

A Local Climate Impacts Profile for Kent

A summary of impacts from past severe weather events 1996 – 2010

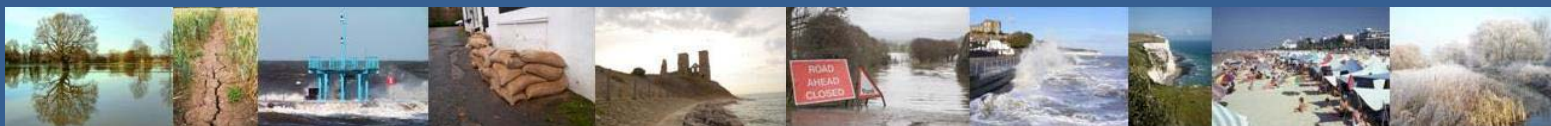
Sustainability & Climate Change

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In collaboration with
Kent Partners



Executive Summary

The Kent Local Climate Impacts Profile (LCLIP) identified 52 weather events, which impacted the county over a 14 year period. The county experienced heavy rain and resultant flood events, heatwaves, droughts, freezing temperatures and snow as well as multiple storm events. The financial impact amounted to over £35 million to county services and the wider Kent Community, with indirect costs and investments totalling a further £428.7 million. Significant impacts were also identified for health, crime and the environment with heatwave events, freezing temperatures and snow having the greatest impact. Between late January and early March 2005 alone, 669 schools closed during bad weather, resulting in 206,740 pupil days lost.

In total, District and Borough Councils faced costs of £2.2 million as a result of severe weather events over the 14 years and accrued indirect costs of over £2.25 million across their services.

Along with the significant impact on Council services across the County, a number of partners delivering services to Kent residents were affected by the events, including transport operators, utility companies, the NHS and Environment Agency.

The County Council services most frequently impacted by these weather events were:

- Kent Highway Services;
- Insurance and Risk (Property) services;
- Emergency Planning;
- Schools.

Other key partners and service providers significantly affected were:

- District and Borough Council services, predominantly environmental health and maintenance, housing, waste and recycling, engineering, emergency planning, policy, transportation, leisure, insurance & risk and economic development;
- Environment Agency;
- Kent Fire & Rescue Service;
- Kent Police;
- NHS;
- South Eastern Rail and Arriva Bus services;
- Utility companies.

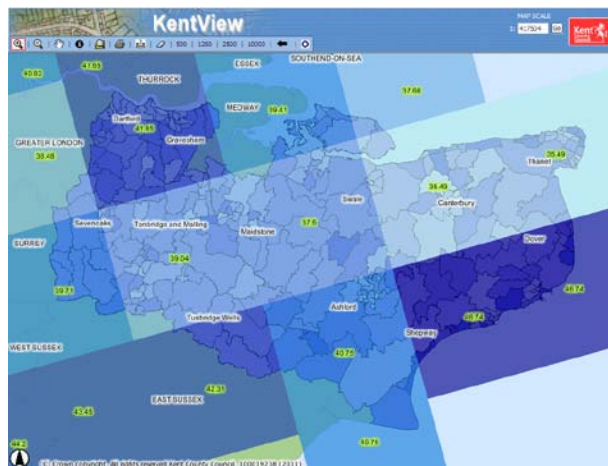
Through the study we have learnt that, as a county, we did not collect adequate data and information with many impacts recorded qualitatively, meaning that figures are likely to under-represent the true scale of the impacts. In response to this, Kent County Council has now developed the [Severe Weather Impacts Monitoring System](#) (SWIMS), a decision-support tool enabling partners across Kent to record how they have been impacted by, and are responding to, severe weather events, as and when they occur. A key element of SWIMS is capturing the monetary value of impacts and responses so that services possess a strong evidence base to build business cases for taking adaptive action¹.

¹ Please see Next Steps section for further information on SWIMS

Introduction

In Kent, we have already begun to feel the effects of a changing climate, with earlier emergence of species such as the Adonis Blue butterfly, observed sea level rise at Sheerness and the hottest temperature on record experienced at Brogdale in Faversham (38.5°C). Key findings from the UK Climate Projections 2009 (UKCP09) suggest we are likely to experience further changes into the future, and that by 2050:

- Winters are likely to be warmer by around 2.2°C;
- Summers are likely to be hotter by around 2.8°C;
- The hottest summer days could increase by up to 3.7°C;
- Summer night time temperatures are likely to increase by 3°C;
- Winter rainfall is likely to increase by 14%;
- Summer rainfall is likely to decrease by 24%.



