

Climate Change Risk and Impact Assessment for Kent and Medway

Part 2:

People and the Built Environment
Sector Summary

June 2020



P. People and the Built Environment

P.1 Key characteristics

Kent and Medway have a population of over 1.8 million (2019)¹, with 24% of the population aged 19 or under and 19% aged 65 or older. This is broadly in line with national figures, although Kent and Medway have more people over 65 than the national average of 16%. The population is expected to grow to 2 million (+8.5%) by 2030, and 2.1 million (+14.5%) by 2040, mostly through inward migration, rather than natural increase. The number of people aged 65+ is expected to increase by 53.1% between 2017 and 2037². With an increase in older people, health conditions and care needs associated with age may become more prevalent.

The population is generally healthy, with 81.6% in either good or very good health and just over 17% stating that poor health compromises their everyday activities. According to the 2011 census, 17.6% (257,038) of Kent's population suffered from a long-term health problem or disability³ that limits their day-to-day activities. People living in the east of the county (Canterbury, Dover, Folkestone and Hythe, Swale and Thanet) are more likely to consider themselves to have a limiting health problem or disability. Thanet has the highest proportion of people with a limiting health problem, at 23.4%. Districts in West Kent (Tunbridge Wells, Tonbridge and Malling, and Sevenoaks) have the lowest proportion of the population who believe they have a limiting health problem, all below 15%. In 2017, Kent had approximately 635,000 households, 65% (410,845) of which contain only one person. Nationwide, there are 7.7 million single person households, just over 28% of total households⁴.

Kent is a relatively affluent county but contains some of the most deprived areas of the United Kingdom, predominantly in coastal areas including Folkestone, Dover, Margate, Ramsgate and Sheerness. Kent's most deprived areas have lower levels of employment and education, and higher crime levels compared with more affluent areas⁵. Overall, unemployment in Kent and Medway in October 2019 was 2.7%; lower than the UK average of 2.9%. Thanet has the highest unemployment rate at 5.4% and Sevenoaks has the lowest at 1.3%⁶. Folkestone, Dover and Margate all contain areas where crime levels are in the highest 1% in England. Two of the top 10 most climate vulnerable districts in the UK are in Kent (Swale and Folkestone and Hythe)⁷.

¹ The Office for National Statistics. 2019. Population projections for local authorities. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandtable2>

² <https://www.kent.gov.uk/about-the-council/information-and-data/Facts-and-figures-about-Kent/summary-of-kent-facts-and-figures#tab-2>

³ Kent County Council. 2018. Disability in Kent: https://www.kent.gov.uk/__data/assets/pdf_file/0018/8181/Disability-in-Kent.pdf

⁴ The Office for National Statistics. 2017. Families and Households. <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2017>

⁵ Department for Communities and Local Government. English Indices of Deprivation. 2015. <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015> (Accessed 19/02/2019).

⁶ Kent County Council. 2019. Unemployment in Kent: https://www.kent.gov.uk/__data/assets/pdf_file/0019/8182/District-unemployment-bulletin.pdf

⁷ Sayers, P.B., Horritt, M., Penning Rowsell, E., and Fieth, J. (2017). Present and future flood vulnerability, risk and disadvantage: A UK scale assessment. A report for the Joseph Rowntree Foundation published by Sayers and Partners LLP. http://www.sayersandpartners.co.uk/uploads/6/2/0/9/6209349/sayers_2017_-_present_and_future_flood_vulnerability_risk_and_disadvantage_-_final_report_-_uploaded_05june2017_printed_-_high_quality.pdf

P.2 Key projected changes to Kent's climate

The UK Climate Projections from the UKCP18 model identifies these potential changes for Kent:

- **Hotter summers** with an increase in average summer temperature of 2 – 3°C by 2040 and 5 – 6°C by 2080.
- **Warmer winters** with an increase in average winter temperature of 1 – 2°C by 2040 and 3 – 4°C by 2080.
- **Drier summers** with a reduction in average precipitation of 20 – 30% by 2040 and 30 – 50% by 2080.
- **Wetter winters** with an increase in average precipitation of 10 – 20% by 2040 and 20 – 30% by 2080.
- **Increases in sea-level rise** by up to 0.3m by 2040 and 0.8m by 2080.

