EB077

Environment Agency

# South Essex Catchment Flood Management Plan

Summary Report December 2009

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# Introduction

**I am pleased to introduce our summary of the South Essex Catchment Flood Management Plan (CFMP). This CFMP gives an overview of the flood risk in the South Essex CFMP area and sets out our preferred plan for sustainable flood risk management over the next 50 to 100 years.**

The South Essex CFMP is one of 77 CFMPs for England and Wales. Through the CFMPs, we have assessed inland flood risk across all of England and Wales for the first time. The CFMP considers all types of inland flooding, from rivers, ground water, surface water and tidal flooding, but not flooding directly from the sea (coastal flooding), which is covered by Shoreline Management Plans (SMPs). Our coverage of surface and groundwater flooding is however limited due to a lack of available information.

The role of CFMPs is to establish flood risk management policies which will deliver sustainable flood risk management for the long term. This is essential if we are to make the right investment decisions for the future and to help prepare ourselves effectively for the impact of climate change. We will use CFMPs to help us target our limited resources where the risks are greatest.

This CFMP identifies flood risk management policies to assist all key decision makers in the catchment. It was produced through a wide consultation and appraisal process, however it is only the first step towards an integrated approach to flood risk management. As we all work together to achieve our objectives, we must monitor and listen to each others progress, discuss what has been achieved and consider where we may need to review parts of the CFMP.

There are different sources of flood risk in the catchment. River flooding occurs from the rivers Mardyke, Crouch, Roach and their tributaries that discharge directly into the sea or the Thames Estuary. Wickford, Eastwood, Stanford-le-Hope and Purfleet are at risk of river flooding. Tidal flooding from the North Sea and the estuaries, affects Burnham-on-Crouch, North and South Fambridge, South Woodham Ferrers, Purfleet, Tilbury and Canvey Island. The lower reaches of the rivers Crouch, Horndon, Mardyke and Roach are also influenced by tides. Southend-on-Sea, Basildon, Wickford and Grays are at risk of surface water flooding. Sewer flooding has occurred in Stanford-le-Hope, Southend-on-Sea, Purfleet, Tilbury and Basildon. Aveley and Purfleet may be vulnerable to groundwater flooding.

We cannot reduce flood risk on our own. We will therefore work closely with all our partners to improve the co-ordination of flood risk activities and agree the most effective way to manage flood risk in the future. We work with many organisations, groups and individuals with an interest in how flood risk is managed including local authorities, Internal Drainage Boards (IDBs), water companies, conservation bodies such as Natural England and the public.

This is a summary of the main CFMP document. If you would like to see the full document an electronic version can be obtained by emailing **enquiries@environment-agency.gov.uk** or telephoning 08708 506 506. Alternatively, paper copies can be viewed at any of our offices in Anglian Region.

**Paul Woodcock**
**Regional Director Anglian Region**

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↑ Thorndon Country Park

# The purpose of a CFMP in managing flood risk

CFMPs help us to understand the scale and extent of flooding now and in the future, and set policies for managing flood risk within the catchment. CFMPs should be used to inform planning and decision making by key stakeholders such as:

- the Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions;
- regional planning bodies and local authorities who can use the plan to inform spatial planning activities and emergency planning;
- Internal Drainage Boards (IDBs), water companies and other utilities to help plan their activities in the wider context of the catchment;
- transportation planners;
- land owners, farmers and land managers that manage and operate land for agriculture, conservation and amenity purposes;
- the public and businesses to enhance their understanding of flood risk and how it will be managed.

CFMPs aim to promote more sustainable approaches to managing flood risk. The policies identified in the CFMP will be delivered through a combination of different approaches. Together with our partners, we will implement these approaches through a range of delivery plans, projects and actions.

The relationship between the CFMP, delivery plans, strategies, projects and actions is shown in Figure 1.

**Figure 1 The relationship between CFMPs, delivery plans, projects and actions**


Note: Some plans may not be led by us – we may identify the need and encourage their development.

# Catchment overview

The South Essex CFMP area is located in the east of England. Map 1 shows the location and extent of the South Essex CFMP, it includes the catchments of three major rivers: The River Crouch, the River Roach and the River Mardyke. The downstream limit of the CFMP area is located at The Essex and South Suffolk Shoreline Management Plan (SMP) boundary. The SMP deals with coastal flood management issues along its boundary from Landguard Point (on the north bank of the Orwell estuary) to Purfleet (on the north bank of the River Thames) including the estuaries up to their tidal limit.

The CFMP covers an area of around 727 km$^2$, and has a population of 650,000 people. Over 20% of the total area is urbanised, this figure is likely to increase in the future following initiatives such as the Thames Gateway development. The main urban areas within the CFMP are: Basildon, Southend-on-Sea, Grays and Rochford. Smaller towns include Eastwood, Tilbury, Canvey Island and Wickford. Approximately 46% of the land in the CFMP area is used for arable crop production and 23% for pasture land.