Screenshot from KentView, our online GIS mapping incorporating UKCP09 projections

In addition to this, we are also likely to experience an increased frequency of severe weather events, posing significant risks, with:

- More 'very hot' days – what we consider extreme currently will likely prove to be average in 30 years;
- More intense downpours of rain leading to increased flood risk, particularly surface water flooding;
- Increased risk of coastal flooding;
- Changes in storminess and high winds.

Approximately 8.3% of Kent's population is already at risk from flood events (over 70,000 properties) and with the county's long coastline, population density and geographical position we are likely to feel some of the strongest effects of climate change across the United Kingdom.

With this in mind, Kent County Council and the Kent Climate Change Network undertook a Local Climate Impacts Profile (LCLIP) in 2009/10 to increase our understanding of the county's vulnerability to past severe weather events. This has provided us with a valuable engagement tool and evidence base and has underpinned the development of the Kent Adaptation Action Plan.²

This report provides a snapshot of some headline impacts and responses from severe weather events over approximately 14 years, from August 1996-January 2010.

² http://kent.gov.uk/environment_and_planning/environment_and_climate_change/adaptation_plan.aspx

Kent at a Glance...

- The county of Kent is approximately 3,544 square kilometres in size, with a population (excluding Medway) of over 1.4 million;
- Kent is located in the South East of England and is one of the warmest parts of the UK;
- The county has a long coastline (approximately 345 kilometres in length) and borders the River Thames, the North Sea to the North and the Straits of Dover and Channel to the South;
- The county has a highly diversified economy, with a high percentage of small to medium enterprises (SMEs) and economy benefitting from hop farms, orchards, tourism and agriculture;
- The average income of Kent residents is above that of the national average but the county also contains pockets of poverty and some of the most deprived areas of the UK.



The LCLIP was carried out through a selection of interviews with officers from services across the County Council, District and Borough Councils and with our wider strategic partners, such as Kent Fire and Rescue Service and the Environment Agency. A Media Trawl was also conducted to investigate key impacts which received particular attention in Kent over the study period. Much of the data collected through interview was recalled from memory and qualitative in nature, highlighting a need to capture more accurate and quantitative information. From now on, the impacts and responses to events will be captured through Kent's innovative new [Severe Weather Impacts Monitoring System](#) (SWIMS)³.

The following sections provide a summary of impacts for each type of severe weather event experienced in Kent.

³ Please see Next Steps section for further information on SWIMS

Heavy Rain and Flooding

Heavy rain and flooding had the most frequent and severe impacts on the county, with 22 heavy rain and flooding events over the 14 year period, accounting for 56% of all financial impacts. The county incurred direct costs of over £30 million and additional investments of over £227 million. The flood and heavy rain experienced in July 2007 alone accrued costs of £15.4 million, whilst South East Water made additional investments of £223 million, following heavy rain and flooding events in 2005-2010. Key impacts included:

- Kent Highway Services accrued £7.9 million in costs over the 14 year period, with £7 million repairing flooded roads in October 2001;
- In total, Kent County Council faced losses of £753,000 from damage to schools, libraries and education centres;
- 18,000 Kent residents passed through our rest centres in October 2000;
- 82 schools closed during November 2000;
- Insurance claims and property damage cost £5.9 million in November 2000;
- In December 2000 two major cliff falls occurred in one day at St Margaret's bay with thousands of tonnes of chalk smashing down onto the beach;
- Approximately 503 houses flooded in July 2007, costing the Medway community £14.3 million;



District and Borough Councils

Heavy rain and flood events also had the greatest financial impact for District and Borough partners who faced costs of over £1 million and additional costs of £2.25 million:

- Shepway District Council received 200 calls in two hours of an event in August 1996. Over 400 properties were flooded, 192 internally, 44 declared uninhabitable and 30 structurally damaged. £117,000 was accrued in the first four days;
- 200 residents in the Canterbury district were impacted by floods, with over 40 flooded internally, during April 2000. This cost the City Council £20,000;
- The October 2000 floods left the Tonbridge Swimming Pool facility out of action for approximately 14 weeks, with the entire building flooded to a depth of 18 inches. Fully insured losses amounted to £900,000;
- In November 2000, Ashford Borough Council opened its Emergency Control centre for 72 hours, with direct costs of £12,000 and 150 staff hours;
- In December 2000, Sevenoaks District Council's emergency planning team undertook extensive in-hours and out-of-hours delivery of sandbags, costing the council £19,900;