More details on the projected climate impacts for Kent can be found in Part 1 of the CCRIA.

P.3 Climate risks and impacts for Kent

The main relevant climate risks for people and the built environment identified by the 2017 UK Climate Change Risk Assessment (CCRA) are:

- Flooding and coastal change risks to communities, businesses and infrastructure
- Risks to health, well-being and productivity from high temperatures
- Risk of shortages in the public water supply, and for agriculture, energy generation and industry.
- New and emerging pests and diseases, and invasive non-native species, affecting people, plants and animals.

Local stakeholders also identified the following risks to Kent and Medway, distinct from the risks identified in the UK CCRA, due to their potential impact on the county:

- Risk that the built environment could become less habitable as a result of increasingly uncomfortable indoor temperatures
- Increased risk of flooding, impacting the economy and quality of life; particularly for vulnerable groups such as the elderly and infants.

P.3.1 Increasing temperatures

Higher temperatures in Kent and Medway could create significant issues for people and the built environment. Although the population and infrastructure of the South East of England are more accustomed to higher temperatures than other areas of the UK, daily mortality in the South East of England still increases when temperatures reach 27°C. This could pose an increased risk to residents as heatwaves become more common and extreme. Summer temperatures in the South East could be up to 5.4°C warmer by 2070 meaning that the 27°C threshold will be passed with increased frequency in summer months, and warm periods will last for longer.

People

The heatwave of 2003 cost the NHS £41.4 million, and resulted in 130 excess deaths in residents over 65 in Kent and Medway. During the July 2018 heatwave, A&E departments across the UK saw a surge in patients attending, reaching a record 2.2 million visits. Kent is prone to temperatures that are higher than the rest of the UK and are more comparable with those on mainland Europe. The second highest temperature record for the UK (38.5°C) was recorded in Faversham during the 2003 heatwave. The heatwave of 2018 presented increasingly high temperatures across the UK, and for Kent and Medway. During July 2018, Faversham again experienced extreme high temperatures up to 35.3°C.

There were an estimated 23,200 excess winter deaths which occurred in England and Wales in the 2018 to 2019 winter, the lowest since the winter of 2013 to 2014⁸. Whilst warmer winter temperatures predicted for Kent may lead to a reduction in excess winter deaths, predicted higher temperatures in summer periods may lead to vulnerable populations experiencing other ill effects from higher temperatures.

Vulnerable populations in Kent could experience ill effects from higher temperatures; increasing temperatures can exacerbate pre-existing health conditions by increasing discomfort and lowering air quality. Babies and young children are at a higher level of risk from increased temperatures as they cannot regulate their body temperature like adults, and they sweat less meaning it is harder for them to cool down. People with learning disabilities and illnesses are at risk from increased temperatures as they may have reduced capacity to communicate if they are dehydrated or are suffering from heat stress. In addition, hospital admissions for mental health issues and alcohol related illnesses have been shown to increase in extreme temperatures.

People with respiratory illnesses, such as COPD may experience worsening symptoms in higher temperatures as air quality decreases. People with cardiovascular illnesses such as angina, heart attacks or strokes could see their symptoms worsen under higher temperatures as the heart is put under increased stress as it works to cool the body. Older people, who are most likely to experience these illnesses, and are already at increased risk from high temperatures, are among those most at risk in extreme summer conditions. Kent and Medway's ageing population means that these impacts will grow in significance into the future as an older population is more susceptible to the impacts from extreme climate conditions.

Increasing temperatures are also likely to impact upon rough sleepers, whose numbers in Kent have increased 107% since 2010⁹, as they are less likely to have shelter and protection from heat. They are already exposed to increased stress due to difficult living conditions which, with higher temperatures, can reduce coping mechanisms. Rough sleepers are more exposed to conditions such as heat stroke, heat exhaustion and hyperthermia where the core body temperature rises too high and cannot cool itself down. In Kent, 1,447 homeless applications were accepted as

⁸ Office For National Statistics. 2019. Excess winter mortality in England and Wales: 2018 to 2019 (provisional) and 2017 to 2018 (final).