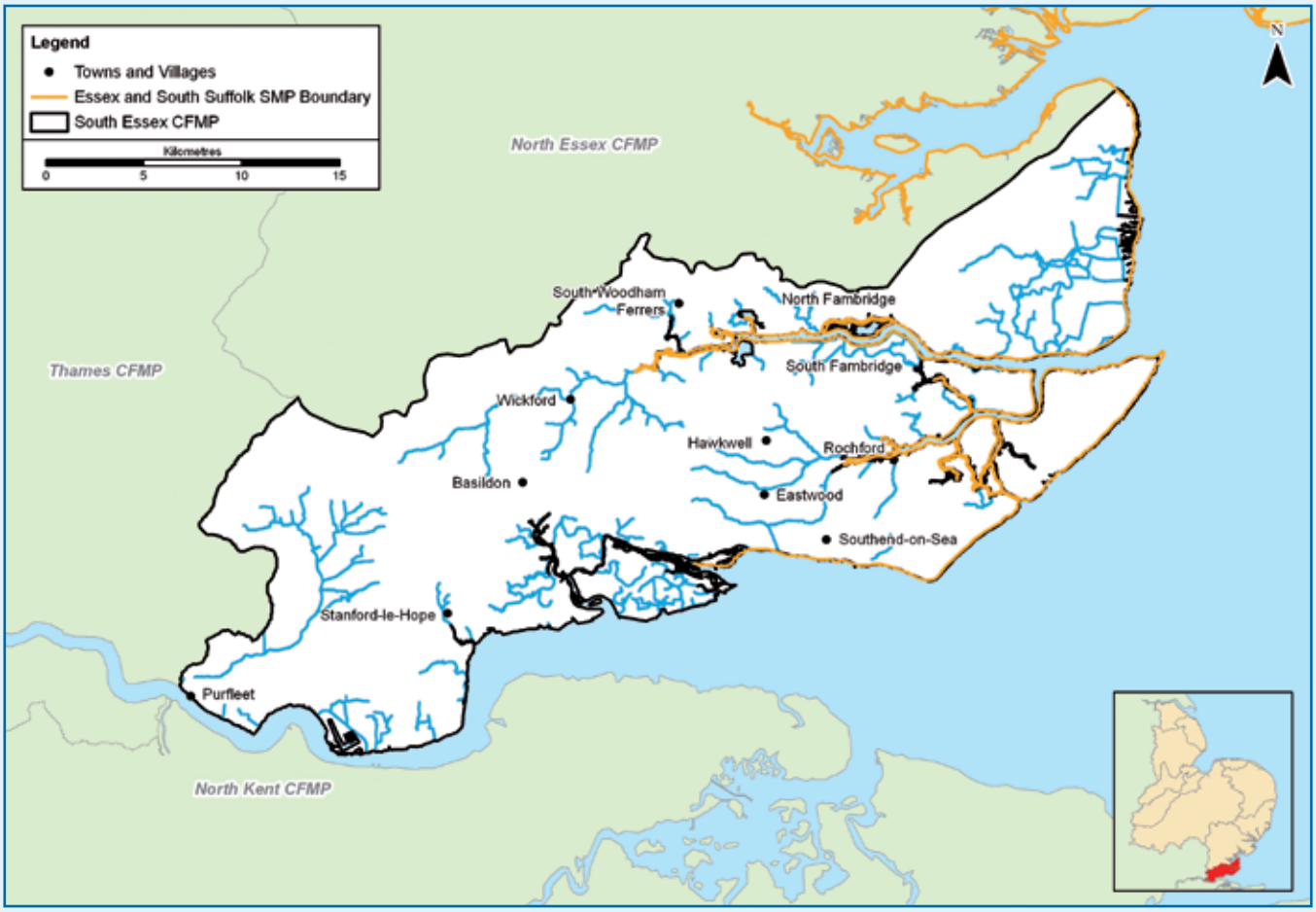
Much of the South Essex CFMP area is low-lying. The CFMP area can be split into three characteristic groups:

- relatively low-lying marshes of Dengie, Foulness, Canvey, Tilbury and the valleys of the rivers Crouch and Mardyke;
- the high grounds between Brentwood and Billericay to the north, the Langdon Hills at Basildon and the area of land between South Benfleet and Hockley in the east of the CFMP area;
- the clay uplands surrounding the valleys of the rivers Crouch and Mardyke.

The underlying geology is dominated by London clay, with some underlying chalk to the south-west of the CFMP area around Tilbury and Thurrock. Where the underlying rock is clay, there are higher rates of rainfall runoff, and runoff flows directly into the watercourses. There is also a risk from surface water flooding in these areas. In the areas where there is chalk bedrock, runoff may infiltrate the rock delaying the response of rivers to rainfall and reducing peak flood flows. There is also a risk from groundwater flooding in these areas.

Within the South Essex CFMP area there are a number of sites designated for their environmental importance including Special Protection Areas (SPAs), Special Areas of Conservation (SAC), Ramsar sites, Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs). Important environment sites in the catchment include: Dengie (Ramsar, SPA, SAC, NNR, SSSI), Mucking Flats and Marshes (Ramsar, SPA, SSSI), Crouch and Roach Estuaries (Ramsar, SPA, SAC, SSSI). River flooding has a minimal impact on these sites and they will be mainly affected by issues considered in the Essex and South Suffolk SMP. Throughout the CFMP area there are 25 SSSIs. There are 60 Scheduled Monuments (SMs), designated for their heritage value distributed across the CFMP area.

## Map 1 Location and extent of the South Essex CFMP area




↑ Stifford gauging station, River Mardyke

# Current and future flood risk

## Overview of the current flood risk

Flood risk has two components: the chance (probability) of a particular flood and the impact (or consequence) that the flood would have if it happened. The probability of a flood relates to the likelihood of a flood of that size occurring within a one year period, it is expressed as a percentage. For example, a 1% annual probability flood has a 1% chance or 0.01 probability of occurring in any one year, and a 0.5% annual probability flood has a 0.5% chance or 0.005 probability of occurring in any one year. The flood risks quoted in this report are those that take account of flood defences already in place.

The catchment has a history of flooding. There have been some significant events in past years. For example major tidal flooding occurred in 1953 and 1978 and there was some minor tidal flooding in 2005. Significant river flooding occurred in 1958 and 1968 with some minor river flooding events in 1981, 2002 and 2003.

Currently the main sources of flood risk for people, property, infrastructure and the land are:

- river flooding from the River Crouch in Basildon and Wickford, from the River Roach in Hawkwell and Rochford, from Eastwood Brook in Eastwood, from Prittle Brook in Southend-on-Sea and Stanford Brook in Stanford-le-Hope;
- surface water flooding, particularly in large urban areas such as Southend-on-Sea, Rochford, Wickford and Grays, due to the impermeable surfaces of these urban areas. Parts of the CFMP area such as Basildon, Hawkwell, Hockley and Rayleigh are susceptible to surface water flooding due to the steep slopes and underlying impermeable clay;
- sewer flooding has caused problems in the past in Southend-on-Sea, Thurrock, Castle Point and Basildon. The majority of this flooding is a result of the inadequate capacity of the sewage system and blockages;
- groundwater flooding is a risk in the chalk areas around Thurrock and Tilbury, where there are high groundwater levels in the underlying rock. However there have been no records of groundwater flooding in the South Essex CFMP area.

## What is at risk?

At present there are approximately 5,900 people and 2,700 commercial and residential properties at risk in the CFMP area from the 1% annual probability river flood, taking into account the current flood defences. This means that 1% of the total population living in the CFMP area are currently at risk from river flooding. There is 115 $km^2$ of grade one and two agricultural land in the CFMP area and approximately 1% of this is at risk of flooding from a 1% annual probability river flood. There is a grade three agricultural land at risk in the lower part of the catchment.