- Tonbridge and Malling Borough Council manned their emergency centre for 24 hours over several days, with staff time in excess of 1,000 hours;
- On the 8th February 2001 Canterbury City Council's Flood Emergency Centre received over 1,300 telephone calls. Over the next 12 months, 290 houses, 60 roads and the Chartham railway line flooded, causing weeks of disruption. The Engineering team accrued 3,000 hours in staff overtime and £150,000 direct costs;



- Flash floods affected roads and flooded over 40 houses in Canterbury in August 2007, costing £15,000;
- Sevenoaks District Council faced costs of over £2,000 in January 2008 through flood damage to businesses and households in the district.

Strategic Partners

- Kent Fire and Rescue Service recorded seven times more flood incidents in June 1997, compared to the 1998-2008 average;
- The Environment Agency delivered 32,000 sandbags to Littlebourne in 2000;



- In December 2000 Firemen pumped 100,000 litres of water from one street and in June 2007 received 40 calls about flash floods;
- Emergency crews attended an incident in June 2007 resulting from the heavy rain and floods, where one fatality and 20 injuries occurred;
- In June 2007, Mid Kent Water invested £2 million a year and South East Water invested £223 million in 2005-2010 to secure long term water supplies.

Freezing Temperatures and Snow

Kent incurred over £4.2 million direct costs from 12 freezing temperature and snow events, and a further £1.5 million indirect costs. Over £2.3 million was attributed to impacts in January 1997 (the LCLIP was undertaken before the significant impacts seen in late 2010).

- Kent Highway Services spent £1 million in just one day in spring 2005 to repair damaged roads and pathways;
- 583 schools closed across Kent from events in 2003, 2007 and 2009. Woodlands Infant School accrued £878 in costs;
- All rail services were suspended in January 2009, whilst December saw road closures, cars stuck on icy hills and collisions across the county;
- Staff levels of the County Council Media department were reduced to a third in late 2009 and January 2012;
- In December 2009 Dover was gridlocked with delays on the ferries, and the Channel Tunnel was closed;
- The county was down to three tonnes of salt by the 13th January 2010, after stock piling 20,000 tonnes in mid December 2009.

District and Borough Councils

- Scheduled street cleansing and refuse collections were suspended across the county in January 2003;
- Sevenoaks District Council spent £5,496 gritting District Council car parks in early 2003 and 2009 and recharged £18,487 to Kent Highway Services for emergency responses across the district in 2003;
- Tunbridge Wells Borough Council received high call volumes of dead, dying and diseased trees across the borough in April 2006, leading to 100 extra site visits;
- In February 2009, Dartford Borough Council suspended service delivery at its Civic Centre, losing 367 staff hours and accruing £4,850 from increased

calls and the loss of six Civil Enforcement Officers;



- In February 2009 Sevenoaks District Council lost £2,500 from Pay and Display parking meters and Shepway District Council lost £5,000 in car park income and a further £3,000 in penalty charge notices, as well as 88 staff hours.

Strategic Partners

- Southern Water workmen repaired over 400 burst mains in January 1997 due to freezing temperatures, with more than 120 staff on stand-by;
- The NHS experienced higher than average deaths in residents over 65 years of age in January 2003 whilst snow and ice led to fifty A&E incidents around Maidstone in one day and 120 admissions for fall-related injuries;
- In March 2005, Army Land Rovers were required to take staff to work at the hospital;
- Kent Police shut the A229 at Blue Bell Hill in Maidstone due to icy conditions and were involved in closures and road incidents in March 2005;
- Tourism fell by 13% in February 2009 compared to previous years;
- Freezing temperatures also resulted in multiple impacts on transport with damaged trains, cancelled services, electrical failures, increased crashes and thousand of commuters and travellers affected.