⁹ KCC. 2019. Estimated rough sleepers in Kent: Autumn 2018.

https://www.kent.gov.uk/__data/assets/pdf_file/0020/91361/Rough-sleepers-in-Kent-report.pdf

being in priority need during 2017/18 and 4,427 households were assisted to prevent or relieve homelessness¹⁰.

Related to increasing temperatures is a degradation in air quality, particularly in built-up areas due to more hot and stagnant air, which could become more common and will increasingly impact on the health of the population. In 2011, there were an estimated 1,050 early deaths from PM2.5 air pollution across Kent and Medway.

Higher temperatures could also introduce new diseases and vectors to Kent that are prevalent in areas of the world with warmer climates. Mosquitoes carrying the Chikungunya virus and Dengue Fever have been detected in both Italy and France in the last 12 years. It is not consistently warm enough in the UK at present for these mosquitoes to survive, however as summers become warmer and the intensity of rainfall events increases, periods where the conditions are suitable for the mosquitoes to survive and breed are more likely, which could negatively impact Kent residents. There is also the potential for mosquitoes to reach Kent via links with France, as has occurred with the West Asian Mosquito. This mosquito is now endemic across mainland Europe, and eggs and larvae have been found in Kent. It can be eradicated quickly but monitoring must be enough to tackle the issue and ensure that a population cannot establish¹¹.

In addition to the direct health impacts of higher temperatures and air pollution, there are social impacts as well, and higher temperatures have resulted in an increase in crime in the past. Residents are more likely to leave doors and windows open, leading to increases in attempted burglary. People spending more time outdoors can lead to increases in noise complaints and anti-social behaviour linked to alcohol consumption.

The Built Environment

The built environment is crucial to the continued economic and social success of Kent, and its quality directly influences value of life in the county. However, higher summer temperatures present many challenges for homes and the built environment in Kent and Medway. The built environment, as is the case everywhere, has been specifically designed with our present climate in mind, and buildings are designed to retain heat.

Recent legislation in the UK has focussed on ensuring new homes are well-insulated and effectively adapted to staying warm in the winter. However, this can mean that new homes are very challenging to keep cool in extreme high temperatures. There are currently no planning requirements in place in relation to keeping houses cool.

There are no legislated maximum temperatures for workers and many offices and other working places have limited cooling measures. It is difficult to determine a safe maximum working temperature as it varies depending on the industry – some environments have controls in place enabling safe working in high temperatures. However, temperatures above 25°C can cause a decline in productivity.

¹⁰ Kent County Council. 2018. Statutory Homelessness in Kent: 2017/18: https://www.kent.gov.uk/__data/assets/pdf_file/0005/7349/Homelessness-in-Kent.pdf

¹¹ Mosquito treatment in Ashford, Kent. <https://www.gov.uk/government/news/mosquito-treatment-in-ashford-kent>

Many of Kent and Medway's public buildings are old and are therefore more vulnerable to high temperatures and overheating. Examples of the types of buildings affected by higher temperatures include schools, prisons, hospitals and care homes. These buildings are, by necessity, designed with small rooms which do not allow air to circulate effectively, negatively impacting both staff and building users. Increased public funding may be required to keep these buildings cool in the future, although these costs may be offset by a lessening need to warm them during winter months.

Urban areas also face an increase in the urban albedo effect. Urban Albedo refers to the capacity of urban surfaces to reflect solar radiation and is an important contributor to changes in outdoor temperature¹². This can be a problem both in suburbs and in town centres as developed areas with lots of buildings and pavements absorb heat and reflect less back into the atmosphere, leading to higher temperatures. Public spaces in these urban areas present a particular risk as they are often lacking shaded or cooler areas and surrounded by buildings that absorb the heat, making existing overheating issues in public spaces worse.

