2050. The annual flood level shows areas which statistically flood every year on average. This does not mean they will flood every year and in some years they may flood more than once. Source – Derived from maps produced by Climate Central²³

In the near term to 2030 using RCP 2.6, average summer rainfall is predicted to reduce by 3.8% whereas average winter rainfall is predicted to increase by around 2%. However, under an RCP 8.5 scenario, summer rainfall could decrease by 43%-50% and winter rainfall increase by 13%-20%.

Table 2: Changes in average annual rainfall, summer rainfall and winter rainfall for different RCP scenarios across varying timescales

RCP scenario	Timeframe range for predictions	Average annual rainfall	Summer rainfall	Winter rainfall
RCP 2.6	2001-2030	0.1% decrease [^] (relative to 1990 levels)	3.8% decrease [^] (relative to 1990 levels)	2.18% increase [^] (relative to 1990 levels)
	2041-2070	1.3% decrease [^] (relative to 1990 levels)	10.6% -12.6% [^] decrease (relative to 1990 levels)	5.8%-6.1% [^] increase (relative to 1990 levels)
	2071-2100	0.3% decrease [^] (relative to 1990 levels)	13.8%-14.5% [^] increase (relative to 1990 levels)	6.5%-7.5% [^] increase (relative to 1990 levels)
RCP 6.0	2041-2070	2.5% - 4.3% decrease* (relative to 1980 levels)	10.7% - 13% decrease* (relative to 1980 levels)	3.75 - 5.6% increase* (relative to 1980 levels)

	2070-2100	1.7% decrease [^] (relative to 1990 levels)	24.7% decrease [^] (relative to 1990 levels)	15% increase [^] (relative to 1990 levels)
RCP 8.5	2041-2070	2.5 - 7.5% decrease* (relative to 1980 levels)	7.1 - 27.3% decrease* (relative to 1980 levels)	3.1 -16.9% increase* (relative to 1980 levels)
	2071-2100	2.5 - 16% decrease [^] (relative to 1990 levels)	33.4% - 50.7% decrease [^] (relative to 1990 levels)	13.8% - 21.4% increase [^] (relative to 1990 levels)

*Using predictions from the LCAT

[^]Using predictions from the UKCRI Explorer

The impacts caused by flooding and drought include:

- **Damage to property and business premises** – Water intrusion can damage buildings and any equipment.
- **Impact on mental wellbeing** – Flooding can leave people homeless and many of their belongings may be lost or damaged.
- **Disruption to travel** – Roads can become impassable in heavy rain. There are certain stretches of road that frequently flood in Colchester (e.g. Haven Road) and this has the potential to worsen with increased levels and intensity of rainfall.
- **Water quantity and quality** – Potential for spread of disease due to poor water quality, especially when combined with higher temperatures. Reservoirs and other sources of fresh water can then be impacted, meaning a lack of available drinking water.
- **Soil/land erosion** – Heavy rain is more likely to lead to eroding of soils, which in turn can impact on crop growth. Coastal flooding combined with sea level rise also causes erosion of the coastline. This is of particular risk to the coastline on Mersea Island. Data from the Environment Agency’s national coastal erosion risk map²⁵ suggests that areas of East Mersea are likely to see the coast ‘retreat’ (i.e. land being eroded and subsequently the coastline being moved further inland) by 10-20m until 2060. Under current shoreline management plans, ‘no active intervention’ is being taken and the coastline is being maintained naturally. In comparison, much of West Mersea is being managed with a ‘Hold the Line’ management approach, meaning attempts are being made to maintain the coastline in its current location with protections in place to prevent erosion occurring. Under the current [Shoreline Management Plan](#), coastal retreat is expected to be zero metres, whereas with no active intervention it would be 10-20m by 2060. However, this does not mean that this area of coastline will remain unaffected in other ways by coastal flooding; in recent years a ‘dismountable flood barrier’ has been installed at West Mersea to prevent flood damage to homes close to the coastline²⁶. On North Mersea near the Strood, there are plans in the Essex and South Suffolk Shoreline Management Plan to introduce a ‘managed realignment’ approach between 2025-2055 to deliberately allow breach of sea defences, enabling the surrounding area to flood. By creating additional area that can take on flood water, it protects nearby areas from flooding.

- **Subsidence** – Much of the land in Colchester, and wider Essex, is clay soil based. The clay soils absorb water during rainfall, causing the soils to swell up. Then when warm, dry periods occur the clay soils become hard and shrink which causes the subsidence and potential damage to property foundations and trees.