Heatwaves and Drought

The county experienced seven heatwave events over the period amounting to costs of £30,350. £30,000 of these direct costs is attributed to Kent Highway Services dealing with hot weather damage to roads and pathways during August 2005. The county also experienced four drought events, incurring a variety of impacts and £200 million additional costs. General impacts included:

- The River Stour was at its lowest level for 200 years in April 1997 and in August 2006, levels at the Bewl reservoir fell to 37%;
- The Environment Agency reported a devastating effect on wildlife and the environment from drought;
- In August 1997 ice cream sales rocketed and vineyards produced better grape yields. At Haynes car showrooms, all Ford Escorts being offered with free air conditioning were sold;
- Road surfaces melted and pipes exploded in August 1997;
- In summer 2003, Morellis in Canterbury sold one week's worth of ice cream in two days and Lunn Poly travel agents in Maidstone received a 30% increase in bookings. Edenbridge businesses reported a soar in profits in pubs, shops and leisure facilities;
- Air conditioning firms received a 70% increase in calls due to overworked systems;
- In August 2006, levels at the Bewl Reservoir fell to 37%;
- Air conditioning firms received a 70% increase in calls due to overworked systems;



- Small pockets of subsidence problems occurred across the Dover district due to drought, in August 2000 and 2006;
- Road deformation due to extreme road surface temperatures was experienced in Sevenoaks, during summer 2006.

Strategic partners

- The heatwaves in August 1997 and 2006 led to increased burglaries as more people left doors and windows open to keep cool;
- The NHS experienced 130 excess deaths in residents over 65 years of age as a result of the heatwave in August 2003;
- In 2003 and 2006 the NHS received a 22% increase in calls regarding mosquito bites, whilst Kent ambulance reported an increase in heat related calls;
- Tourism increased by 42.8% for outdoor activities during excessive heat in August 2006;
- In April 1997, KFRS dealt with the highest number of fire incidents on record (1,144) compared to the 1998-2008 average of 722;
- In August 1998, KFRS tackled 318 fires in six days and there were over four times as many blazes involving grass, fields and hedges compared to the year before;

- After a heatwave in April 1997, Thames Water invested an additional £200 million to solve drought issues by 2005;



- In August 1999, residents in Otford, Kemsing, West Kingsdown, Plaxtol and Heaverham were without water supply for five days;
- In summer 1999 severe water supply issues occurred at the Brands Hatch World Super Bikes Championship, attended by 120,000 people;
- In April 1997, there were 262 more secondary fires than the 2000-2008

average. Two fires occurred in Tunbridge Wells, the first lasting over three hours covering 600 square metres of Pembury Woods and the second spreading over 500 square metres of undergrowth;

- After a heatwave in August 2003 lasting approximately ten days in

length, three times more grassland fires occurred than normal (990), with the hottest temperature recorded in North Kent (38.5°C in Brogdale);

- August and September 2003 are the second and third highest figures on record for secondary fires.

Storms

The county experienced ten severe storm events, with direct costs totalling £490,000. Kent Highways spent £385,000 over the period to deal with the impacts to roads and other routes, whilst the County Council paid over £100,000 in damages to council property including schools, a fire station, offices and gypsy site. Amongst the most heavily impacted were various businesses, utilities, transport operators and households across the county, with significant impacts and costs largely unknown, but anticipated to be high:

- In August 1997, thousands of homes were without electricity resulting from 50 lightning strikes in three hours;
- In January 2007, Kent Police received five times as many storm-related calls than average, with 250 from Dover and Folkestone alone. 500 trees fell down from gales across the county;
- Dover Port closures in 2004 left hundreds of passengers stranded on eight ships unable to berth, with further closures in 2007 and 2008;
- Winds of up to 70 mph led to the closure of the Dartford tunnel and suspended rail services whilst over 400 trees were removed from rail lines;
- Gale force winds in October 2000 caused a power cut for 92 hours.
- In January 2007 Kent Highways reported a three-fold increase in calls compared to a usual storm event;
- Canterbury City Council received six property claims following a storm in February 1997, costing £4000;
- KFRS received three times more calls in one day (273) in January 2007, compared to the same day in 2006 and dealt with 147 more emergency incidents that year on average.
- In Chartham, hundreds of businesses and homes were left without power in 1998;



Responding to Events

The county already has a number of plans, training and resources in place to respond to severe weather events. The Kent Resilience Forum (KRF) has developed, and is developing, a number of plans with Kent Partners including:

- Pan-Kent Multi Agency Flood Plan (covering Kent & Medway)
- Local Multi Agency Flood Plans
- Heatwave Plan
- Heatwave Plan for England (2010)
- Reservoir Inundation Plans
- Severe Weather Advisory Group (SWAG) Protocol
- Low Temperatures & Heavy Snow Plan
- Public Warning & Informing Strategy
- Kent Resilience Forum Drought Plan
- Kent Resilience Forum Heat Wave Plan
- Kent Water Demand Management Group delivery plan
- Select Committee on Flood Risk Management
- Catchment Flood Management Plans
- Surface Water Management Plans
- Preliminary Flood Risk Assessments
- Single and Multi-Agency Flood Response Plan (Kent Resilience Forum)
- Capital Flood Defence (Environment Agency)
- Shoreline Management Plans
- Strategic Flood Risk Assessments

Some examples of direct responses to severe weather captured through the LCLIP include:

- Rest centres were set up for four consecutive days in November 2000, with over four days of additional staff time accrued;
- The Kent Resilience Forum developed drought guidelines and plans with six water companies in 2006, to ensure vulnerable people would be assisted if drought measures were implemented;
- Between 1996 and 2007 Operation Stack was enforced 23 times as a result of bad weather conditions;
- Kent Highway Services (KHS) spent £7.9 million to repair damage to minor roads caused by flooding;
- KHS spent a further £4.1 million to repair roads, pathways and other access routes from the impacts of snow and ice;
- More than 60 salting lorries were put into action to grit roads in December 2005 and KCC suspended all maintenance work to enable extensive salting in February 2009;
- In December 2009 KHS salted primary and secondary routes twice a day. 53 primary routes were gritted six times in a four day period and 6, 500 tonnes of salt was used;



- Maidstone Borough Council diverted 100 members of staff from normal work activity to grit pavements in 2009;
- KHS invested £1 million to make pothole repairs between March and May 2010;
- In 2008-09 KHS funded 15 extra crews to deal with frost damage and 10 crews to tackle potholes and carriageway patching. From late February to March 66 crews made minor and major surface repairs across Kent, at peak levels repairing around 3,000 potholes and carriageway patches a week;
- KHS moved budget to the “front end” of its service in 2009 -10 to fund a further 23 maintenance crews, 18 minor repair crews, 18 major repair crews and 2 “Jetpatching” machines for six months. Minor resurfacing cost £1 million and major £15 million.

District and Borough Councils

- Shepway District Council evacuated residents, following floods in August 1996 and offered 20 residents temporary accommodation. Following the event, the Council acquired government funding through the Belwing Scheme to hire a Flood Warden and implemented a £2 million flood alleviation scheme in 1998/99;
- Canterbury City Council set up an emergency room for 18 hours with some evacuation to rest centres to deal with flooding in April 2000;
- Following the closure of Tonbridge Swimming Pool for 14 weeks in 2000, the Borough Council invested £250,000 capital to build a double skinned flood wall and manual floodgate system, developed in liaison with a specific flood plan. Other mitigation measures including wireless alarm systems and raised electric sockets were considered;
- In November 2000, Ashford Borough Council diverted £1 million of its own stock to make emergency repairs;
- After floods in Autumn 2000, Tonbridge & Malling Borough Council issued a considerable package of flood recovery works to remedy defective drainage, costing several hundred thousand pounds;
- Canterbury City Council set up an emergency room on four to five occasions in 2001, deploying full teams to make evacuations and set up rest centres. Sandbags distributed across the City prevented 500 houses from being internally flooded;
- Sevenoaks District Council's street cleansing team spent £500 working with KHS in 2005 to clear flood debris. 250 sandbags were deployed and 14,500 gallons of water displaced to help limit the extent of the flooding;