Urban areas also tend to suffer from lower air quality, which can be exacerbated by increased temperatures. Air quality varies across Kent, but there are several areas of concern. Maidstone, Rochester, Canterbury and Margate all experience poor air quality in their most built-up areas. Upper Stone Street in Maidstone was identified as the 5th worst place in the UK outside of London for annual average level of NO₂ (79.3 ug/m³)¹³. Stretches of the M2, M20 and M25 all experience lower air quality close to residential properties, and industrial areas on the banks of the Thames (around Dartford and Gravesend) frequently experience elevated levels of air pollution.

Additionally, higher temperatures could increase the need for air conditioning to be installed in more residential, office and public buildings in Kent. Although the installation of air-conditioning units would boost the Kent and Medway economy through growth in the supply chain and installation network, this could cause an increase in the urban heat island effect as excess heat will be discharged externally, further exacerbating the problems associated with increased temperatures in urban areas, particularly at night. Increased energy demand for cooling during the summer months could also result in increased carbon emissions.

P.3.2 Drought

The South East has experienced more droughts than any other part of the UK, with nine periods of significant drought since 1970¹⁴. In 2007, most of the South East, including Kent and Medway, was officially designated as an area of serious water stress by the Environment Agency. The South East experiences half the amount of rain compared with other regions of the UK but has a much larger population. Under current climate conditions, the county already has an imbalance between water demand and supply.

¹² University of Kent. Urban Albedo Calculator. <https://research.kent.ac.uk/urbanalbedo>

¹³ Barrett, T. 2019. Almost 2000 UK sites found to be breaching air pollution limits. <https://airqualitynews.com/2019/02/27/nearly-2000-uk-sites-breaching-air-pollution-levels/>

¹⁴ Water Resources in the South East (WRSE). From source to tap: the south east strategy for water: http://www.wrse.org.uk/wp-content/uploads/2018/04/WRSE_File_726_From_Source_To_Tap.pdf

Kent and Medway have the highest dependency on groundwater of any region in the country; with over 70% of drinking water coming from groundwater sources. As temperatures increase and summer rainfall decreases, aquifers and reservoirs may not be replenished in the same way they are currently. In addition, changes to rainfall patterns could lead to a 30% decrease in average river flows during 'dry' periods, meaning they are more likely to experience low flows at a given time. This could increase water stress in Kent and Medway. Coupled with predicted increases in population, Kent and Medway may soon have a negative water supply and demand balance, significantly impacting residents' health and wellbeing.

P.3.3 Flooding and sea-level rise

Many areas of Kent and Medway are already at risk of either surface water, groundwater, fluvial or coastal flooding. Low-lying areas of the Medway towns, Swale, Romney Marsh, the Low Weald, North Kent Marshes, Gravesend and Dartford are all at risk of flooding in various forms. Kent's coastline is approximately 350 miles long and some is very low-lying, resulting in several areas of high flood risk. Areas with significant flood risk around Kent and Medway's coast are the Medway Towns, Romney Marsh, Dartford, Gravesend and large areas of Swale. The urban coastline, including the towns of Margate, Whitstable, Broadstairs, Dover, Folkestone and Sittingbourne, is generally defended from sea-level rise, but coastal flooding could still affect coastal settlements with increasing severity of impacts into the future. Some areas of Kent and Medway are also vulnerable to fluvial flooding from main rivers and tributaries that run through the county, such as the Rivers Medway, Stour, Darent and Dour.

Kent has one of the highest number of properties at flood risk of any local authority in England¹⁵. At present, 15% of all households (88,000 properties) in Kent are at risk of flooding in some form. Of these, 64,000 are at risk of fluvial or coastal flooding, and 24,000 from surface water flooding. Canterbury has the most scheduled monuments at risk of flooding in the UK with 9 monuments at risk, including several areas of the city wall and Blackfriars friary. Canterbury is also 13th in the UK for the number of listed buildings at flood risk in a 1% AEP event with a total of three.

There is expected to be a 5-20% increase in river discharge during periods of intense rainfall, meaning rivers could be in flood more often, for a greater proportion of the year, or both. In addition to causing issues for towns on the banks of Kent and Medway's main rivers, this could pose a risk to areas with many ordinary watercourses in a concentrated area, for example the Low Weald, and the major towns of Tonbridge and Ashford.