It is difficult to assess the current impact of flooding to environmental features. The internationally important sites of Dengie (Ramsar, SPA, SAC, NNR, SSSI) and Crouch and Roach Estuaries (Ramsar, SPA, SAC, SSSI) are not thought to be affected by the impacts of river flooding. The Mucking Flats and Marshes (Ramsar, SPA, SSSI) may be positively impacted by river flooding. Two other SSSIs, one Scheduled Monument (SM) and 23 listed buildings may be at some flood risk in the 1% annual probability river flood.

## Where is the risk?

Around half of the people and properties that are at risk within the CFMP area from a 1% annual probability river flood, (taking into account current flood defences) are located in Wickford and North Benfleet. Large numbers of people and property are also at risk from river flooding in Eastwood (around 15% of the people and properties at risk) and Stanford-le-Hope (a further 15% of the people and properties at risk).

The distribution of properties at risk from a 1% annual probability river flood, taking into account current flood defences, is illustrated on Map 2. Table 1 summarises where there is flood risk to more than 25 properties. Table 2 shows the critical infrastructure at risk in a 1% annual probability river flood. We recognise that there is also a potential risk from surface water and groundwater flooding. However, further studies following on from the CFMP are needed by us and our partners to quantify this potential risk.

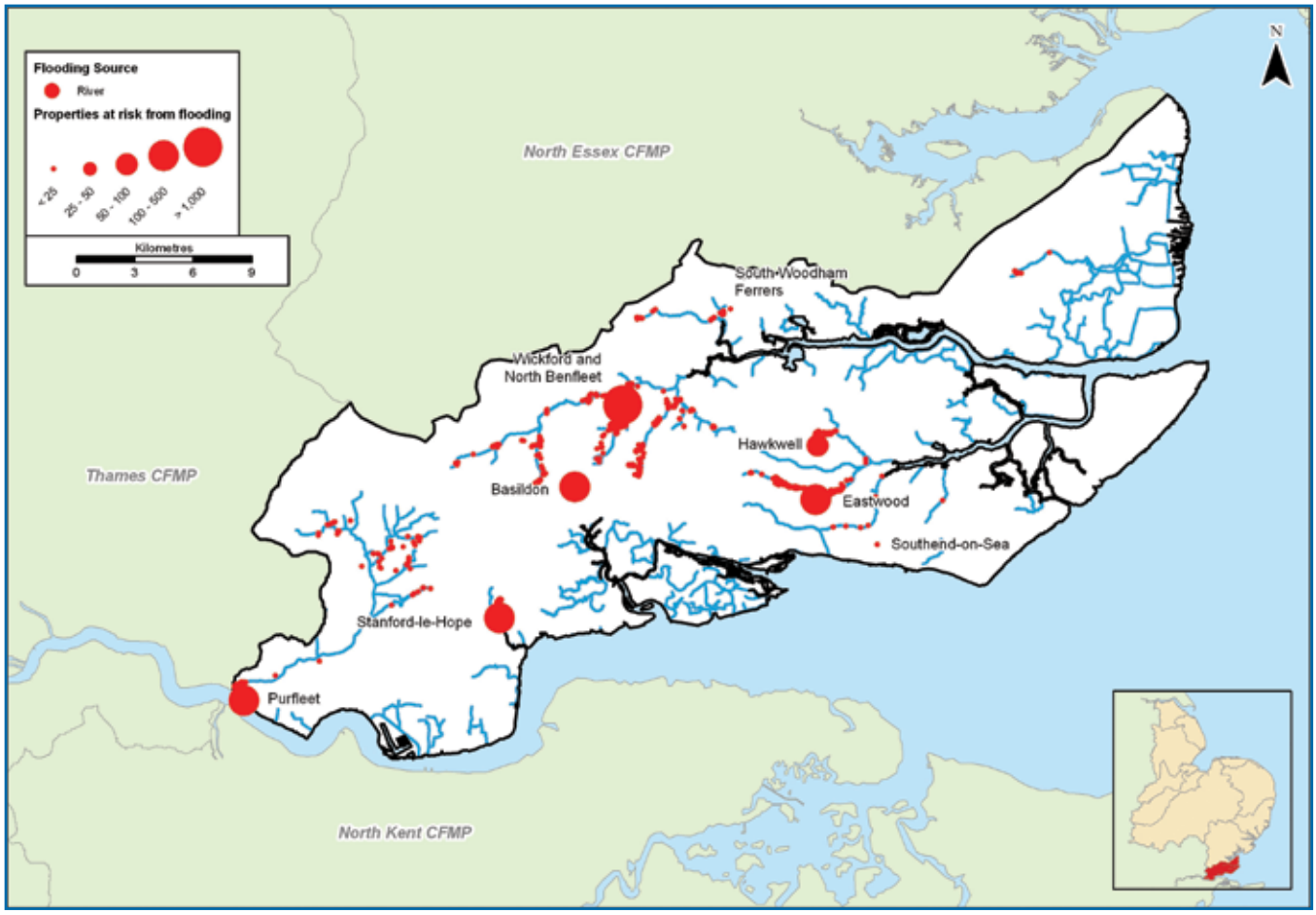
**Table 1 Locations of towns and villages with 25 or more properties at risk in a 1% annual probability river flood, taking into account current flood defences**

| Number of properties at risk | Locations |
|---|---|
| › 1,000 | Wickford and North Benfleet |
| 100 to 500 | Basildon, Stanford-le-Hope, Purfleet, Eastwood |
| 50 to 100 | Hawkwell, Rural Mardyke |
| 25 to 50 | None |

**Table 2 Critical infrastructure at risk in a 1% annual probability river flood**

| | |
|---|---|
| Critical infrastructure at risk | Four electricity sub-stations, one sewage treatment works, Sections of A-road, Sections of railway |

**Map 2** Flood risk to property in a 1% annual probability river flood, taking into account current flood defences




## How we currently manage the risk in the catchment

The CFMP area has a history of flooding generally due to the high rainfall that can lead to extensive flooding of the river valleys and the breaching/overtopping of flood defences. In response to past flood events, a number of flood alleviation schemes have been implemented to reduce river flooding in the CFMP area, including:

- channel improvements. Improvements to Eastwood Brook through Southend-on-sea and on the River Crouch through Wickford provide protection from a 20% to a 1% annual probability river flood. Improvements on the River Roach through Rochford, on Hockley Brook through Hockley and Hawkwell Brook through Hawkwell, all provide protection up to a 1% annual probability river flood;
- flood embankments. Natural earth embankments along the downstream section of Prittle Brook provide protection up to a 1% annual probability river flood in Southend-on-sea. Man made raised defences on the River Roach at Stambridge Mills protect the surrounding agricultural land up to a 2% annual probability river flood. Embankments on the River Roach provide protection up to a 2% annual probability river flood in Mill Head. There are also raised embankments on Asheldham Brook north of Southminster;
- flood relief channels. The Prittle flood relief tunnel at Southend-on-sea provides protection up to a 1% annual probability river flood. Artificial watercourses and the Tilbury flood relief scheme provide protection up to a 1% annual probability river flood in the Tilbury and West Thurrock area;

- flood storage areas. There are a number of flood storage areas that manage the risk of flooding in Basildon: Pipps Hill Lake and lakes in Gloucester Park on Basildon Brook; Burnt Mills, lakes in Northlands Park on Nevenden Bushes Brook, Tilbury, South Woodham Ferrers and Laindon.

These measures have all reduced flood risk and around 1% of the total population in this CFMP area are currently living in areas that benefit from flood risk management schemes.

In addition to these engineering schemes, other flood risk management activities are carried out in the catchment. These include activities which help to reduce the probability of flooding and those that address the consequences of flooding.

Activities that reduce the probability of flooding include:

- maintaining and improving existing flood defences and structures;
- maintaining river channels;
- maintenance of drainage networks by landowners;
- maintenance of road drainage and sewer systems.

Activities that reduce the consequences of flooding include:

- working with local authorities to influence the location, layout and design of new and redeveloped property and ensuring that only appropriate development is allowed on the floodplain through the application of Planning Policy Statement 25 (PPS25);
- understanding where flooding is likely by using flood risk mapping;
- providing flood forecasting and warning services;
- promoting awareness of flooding so that organisations, communities and individuals are aware of the risk and are prepared in case they need to take action in time of flood;
- promoting resilience and resistance measures for those properties already in the floodplain.

Combinations of engineering and other flood risk management activities are used to reduce the probability or consequences of flooding. We have investigated which activities are likely to be most effective and appropriate in different parts of the CFMP area in the future.

↑ River Crouch

## The impact of climate change and future flood risk

In the future, flooding can be influenced by climate change, changes in land use (for example urban development) and rural land management. Using river models we tested the sensitivity of the rivers in the CFMP area to these drivers.

For urbanisation, we tested the sensitivity of the rivers in the catchment by increasing the urban growth value in the model. Increasing urbanisation had an impact on flood risk.

For climate change we tested the following changes up to 2100:

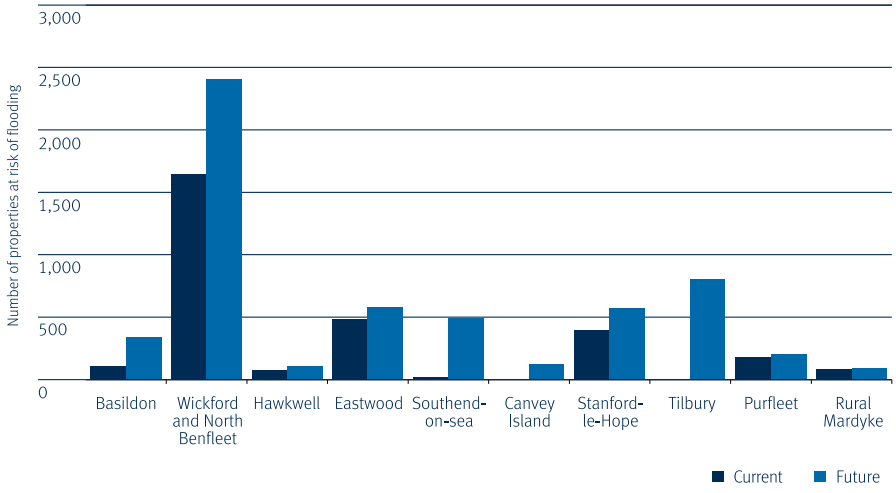
- 20% increase in peak flow in all watercourses. This will increase the probability of large-scale flood risk;
- a total sea level rise of 112 mm by the year 2100. This will increase the probability of tidal flooding and increase the length of time watercourses will not be able to flow freely to the sea at high tide (tide-locked). Climate change was shown to have a significant impact on flood risk.

For rural land management, we adjusted the river models to represent the effect of reducing and increasing intensive farming practices. At a catchment scale this had a limited impact on flood risk. Therefore, changes in rural land management were not taken forward into the final future scenario.

In the South Essex catchment, climate change and urbanisation were shown to have the greatest impact on flood risk. Therefore, the scenario used to model future flood risk was based on urbanisation and climate change as described.

Using river models we estimate that by 2100, approximately 11,800 people and 4,800 residential and commercial properties will be at flood risk across the CFMP area from the 1% annual probability river flood. These figures take account of current flood defences. River flood risk increases mainly in Wickford, Basildon, Tilbury, Canvey Island, Southend-on-Sea and Stanford-le-Hope. Figure 2 shows the difference between current and future flood risks from a 1% annual probability river flood at key locations in the CFMP area. Following on from the CFMP, organisations need to work together to investigate flood risk from other sources (for example, surface water and ground water flooding) in more detail.

**Figure 2 Current and future (2100) flood risk to property from the 1% annual probability river flood taking account of current flood defences**



In a future 1% annual probability river flood, flood risk to infrastructure and transport services is expected to increase. In the future, during a 1% annual probability river flood there is risk to nine electricity sub-stations, two sewage treatment works, and sections of A road and railway.

In the future no additional designated environment sites are expected to be at risk. The area of the environmental site at risk is expected to increase but the consequences of flooding are unlikely to change. One additional listed building may be at risk from a 1% annual probability river flood.

↑ Prittle Brook, Southend-on-Sea

# Future direction for flood risk management

## Approaches in each sub-area

We have divided the South Essex catchment into nine distinct sub-areas which have similar physical characteristics, sources of flooding and level of risk. We have identified the most appropriate approach to managing flood risk for each of the sub-areas and allocated one of six generic flood risk management policies, shown in Table 3.

To select the most appropriate policy, the plan has considered how social, economic and environmental objectives are affected by flood risk management activities under each policy option.