Storms

The severity and frequency of storms is much more complex to predict compared to other climatic events. However, in recent years storm events do appear to have become more frequent (as outlined earlier in the report). Storms have the potential to combine with other climate hazards (including intense rainfall) which can then cause devastating impacts. However, there is little data to map out projections for storm likelihood and impact for England and, where there is, climate models differ quite a lot meaning the confidence in these projections is not high²⁷.

The impacts of storms are similar to other climate hazards but include:

- **Disruption to travel** – Due to high winds making travel dangerous, such as across bridges. Fallen trees and other infrastructure can also leave roads impassable.
- **Property/building damage** – From falling trees or other infrastructure, alongside wind directly damaging roofing and fencing
- **Power outages** – Although they only tend to be short temporary instances, properties can be left without power due to fallen or damaged powerlines. Power outages occurred in Colchester twice due to storms in January 2024, with Storms Henk and Isha causing these issues.

Interdependencies and cascading risks

As has been referred to, climate hazards can combine to cause exacerbated risks and impacts to environments. Even climate hazards occurring in isolation can cause a sequence of impacts. For example a flood event could lead to damage or blockage of transport infrastructure (such as a road), which in turn could prevent people from getting to work and the prevent the operation of a key job or service. There might then be **interdependencies** between organisations that are linked or dependent on each other, meaning if one is impacted by a climate event this might then affect the other organisation's operations indirectly.

The Council is part of many of these interdependent relationships with partner organisations in the city to help deliver key services. Thought should be given to possible cascading impacts between partners when planning responses to climate risk. To some degree this is completed through disseminating communications when responding to extreme weather in the Council's emergency preparedness plans, alongside communications made from Essex County Council as part of the Essex Resilience Forum of which Colchester is a member alongside other local authorities, Essex Police, NHS organisations, transport network and utility providers amongst others. The full membership of the Essex Resilience Forum can be found on their [website](#).

Climate vulnerability

Climate vulnerability is a key factor which impacts the overall climate risk. The same climatic hazard occurring at the same intensity/severity will cause differing impacts, and level of impact, based on the vulnerability of the area. This could be vulnerability of the physical environment, population, service/operation, asset or combination of all of these to the

hazard. Climate vulnerability is influenced by the **sensitivity** of the environment or population (the degree to which it is affected by the hazard) alongside the **adaptive capacity** of the environment, population or systems to adjust to the impacts of climate change (this links to resources, knowledge and behaviours of each)²⁸.

Climate vulnerability is important to understand so we can identify who or what is most likely to be at risk from climatic hazards. Most of the research on vulnerability focusses on the population/people dimension.

Many factors will impact the vulnerability of the population including their health, income, proximity to flood hazards like rivers and seas, knowledge of responding to climate hazards in the past and more. In the Local Climate Adaptation Tool¹³, a set of populations particularly vulnerable to climate change are identified, namely:

- Older people
- Under 5's
- People with health conditions
- People on low incomes
- Tenants in private or social housing
- People who have been living in an area for a short time
- People who are socially isolated
- People with limited mobility

There are several reasons why these groups are likely to be more vulnerable to climate change. This includes:

- Difficulties in regulating body temperatures
- Reduced ability to cope with impacts of climate change due to their mental wellbeing
- Reduced ability to recover financially after impact of climate hazards
- Reduced ability to make their property more climate resilient or insure against damage
- More likely to live in properties that are less resilient to climate hazards like flooding and extreme heat and may lack access to local greenspace.
- lack of support networks and community services to make them aware of climate hazards
- Reduced ability to evacuate during an emergency due to a reliance on public transport, which itself may be negatively impacted during climate hazard events.

Climate risks

As illustrated, significant climatic changes can be expected to occur over the next few years, and some of the impacts that could result from these are outlined. However, it's important to identify what this could mean for Colchester and the key services that the Council delivers.

Many of the services the Council completes are done in collaboration with a range of organisations like Essex County Council, Essex Highways, UK Power Networks and more. However, there are several services which Colchester City Council has direct responsibility for, and these will be predominantly the services and operations considered within the Council's climate risk assessment.

This risk assessment will be shared with other organisations for their information, and where needed discussed in more detail to understand any impacts our response might have on another organisation.