Increased frequency and severity of flooding in many areas of Kent may increase recovery costs for homes and businesses, potentially leading to properties in some areas becoming uninsurable.

Increased flooding may create a loss of confidence and security in Kent communities and could increase mental and physical health issues. When combined with an

¹⁵ Kent County Council. 2017. Kent Local Flood Risk Management Strategy 2017-2023. https://www.kent.gov.uk/__data/assets/pdf_file/0010/79453/Local-Flood-Risk-Management-Strategy-2017-2023.pdf.

increasing population, this may lead to an increase in community stress associated with flooding in the future. Flood events can have a significant impact on mental health, as well as damage to, and loss of, property. This is particularly an issue for those individuals who have previously been flooded.

Kent County Council and Tonbridge and Malling Borough Council are supporting Public Health England's first ever long-term study into the impact of flooding on personal wellbeing¹⁶. In the first year, the study found that the percentage of people with depression, anxiety or post-traumatic stress disorder (PTSD) was highest amongst people whose homes were flooded. The study also found that the risk of mental health issues was approximately six times higher in flood prone areas than in areas unaffected by flooding¹⁷.

Significant portions of the urban coastline of Kent and Medway are well defended against coastal flooding, and future risk from sea-level rise has been considered in the defences. Many stakeholders believe that the Environment Agency has performed well in protecting coastal communities against the risk of flooding. However, current projected increases in sea-level rise are higher than previous projections and currently protected communities could still be affected. Some areas of Medway, Sheppey and Romney Marsh could be lost to sea-level rise by 2100.

As sea-levels rise to the level of current flood defences, valuable intertidal areas may be lost. For some coastal towns such as Margate, Broadstairs and Whitstable, this could significantly impact the local economy through loss of tourism revenue. There may also be impacts on the health of residents with the loss of valuable open space of high recreational value.

Surface water flooding presents a risk to many public spaces and urban areas around Kent and Medway, particularly in town centres where loss of green space has meant that water cannot infiltrate into the soil and instead flows across paved surfaces into drains that can become overwhelmed or blocked in the event of prolonged or heavy rainfall. Areas of Maidstone, Ashford, Tunbridge Wells and Folkestone already suffer from the effects of surface water flooding in their town centres, and as rainfall events intensify and development continues, risks to town centres from surface water flooding are likely to increase.

Protection of the built environment in some areas means that other areas that are deemed less valuable can flood, such as roads and recreational spaces. However, with increased frequency of floods, roads and railways may flood more often as water is diverted from other areas. As a result, houses, small towns and villages in rural areas could quickly become isolated due to lack of access. These places generally have higher proportions of elderly people who are more vulnerable to flooding as they are less mobile and may be socially isolated.

Emergency response services are also impacted by flooding, and research from the University of Loughborough has shown that in urban areas, response times increase

¹⁶ Public Health England. Flooding and health: national study. <https://www.gov.uk/guidance/flooding-and-health-national-study>

¹⁷ Public Health England. 2017. The English National Study for Flooding and Health: First year report. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/597846/NSFH_briefing_for_policymakers_and_practitioners.pdf

as flood severity increases. Surface water flooding was shown to cause more disruption to emergency responders than other types of flooding. Fire & Rescue Service 10-minute accessibility was shown to decrease from 100% with no flood to 26.2% under a 0.01% AEP surface water flood. Total inaccessibility was also shown to increase with flood magnitude, from 6% inaccessible in a 5% AEP event to 31% inaccessible in a 1% AEP surface water event¹⁸.

Flooding also impacts utilities providers – floodwater can block drains and sewers causing backups and leading to floodwater mixing with grey water, household waste water that can be stored and reused for other purposes without purification. If electricity substations become flooded, some properties may suffer power outages, particularly in rural areas, where access may also be an issue. Power outages will disproportionately impact vulnerable populations, particularly older people, babies and people with chronic illnesses. Similarly, flooding can impact upon internet and communication connections, disproportionately affecting rural communities.