**Map 3** Sub-areas and flood risk management policies

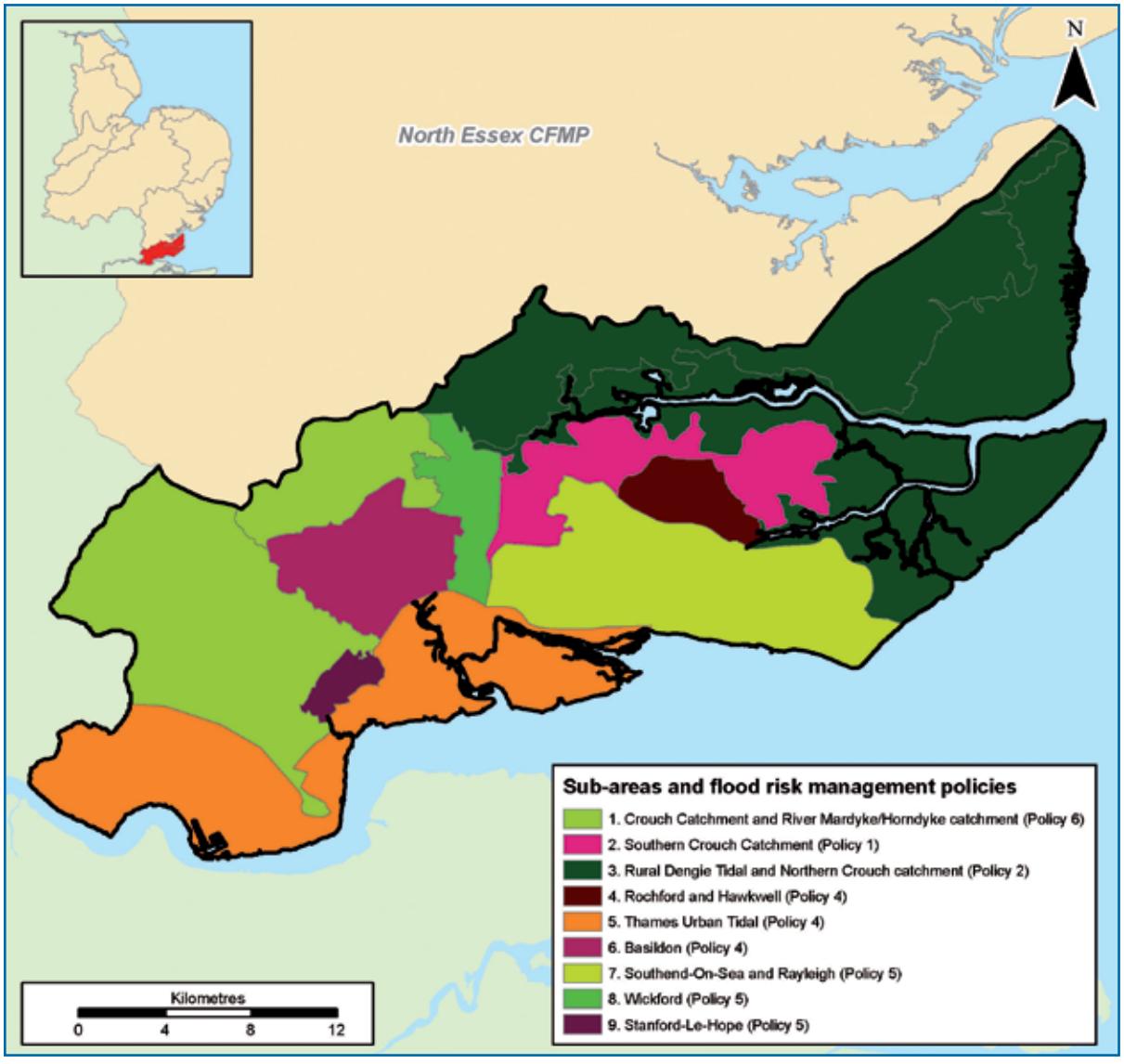


Table 3 **Flood risk management policy options**

## ➜ Policy 1

**Areas of little or no flood risk where we will continue to monitor and advise**

This policy will tend to be applied in those areas where there are very few properties at risk of flooding. It reflects a commitment to work with the natural flood processes as far as possible.

## ➜ Policy 2

**Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions**

This policy will tend to be applied where the overall level of risk to people and property is low to moderate. It may no longer be value for money to focus on continuing current levels of maintenance of existing defences if we can use resources to reduce risk where there are more people at higher risk. We would therefore review the flood risk management actions being taken so that they are proportionate to the level of risk.

## ➜ Policy 3

**Areas of low to moderate flood risk where we are generally managing existing flood risk effectively**

This policy will tend to be applied where the risks are currently appropriately managed and where the risk of flooding is not expected to increase significantly in the future. However, we keep our approach under review, looking for improvements and responding to new challenges or information as they emerge. We may review our approach to managing flood defences and other flood risk management actions, to ensure that we are managing efficiently and taking the best approach to managing flood risk in the longer term.

## ➜ Policy 4

**Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change**

This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

## ➜ Policy 5

**Areas of moderate to high flood risk where we can generally take further action to reduce flood risk**

This policy will tend to be applied to those areas where the case for further action to reduce flood risk is most compelling, for example where there are many people at high risk, or where changes in the environment have already increased risk. Taking further action to reduce risk will require additional appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

## ➜ Policy 6

**Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits**

This policy will tend to be applied where there may be opportunities in some locations to reduce flood risk locally or more widely in a catchment by storing water or managing run-off. The policy has been applied to an area (where the potential to apply the policy exists), but would only be implemented in specific locations within the area, after more detailed appraisal and consultation.

# Crouch catchment and River Mardyke/Horndon catchment

## Our key partners are:

**Thurrock Council**

**Essex County Council**

## The issues in this sub-area

There is low risk to people and property, which are scattered in isolated locations throughout this sub-area. Currently 129 properties within this sub-area are at risk from the 1% annual probability river flood. The majority of the properties at risk (80) are located in the River Mardyke/Horndon catchment. There is some grade two and three agricultural land, the A129, A176, A128 and one Sewage Treatment Works (STW) at risk in the 1% annual probability river flood. Tables 4 and 5 detail flood risk to people and property in this sub-area.