It is first useful to outline the type of services that could be affected. These include:

- Staff working in offices and buildings
- Waste collection teams – These teams mainly operate outside, doing manual labour for many hours a day
- Sport and Leisure services
- Museums teams particularly with the historic estate that needs to be preserved and managed for recreation and heritage.
- Parks and green spaces teams who manage Council owned green spaces and nature reserves, as well as trees across all these spaces, including those in urban environments. These are managed to support biodiversity whilst also balancing this with providing access to people to enjoy these spaces.
- Economic Development team who support businesses in Colchester.
- Housing – Private Sector Housing and Affordable Housing.
- Management of the Council's housing stock, including managing housing condition and the needs of residents within the housing.
- Local Plan and planning applications
- Parking
- Council tax collection
- Benefits and resident welfare guidance
- Environmental health including pest control, air quality, food hygiene
- Licensing of business operations including taxi licensing, gambling and betting facilities, animal licensing and more
- Private Sector housing enforcement
- Homelessness

Against this, the possible impacts and risks that are likely to be of most relevance to Colchester should be identified. The 61 risks and opportunities listed in the 2022 UK Climate Change Risk Assessment have been reviewed and the top risks of relevance to Colchester are outlined below:

- Risk to infrastructure services from coastal flooding and erosion
- Risks to infrastructure services from river, surface water and groundwater flooding
- Risks to people, communities and buildings from river and surface flooding
- Risks to people, communities and buildings from river and coastal flooding
- Risks to people, communities and buildings from sea level rise
- Risks to energy, transport and ICT infrastructure from extreme heat
- Risks to public water supplies from reduced water availability
- Risks to health and wellbeing from high temperatures
- Risks to business locations and infrastructure from coastal change from erosion, flooding and extreme weather events
- Risks to energy from high and low temperatures, high winds, lightning

- Risks to soil health from increased flooding and drought (Priority risk in UK CCRA 2022 – This means action is required in the next 2 years to tackle this)
- Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings (Priority risk in UK CCRA 2022)
- Risks and opportunities from summer and winter household energy demand
- Risks to health from household water supply
- Risks to health from water quality
- Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures
- Risks to subterranean and surface infrastructure from subsidence. Given the dry Essex climate, the risk of subsidence is likely to increase with time²⁹.

Breaking these down into specific impacts, the key impacts are:

- Increased 'Urban Heat Island' effect, leading to warmer urban areas which could impact people's health for example increased incidence of heatstroke, dehydration and respiratory issues
- Dampness and mould in properties due to heavy rain and warmer temperatures
- Increased building and property insurance costs due to flood risk
- Damage to road infrastructure, requiring extra maintenance.
- Drainage infrastructure failing leading to increased surface flooding
- Disruption to transport networks on public transport, walking and cycling due to widespread flooding
- Deterioration in green space and river/wetland environments due to extreme heat, lack of rain and introduction of new pests and diseases
- Possibility for increased soil erosion due to dry soil and high winds
- Reduced water quality leading to issues such as spread of water borne diseases.
- Heat stress impacting on level of service provision
- Disruption or cancellation of outdoor events
- Increasing health inequalities e.g. Increased chance of flooding in deprived areas, poorer quality housing vulnerable to mould, overheating etc.
- Changing impact on demand for and performance of NHS services – More peaks in summer due to heat risk etc. Equipment impacted by flooding and high temperatures.
- Coastal flooding leading to properties being damaged or destroyed.
- Wildlife impacted by changing climatic conditions meaning they can't adapt in time or are affected in invasive species.
- Increased opportunities for pests in warmer and wetter conditions

Climate risk assessment and action plan

To narrow down some of these more 'generic' impacts into impacts that specifically affect Colchester City Council, meetings were held with key teams who deliver services and projects that were deemed to be affected by the impacts of climate change.

The key services and teams engaged were:

- Private Sector Housing
- Environmental Health
- Colchester Borough Homes (the Council's arms length management organisation who manage the Council's housing stock)
- Parks, Countryside and Greening team
- Resilience Officer responsible for business continuity and emergency planning
- Recycling and Waste Depot team
- Museums

The assessment was not comprehensive but was a start at introducing the topic of climate hazards and adaptation planning to staff.

During the meetings, staff were asked what climatic hazards they'd already experienced and how they had responded to these when they occurred. They were then asked if they were taking any steps to reduce the likelihood or impact of the risks resulting from the hazard if they occurred again. The findings of these meetings have been incorporated into a climate risk assessment and action plan as is attached in Appendix 1.

From these discussions, it was clear that there was already a consideration around the impacts of several climatic hazards like extreme temperatures, flooding and storms. Some of this had been acted upon by services, preparing response plans or actions in line with work often carried out as part of business continuity planning. However, others had treated some previous incidents as 'one off' and had therefore not thought too much about preparatory work for future incidents. It was a useful exercise to raise awareness of climate risks throughout the Council, and to understand what was currently being worked on, including how some action is being embedded into existing risk assessments and business continuity plans.

Awareness about climate risks does need to increase across the Council, but this can be mainstreamed into existing risk management procedures. More action is also needed to prepare for climate risks; most of the Council's work to date is based on just responding to the climate hazard and the risks and impacts it causes in order to get services operating 'as normal' again. There is little focus on attempts to mitigate the impact of the risk occurrence or to plan long term for future climate change.

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