P.3.4 Increased storminess

Despite being an area of water scarcity, Kent and Medway can also be impacted by extreme rainfall events – during the winter storms of 2013/14, Kent and Medway experienced almost 2.5 times the average rainfall for the time of year. Responding to this extreme weather and its wider impacts cost Kent and Medway services over £4.4 million. Over the course of the 2013/14 winter, public and private service providers dealt with storm and flood damage to over 3,000 properties. In addition, the county experienced power cuts, transport disruption and creation of sinkholes. KCC Highways and Transportation was the most heavily impacted service across all events, incurring costs of £1.5 million responding to fluvial and surface water flooding, as a result of damage affecting road and highways networks¹⁹.

Coastal erosion is expected to increase with increased storminess. This is being managed in the urban coastline of Kent – many areas benefit from a ‘hold the line’ management approach, but some more rural areas are still susceptible to the impacts of erosion and sea-level rise. Active management is ensuring the protection of several properties behind the beach to the north of Kingsdown. Under a ‘do nothing’ approach, these properties would eventually be lost to erosion. Future iterations of the Shoreline Management Plan for this area intend to continue this active management approach in order to protect the beach and local properties²⁰.

P.4 Management of climate risks and impacts

P.4.1 Increased Temperature

The NHS and Kent Resilience Forum monitor temperatures and provide advice on heatwave events. The NHS also has a Business Continuity Plan for heatwaves in order to maintain standards of care during a potential surge in demand. Indoor

¹⁸ Green, D. and Yu, D. *et al.*, (2016). *Flood Impacts on Emergency Responders Operating at City Scale*. Journal of Natural Hazards and Earth System Sciences. Available online: <https://dspace.lboro.ac.uk/dspace-jspui/bitstream/2134/22912/1/nhess-2016-309.pdf>

¹⁹ Kent County Council. 2015. Monitoring the Impacts of Severe Weather for Winter 2013-14 – full report: https://www.kent.gov.uk/__data/assets/pdf_file/0006/15783/Monitoring-the-impacts-of-severe-weather-for-winter-2013-14-full-report.pdf

²⁰ Dover District Council. No date. Coastal Erosion. <https://www.dover.gov.uk/Environment/Coast--Rivers/Coast-Protection/Coastal-Erosion.aspx>

temperatures in hospitals are checked regularly and staff closely monitor the most vulnerable individuals. In hospitals, heat reduction and alleviation measures can be put in place in extreme events, such as turning off unnecessary equipment and providing access to cool rooms to keep patients safe through heatwaves. Kent County Council issues advice to residents on how to keep themselves and other members of the community safe in a heatwave ('Beat the Heat'), including checking on vulnerable neighbours and family members to ensure they are safe and have adequate supplies. In addition, KCC supported the NHS campaign "Cover Up, Mate" which aims to encourage men who work outdoors, such as farmers, builders, gardeners and sportsmen, to take a safer approach to the sun in summer to help reduce incidents of skin cancer.

The Warm Homes Scheme has provided 2,391 energy efficiency measures in over 2,200 homes in Kent, helping vulnerable residents keep their houses warm in winter and cool in the summer.

Kent Community Health NHS Foundation Trust is aware that new diseases may enter the UK through Kent, due to its climate and proximity to the continent, and is actively monitoring for new diseases. Nationally, NHS England notes that the South East is more exposed to tropical diseases than other areas due to higher concentrations of migrants. NHS staff are undergoing training to become more adept at diagnosing and treating tropical infections in a timely manner, and the NHS will receive £20bn extra by 2023 for control of tropical diseases. This is anticipated to lead to reduced hospital stays²¹, as diseases are identified and treated before they become serious.

Kent and Medway are highly wooded areas, and this helps to offset areas of poor air quality that can be exacerbated by high temperatures. Woodland in Kent is estimated to provide approximately £73 million in prevented health costs annually through improved air quality and availability of green spaces for recreation.