Table 4 **Risk to people and property within the Crouch catchment during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 101 | 118 |
| Number of properties at risk | 49 | 57 |

Table 5 **Risk to people and property within the River Mardyke/Horndon catchment during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 140 | 160 |
| Number of properties at risk | 80 | 90 |

The floodplain in this sub-area can provide an area to store water during flood events. The storage of floodwaters can reduce the impact of flooding to people and properties in urbanised areas downstream. For example, storage of water in the Crouch catchment sub-area may reduce the risk to people in the town of Wickford, and storage of water in the River Mardyke/Horndon catchment sub-area may reduce the risk of flooding to people in Purfleet and Stanford-le-Hope. Currently there is low risk to people and property in this sub-area and the storage of floodwaters will not increase this risk.

## The vision and preferred policy

**Policy option 6:** Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

In these largely rural areas the aim is to manage flood risk by maximising the potential of the floodplain to retain water to benefit locations elsewhere in the catchment. Storing water on these floodplains can reduce flood risk to settlements downstream. This approach may involve:

- restoring river channels, water meadows and the natural floodplain;
- reducing runoff from agricultural land;
- structural measures to control water levels and retain more water on the floodplains;
- engineered schemes to store floodwater.

Locally, the floodplain storage areas may provide long-term benefits for the river environment and wetland habitats.

Within this sub-area reducing bank and channel maintenance will increase the ability of the floodplain to store water by improving the flow between the river and its floodplain. However, where flood risk may be more concentrated, such as in towns and villages, existing actions to manage flooding may be continued.

To be able to use the floodplain for flood risk management, planners must prevent development that affects the ability of the floodplain to retain water.

## The key messages

- Storing water on the floodplain can reduce flood risk to settlements downstream.
- Development that affects the ability of the floodplain to retain water should be prevented.
- Maintenance work on rivers should aim to increase the capacity of the floodplain to retain water.
- Storing water on the floodplain could provide long-term benefits for the river environment and wetland habitats.

## Proposed actions to implement the preferred policy

**General actions across the sub-area:**

- Produce flood storage studies to investigate the most appropriate storage options and locations for floodplain storage. The studies should also consider opportunities to enhance the environment by improving the natural state of the river and its habitat.
- Identify opportunities where bank and channel maintenance can be reduced to improve the flow between the river and its floodplain to increase water storage on the natural floodplain.
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and flood awareness plans.

**Actions specific to the Crouch catchment:**

- Continue with the current flood risk management activities in Noaks Hill.
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be resilient to flooding and provide opportunities to improve river environments.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.

**Actions specific to the River Mardyke/Horndon catchment:**

- Encourage planners to prevent development within the floodplain. The floodplain should be maintained as an asset to make space for water.

# Southern Crouch catchment

## Our key partners are:

**Rochford District Council**

**Anglian Water**

## The issues in this sub-area

Currently there are 10 properties at risk from the 1% annual probability river flood. There is mainly grade three agricultural land, the A125 and A129 are at risk in a 1% annual probability river flood. Table 6 details flood risk to people and property in this sub-area.

**Table 6 Risk to people and property within the Southern Crouch catchment sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 5 | 25 |
| Number of properties at risk | 10 | 19 |

## The vision and preferred policy

**Policy option 1:** No active intervention (including flood warning and maintenance). Continue to monitor and advise.

Flood risk is minimal in this sub-area. Expenditure is already low and so ceasing the current maintenance activity will not significantly increase flood risk locally or downstream. This policy will enable limited resources to be targeted to other areas of the catchment where the risks are greater, to ensure value for money. Having no ongoing maintenance activity in this sub-area will provide environmental benefits by allowing the river channel to return to its natural state.

## The key messages

- Where feasible, flood risk management activities will be ceased, as the current activity to manage flooding is out of proportion with the level of flood risk.
- Ceasing channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain.

## Proposed actions to implement the preferred policy

- Investigate options to cease current bank and channel maintenance and flood defence maintenance. In addition, changes in land use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in flooding in the future.
- Monitor this policy unit for any changes in flood risk.
- Work with partners to investigate the extent and impact of surface water flooding in Ashingdon.

↑ Rawreth Brook

# Rural Dengie Tidal and Northern Crouch catchment

## Our key partners are:

- Rochford District Council
- Chelmsford Borough Council
- Maldon District Council
- Essex County Council
- Anglian Water

## The issues in this sub-area

Currently there are 75 properties at risk in this sub-area from the 1% annual probability river flood. There is grade two and grade three agricultural land, the A1245, A132 and one electricity sub-station at risk in a 1% annual probability river flood. Tables 7 and 8 detail flood risk to people and property in this sub-area.

**Table 7 Risk to people and property within the Rural Dengie Tidal sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 113 | 148 |
| Number of properties at risk | 56 | 69 |

**Table 8 Risk to people and property within the Northern Crouch catchment sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 40 | 76 |
| Number of properties at risk | 19 | 36 |

## The vision and preferred policy

**Policy option 2:** Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

In these rural areas the current activity to manage flooding is out of proportion with the level of flood risk, or is not effective. In general, overall flood risk management activities will be reduced within this sub-area, however where flood risk is more concentrated (for example in towns and villages) existing actions to manage flooding may be continued.

The preferred approach is to reduce bank and channel maintenance in some locations. This will enable limited resources to be targeted to other areas of the catchment where the risks are greater, to ensure value for money. The preferred approach will also help improve the flow between the river and its floodplain and so improve wetland and aquatic habitats.

Flood warning is an important way of managing the consequences of flooding throughout the catchment. Therefore, the local flood warning infrastructure (such as river flow gauging stations) needs to be maintained.

## The key messages

- Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk.
- Reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain.
- Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.

## Proposed actions to implement the preferred policy

**General actions across the area:**

- Investigate options to reduce current bank and channel maintenance and flood defence maintenance. In addition, changes in land use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in flooding in the future.
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be resilient to flooding and provide opportunities to improve river environments.

**Actions specific to Rural Dengie Tidal:**

- Work with partners to develop a surface water management plan for Great and Little Wakering and Asheldham.

**Actions specific to Northern Crouch catchment:**

- Work with partners to investigate the extent and impact of surface water flooding particularly in Rettendon, Southminster and Burnham-on-Crouch.

↑ Dengie Site of Special Scientific Interest

# Rochford/Hawkwell

## Our key partners are:

**Essex County Council**

**Rochford District Council**

## The issues in this sub-area

Currently there are 118 properties at risk from the 1% annual probability river flood. There is a small amount of agricultural land at risk in the 1% annual probability river flood, but no critical infrastructure is at risk. Table 9 details flood risk to people and property in this sub-area.