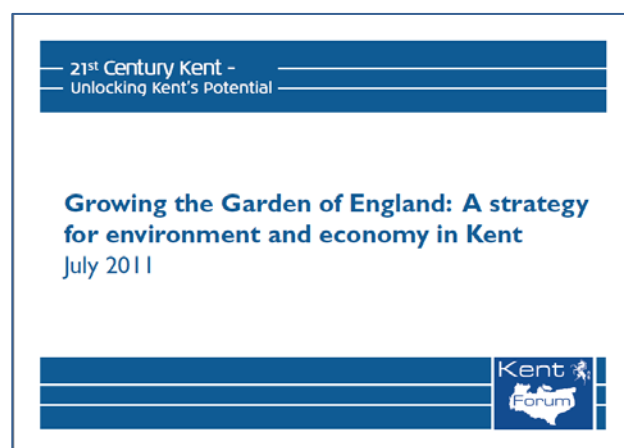
- Dartford Borough Council spent £5000 on a new waste water container for the district's central park, in July 2009;
- Following heatwave and drought events in 2006, Dover District Council updated its pre-season planning schedule to include drought resistant bedding plants, use of 'grey' water, use of cans instead of hosepipes to reduce water use, along with the use of more inert materials and mulching to mitigate water evaporation. The council also replaced vehicle washing programmes with jet washing facilities in public areas;
- In February 2009, Sevenoaks District Council moved towards greater electronic delivery of services, making research tools available on-line and providing some teams with IT keys to enable remote access to services.

Next Steps

It is clear from LCLIP findings that severe weather has had a significant impact on Kent and our ability to deliver services to the county throughout the 14 years analysed. The UK Climate Projections (UKCP09) suggest we are likely to see an increase in these types of weather extremes into the future and in light of the actions required to respond and prepare for climate change, Kent has taken a strategic view:

Kent Environment Strategy

Kent County Council has worked in partnership with Districts and Borough Councils, emergency services and public and private sector bodies across Kent to develop county-wide priorities for Kent to achieve by 2030, outlined in the Kent Environment Strategy, a document to deliver social, economic and environmental wellbeing for Kent's communities over the next 20 years.

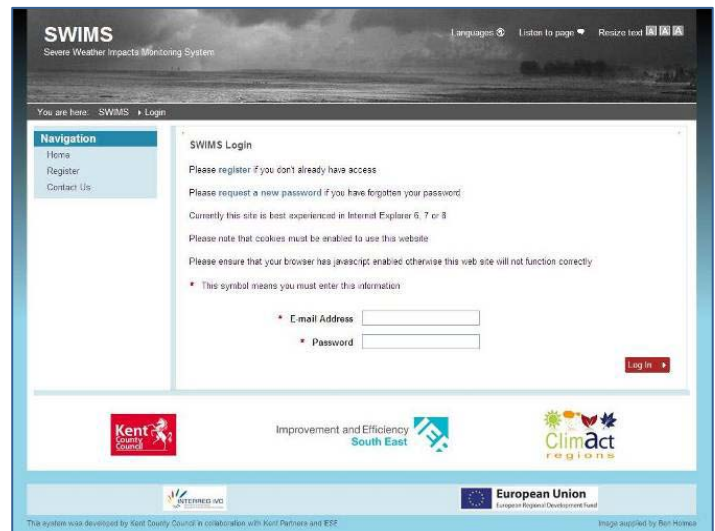


Kent Adaptation Action Plan

A key priority within theme 2 of the strategy is to ***manage the impacts of climate change, in particular severe weather events*** and Kent partners have identified key opportunities and threats arising from climate change and developed a comprehensive action plan to address these. The Kent Adaptation Action Plan identifies the actions we will be taking over the next two years in priority areas, including Health & Social Care; Biodiversity and the Natural Environment; Kent Highway Services; Kent Communities; Kent Businesses; Public Sector Estate; Public Sector Staff; Waste Management and Planning. This will ensure we take full advantage of the opportunities a changing climate can bring to the county and manage the risks to our service continuity and operations.

On-going data collection and monitoring

The LCLIP findings were based on a limited data capture, highlighting that we can go further in building a clear picture of how we are impacted by severe weather events across the county. In 2011 Kent partners developed the Severe Weather Impacts Monitoring System (SWIMS), a decision-support tool enabling partners to capture key information on how they are being impacted by, and responding to, severe weather. By using this system, Kent partners can build up a sound evidence base to develop business cases for taking adaptive action.



Links to further information:

- Kent County Council Climate Change pages: www.kent.gov.uk/climatechange
- Kent Environment Strategy: www.kent.gov.uk/environment_and_planning/environment_and_climate_change/kent_environment_strategy.aspx
- Kent Adaptation Action Plan: http://www.kent.gov.uk/environment_and_planning/environment_and_climate_change/adaptation_plan.aspx
- SWIMS: www.kent.gov.uk/SWIMS