P.4.2 Drought

Southern Waters' Water Resources and Drought Strategy combines their Drought and Water Resources Management Plans for 2015-40 and sets out how they aim to manage water resources until 2040. The Drought Plan²² sets out how the company will deal with a drought in Kent, Sussex, Hampshire and the Isle of Wight. These plans and strategies set out what actions will be undertaken to secure a long-term water supply, even during periods of extreme drought; accounting for population growth and the impacts of climate change.

P.4.3 Flooding and sea-level rise

Flood defences are in place in many areas to manage the risk of fluvial and coastal flooding. Across Kent and Medway, Nature Based Solutions (NBS) are being employed in upper catchments to protect built infrastructure and rural areas downstream. On the River Beult in Medway, NBS include planting of riparian

²¹ NHS England Commissioning Board. Guide for tropical medicine. <https://www.england.nhs.uk/wp-content/uploads/2013/06/b07-tropical-med.pdf>

²² Southern Water. Our Drought Plan. <https://www.southernwater.co.uk/our-drought-plan>

vegetation and trees, installing buffer strips and drinking bays²³, as well as installing leaky dams and reinstating water meadows. Similar schemes are taking place along the River Teise near Tunbridge Wells and Hawden Stream near Tonbridge, among others.

After the December 2013 flood event, over £9.8m was spent managing flood risk in areas such as Ashford, Maidstone, Sevenoaks and Tunbridge Wells with up to £1m being spent on maintenance of flood defences within the catchment each year. So far, works have included:

- Repair and refurbishment of the Leigh Flood Storage Area costing over £1.25m and reducing flood risk to 1,200 homes in Tonbridge;
- Installation of Property Flood Resilience (PFR) measures to 52 homes in Aylesford;
- Maintenance of structures, reservoirs and operations;
- Removing trees and silt from rivers throughout the Medway catchment;
- Restoration and clearing of the River Len.

The Medway Flood Partnership (MFP) was established in January 2017 to reduce flood risk across the Medway catchment. Work has focussed on tributaries to the Medway and on surface water risks present in the catchment. The Partnership developed the Medway Flood Action Plan in November 2017²⁴. In order to manage flood risk in the Middle Medway, PFR measures such as flood doors, airbrick covers, and non-return valves are being installed in towns and local villages. In towns susceptible to surface water flooding, such as Tunbridge Wells and Maidstone, there are also supplies of sandbags to be issued in event of emergency.

In addition to physical flood defences, community flood resilience schemes and flood action groups are being developed across Kent and Medway so that communities are better prepared for flooding and can take actions to protect themselves.

In order to increase community resilience to flooding, and to build confidence in the ability of an area to cope with flooding, the Kent Resilience Forum has trained over 200 volunteer flood wardens in key at-risk communities, including 54 around Yalding and Collier Street and 45 in East Peckham, Hildenborough, Tonbridge and Edenbridge. These areas have community flood plans in place, supported by the flood wardens, that help residents prepare for, respond to and recover from flood events. The plans contain practical advice for residents and businesses on how to keep safe during a flood. Having this system in place can help to reduce stress within communities before, during and after an event and strengthen community cohesion.

Age UK has partnered with the Environment Agency to provide advice for older people about how to prepare for floods. The advice describes actions that should be

²³ Environment Agency. 2017. Plan Together – Deliver in Partnership: Medway Flood Action Plan Summary Document. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/663908/6.3787.EA.Medway_Flood_Action_Plan.Summary.SinglePages_AW.PDF

²⁴ Environment Agency. 2017. Plan Together – Deliver in Partnership: Medway Flood Action Plan Summary Document. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/663908/6.3787.EA.Medway_Flood_Action_Plan.Summary.SinglePages_AW.PDF

taken to protect the property and valuables in the event of a flood and advises creation of a 'flood kit'; consisting of essential items should a flood occur.

Kent County Council is a partner in several EU funded projects that aim to improve flood resilience through implementing nature-based solutions in upper catchments and rural areas. The aim of these measures is to manage water flow into rivers and reduce downstream flooding. There are also projects looking at surface water flooding and aiming to use solutions such as Sustainable Urban Drainage to manage water in urban areas and reduce risks from surface water flooding. Solutions being considered include tree pits, which, as well as providing drainage in urban areas, can provide additional benefits including increasing tree cover and shading.