**Table 9 Risk to people and property within the Rochford and Hawkwell sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 262 | 474 |
| Number of properties at risk | 118 | 211 |

## The vision and preferred policy

**Policy option 4:** Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

Hawkwell is at risk from river flooding and tidal influences are evident in Rochford.

Historically, flood defences have been constructed to reduce the probability of flooding in Rochford and Hawkwell. In the future, the protection given by these defences may decline. Flood risk is expected to increase in the future to people and property. It is therefore important to maintain the current level of flood risk into the future. For these settlements the preferred approach to manage future flood risk will be to improve current maintenance activities.

Different approaches are required for different sources of flooding, as river defences do not reduce the risk from urban drainage issues and surface water flooding. Investigations into the impacts of surface water flooding may identify the need for further management.

The risk of flooding cannot be completely removed, therefore flood awareness plans must continue to be promoted. The flood awareness plans should focus on informing people how to prepare for and respond to flooding.

## The key messages

- Investigate improving maintenance activities to manage flood risk into the future.
- Emergency response and flood awareness plans will be used to manage flood risk from the flood defences failing or being overwhelmed.
- Organisations need to take an integrated approach to managing river, tidal and surface water flooding.

## Proposed actions to implement the preferred policy

- Investigate improving current maintenance activities to manage the flood risk into the future.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to, flood warnings. Flood awareness plans will inform people about the risk of defences breaching and the actions they can take to protect themselves and their property.
- Develop emergency response plans to manage flood risk from the defences failing or being overwhelmed, and work with partners to manage flood risk to critical infrastructure.
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be resilient to flooding and provide opportunities to improve river environments.
- Work with partners to develop a Surface Water Management Plan for Rochford, Hawkwell and Hockley.

↑ Hockley Brook

# Thames urban tidal

## Our key partners are:

**Castle Point Borough Council**

**Basildon District Council**

**Thurrock Council**

**Essex County Council**

**Anglian Water**

## The issues in this sub-area

In this urban sub-area, there are currently 181 properties at risk from the 1% annual probability river flood. There are no formal river flood defences in this sub-area. There is some agricultural land, the A1090 and A1306 are risk from the 1% annual probability river flood. Table 10 details flood risk to people and property in this sub-area.

Table 10 **Risk to people and property within the Thames urban tidal sub-area during a 1% annual probability river flood**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 396 | 453 |
| Number of properties at risk | 181 | 201 |

## The vision and preferred policy

**Policy option 4:** Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

The majority of the sub-area is relatively flat and low-lying. Historically, the area has relied on a pumped drainage system to control river and surface water flood risk. The failure of the system would lead to an unsuitable level of risk in the sub-area.

This policy would allow us to take additional action to sustain the current flood risk into the future. The preferred approach is to manage the probability of river flooding by storing water on the floodplain upstream in the Crouch catchment, River Mardyke/Horndon catchment sub-area. This should be in combination with increasing maintenance in the settlements throughout the sub-area.

Different approaches are required for different sources of flooding, as river defences do not reduce the risk from urban drainage issues and surface water flooding.

Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.

The risk of flooding cannot be completely removed. Other measures need to be taken to manage the consequences of flooding. Flood awareness plans should be produced to encourage people to sign up to and respond to flood warnings. Within the town the urban environment needs to be adapted to make it more resilient to flooding, for example as commercial sites are redeveloped, the location and layout of buildings could be designed to help reduce flood risk

## The key messages

- Storing water on the floodplain upstream can reduce flood risk to the settlements in this sub-area.
- Investigate improving current maintenance activities to manage flood risk into the future.
- Emergency response and flood awareness plans will be used to manage flood risk from the flood defences failing or being overwhelmed.
- Organisations need to take an integrated approach to managing river, tidal and surface water flooding.

## Proposed actions to implement the preferred policy

- Investigate improving current maintenance activities to manage the flood risk into the future.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to, flood warnings. Flood awareness plans will inform people about the risk of defences breaching and the actions they can take to protect themselves and their property.
- Develop emergency response plans to manage flood risk from the defences failing or being overwhelmed, and work with partners to manage flood risk to critical infrastructure.
- Develop a flood storage study to investigate the feasibility of creating storage areas, natural or engineered, along the river corridor upstream of this sub-area to manage future flood risk.
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be resilient to flooding and provide opportunities to improve river environments.
- Work with partners to develop a Surface Water Management Plan for Canvey Island, Tilbury and Purfleet.

↑ Canvey Island

# Basildon

## Our key partners are:

**Basildon District Council**

**Essex County Council**

## The issues in this sub-area

Currently there are 109 properties at risk from the 1% annual probability river flood. There is a very small amount of agricultural land, the A1235 and two electricity sub-stations are at risk in a 1% annual probability river flood. Table 11 details flood risk to people and property in this sub-area.

**Table 11 Risk to people and property within the Basildon sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 193 | 683 |
| Number of properties at risk | 109 | 337 |

## The vision and preferred policy

**Policy option 4:** Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

Historically, flood risk in Basildon has been managed through extensive maintenance activities and flood storage areas. The preferred approach is to improve maintenance activities to manage flood risk into the future. This includes maintenance of the Basildon washlands to ensure they function at their design standard. As flooding becomes more frequent in the future, this policy will reduce the risk to people in Basildon and other risk areas downstream such as Wickford.

Different approaches are required for different sources of flooding, as river defences do not reduce the risk from urban drainage issues and surface water flooding.

Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.

The risk of flooding cannot be completely removed. Other measures need to be taken to manage the consequences of flooding. Flood awareness plans should be produced to encourage people to sign up to and respond to flood warnings. Within the town the urban environment needs to be adapted to make it more resilient to flooding, for example as commercial sites are redeveloped, the location and layout of buildings could be designed to help reduce flood risk.

## The key messages

- Where possible, flood risk should be managed by storing water on the floodplain upstream of settlements at risk.
- Investigate improving current maintenance activities to manage flood risk into the future.
- Any redevelopment of floodplain areas is an opportunity to increase their flood resilience.
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.
- Flood awareness plans will be used to manage the consequences of flooding.

## Proposed actions to implement the preferred policy

- Investigate improving current maintenance activities through the town, and working with partners to improve the capacity of the existing washland system to manage future flood risk.
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be resilient to flooding and provide opportunities to improve river environments.
- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk.
- Work with partners to investigate the options for managing urban drainage issues and surface water flooding. Where strategies, including water cycle strategies have been developed, organisations need to work together to implement the recommendations made.