Kent County Council is working with insurance companies to mitigate building insurance costs in areas that are highly susceptible to flooding. The Council is also reviewing the locations of public sector buildings to assess their flood risk.

P.5 Urgency scoring and recommendations

Using available evidence, urgency scoring was undertaken based on risk magnitude, interdependencies, and adaptation shortfall. This urgency scoring can be used to help prioritise and manage the climate risks and opportunities to Kent and Medway. Further information on the methodology can be found in the CCRIA Part 1.

Table P-1: Urgency Scoring for People and Built Environment Sector

Risk	Magnitude	Explanation	Adaptation Shortfall	Explanation	Inter-dependencies	Explanation	Urgency Score	Recommendation
Heat leading to increased mortality	High	Daily mortality increases with higher temperatures and could see 140-200 more deaths.	Medium	The UK heatwave plan does acknowledge this problem but focuses on prevention not preparation of NHS.	High	If people are not able to access the natural environment this could impact health. Pressure on utility companies for cooling to avoid health impacts.	High	More research is needed into the impacts of increased temperatures on health and how the NHS can prepare emergency plans.
Overheating homes and public buildings causing health and productivity issues	High	The built environment in Kent is thought to be well equipped to deal with a small increase in temperatures but not to handle extreme heat events.	High	Only 0.5% of homes in the UK have air conditioning and many apartments often only have one external wall making it difficult for heat to escape.	High	Pressure on utility companies when there is a need for more electricity to cool homes, businesses, schools etc.	High	More research is needed into the extent to which the need to cool homes could contribute to climate change.
Overheating of public spaces affecting health	High	Public spaces and town centres across Kent and Medway are poorly equipped to cope with extreme temperatures.	High	Public spaces and town centres are highly developed and currently absorb & retain heat well, increasing the urban albedo effect.	High	If town centres and public spaces become too hot, they may not be used, impacting businesses as well as health of residents.	High	More research is needed into methods of effectively reducing heat in open public spaces and in town centres.
Water scarcity and droughts affecting access to water	High	Many areas are already in negative supply/ demand balance and so future droughts could see severe limitations to potable water supply.	Medium	Water companies have drought management plans in place and run water efficiency campaigns, but these measures may not go far enough.	High	More water removed from the environment could impact the quality of that ecosystem.	High	More research is needed into the effectiveness of water conservation campaigns.

Risk	Magnitude	Explanation	Adaptation Shortfall	Explanation	Inter-dependencies	Explanation	Urgency Score	Recommendation
Increased flood risk impacting people's homes, businesses, health and social care facilities and access	High	64,000 properties are at risk from river or sea flooding, and 24,000 at risk from surface water flooding. 8.3% of homes in Kent will see an increase in flood risk (152,000 people).	Medium	There are flood risk management strategies and flood defences in place but there needs to be more done to ensure they are resilient to climate change impacts.	High	<p>Flooding could impact on utility companies, putting pressure on water supply or sewage issues, and in turn impacting people's health.</p> <p>Flooding will impact the transport sector, making travelling more difficult.</p>	High	More action is needed to improve drainage in areas at high risk of surface water flooding.
Increased rates of coastal change, particularly impacting vulnerable communities	Medium	Many homes in coastal towns such as Whitstable and Margate were built in the 1800s and are in a poor state of repair, therefore are not well protected from sea-level rise, increased coastal flooding or erosion.	Medium	A lot of coastal defences are in place across Kent, however as sea-levels rise these defences may be compromised.	Medium	As sea-levels rise it could cause the loss of important habitat types such as intertidal habitat, which would negatively impact the natural environment, and may impact tourism in coastal areas.	Medium	More research is needed into how these impacts could disproportionately impact vulnerable communities.
Declining air quality affecting health	High	It is anticipated that by 2080, poor air quality will impact all of Kent's vulnerable residents.	High	Lack of preparedness in NHS to deal with impacts of poor air quality.	Low	People may migrate out of Kent which could put strain on public services.	Medium	More research is needed into the impacts of air quality on public health.