↑ Basildon Brook

# Southend-on-Sea and Rayleigh

## Our key partners are:

**Southend-on-Sea Borough Council**

**Anglian Water**

## The issues in this sub-area

Currently there are 505 properties at risk from the 1% annual probability river flood. There is some agricultural land, the A1015, A1158 and A1159 are at risk from the 1% annual probability river flood. Table 12 details flood risk to people and property in this sub-area.

Table 12 **Risk to people and property within the Southend-on-sea/Rayleigh sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 955 | 2,314 |
| Number of properties at risk | 505 | 1,161 |

## The vision and preferred policy

**Policy option 5:** Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

In this densely populated urban sub-area the preferred approach to manage flood risk in Southend-on-Sea and Rayleigh, is to do a flood risk study. This study should look at how we can reduce the flood risk, which may investigate the possibility of building new flood defences.

Food risk management planning needs to be linked closely with regeneration and redevelopment of these towns so that policies can be put in place to create green corridors, and to incorporate flood resilience measures into the location, layout and design of development.

Organisations need to work together to manage all flood sources as flooding from surface water and sewer flooding could increase in the future due to more frequent and intense storms.

The risk of flooding cannot be reduced entirely, therefore flood awareness and emergency response plans must be developed to manage the consequences of flooding.

## The key messages

- Develop a study for Southend-on-Sea and Rayleigh to investigate how flood risk in the towns should be managed.
- Flood risk management planning needs to be linked closely with regeneration and redevelopment so that the location and layout of development can help to reduce flood risk.
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.
- Flood awareness and emergency response plans should be used to manage the consequences of flooding.

## Proposed actions to implement the preferred policy

- In the short term, continue with the current flood risk management activities.
- Develop a flood risk study for Southend-on-Sea and Rayleigh. The study should investigate the possibility of building new defences along Prittle and Eastwood Brook.
- Continue with the flood warning service including the maintenance of flood warning infrastructure for example, river flow gauging stations.
- Develop emergency response plans to manage flood risk from the defences failing or being overwhelmed, and work with partners to manage flood risk to critical infrastructure.
- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk.
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk. Planners should prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25), and ensure that any new development does not increase the risk to existing development. Any new development or regeneration should provide opportunities to improve the river environment and make space for water.
- Work with partners to develop a surface water management plan for Southend-on-Sea and Eastwood.

↑ Tributary of the Prittle Brook

# Wickford

## Our key partners are:

**Basildon District Council**

**Essex County Council**

**Anglian Water**

## The issues in this sub-area

Currently there are 1,645 properties at risk from the 1% annual probability river flood. There is some agricultural land, the A132, A129, some railway line and two electricity sub-stations are at risk from the 1% annual probability river flood. Table 13 details flood risk to people and property in this sub-area.

Table 13 **Risk to people and property within the Wickford sub-area during a 1% annual probability river flood, taking into account current flood defences**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 3,126 | 4,697 |
| Number of properties at risk | 1,645 | 2,403 |

## The vision and preferred policy

**Policy option 5:** Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

In this densely populated urban sub-area the preferred approach to manage flood risk in Wickford, is to do a flood risk study. This study should look at how we can manage the probability of flooding by storing flood water on the floodplain upstream in combination with flood defences in the town.

As river defences do not reduce the risk from all sources of flooding organisations must work together to manage the risk of surface water flooding.

The risk of flooding cannot be completely removed. Other measures need to be taken to manage the consequences of flooding. Flood awareness plans should be produced to encourage people to sign up to and respond to flood warnings. Within the town the urban environment needs to be adapted to make it more resilient to flooding, for example as commercial sites are redeveloped, the location and layout of buildings could be designed to help reduce flood risk.

## The key messages

- Develop a study for Wickford to investigate how flood risk in the towns should be managed.
- Any redevelopment of floodplain areas is an opportunity to increase their flood resilience.
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.
- Flood awareness and emergency response plans should be used to manage the consequences of flooding.

## Proposed actions to implement the preferred policy

- In the short term, continue with the current flood risk management activities.
- Develop a flood risk study for Wickford. The study should investigate the possibility of building new defences along North Benfleet Brook.
- Develop a flood storage study to investigate the feasibility of creating storage areas, natural or engineered, along the river corridor upstream of the town to manage future flood risk.

- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk.
- Continue with the flood warning service including the maintenance of flood warning infrastructure for example, river flow gauging stations.
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk. Planners should prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25), and ensure that any new development does not increase the risk to existing development. Any new development or regeneration should provide opportunities to improve the river environment and make space for water.
- Work with partners to develop an emergency response plan for critical infrastructure and transport links at risk of flooding.
- Work with partners to develop a surface water management plan for Wickford.

↑ River Crouch, Wickford

# Stanford-le-Hope

## Our key partners are:

Thurrock Council

Essex County Council

## The issues in this sub-area

Currently there are 397 properties at risk from the 1% annual probability river flood. There is a very small amount of agricultural land, some railway line and one gas works at risk in a 1% annual probability river flood. Table 14 details flood risk to people and property in this sub-area.

**Table 14 Risk to people and property within the Stanford-le-Hope sub-area during a 1% annual probability river flood. There are no formal river flood defences in this policy unit**

| | Current | Future (2100) |
|---|---|---|
| Number of people at risk | 872 | 1,244 |
| Number of properties at risk | 397 | 569 |

## The vision and preferred policy

**Policy option 5:** Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

This mostly urban sub-area has a high population density and contains little open land. Stanford-le-Hope is at flood risk from high flows in Horndon Brook. Impermeable surfaces in this sub-area can lead to rapid run-off and this poses surface water and sewer flood risk to people and properties.

For Stanford-le-Hope the preferred approach is to manage the probability of river flooding by storing water on the floodplain upstream. Within the town the urban environment needs to be adapted to make it more resilient to flooding, for example as commercial sites are redeveloped, the location and layout of buildings could be designed to help reduce flood risk. The risk of flooding cannot be completely removed and other measures need to be taken to manage the consequences of flooding. A flood warning service for river flooding should be developed for Stanford-le-Hope and flood awareness plans produced to encourage people to sign up to and respond to the flood warnings.

## The key messages

- Where possible, flood risk should be managed by storing water on the floodplain upstream of the town.
- Any redevelopment of floodplain areas is an opportunity to increase their flood resilience.
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.
- Developing a flood warning service for river flooding along with flood awareness plans will manage the consequences of flooding.

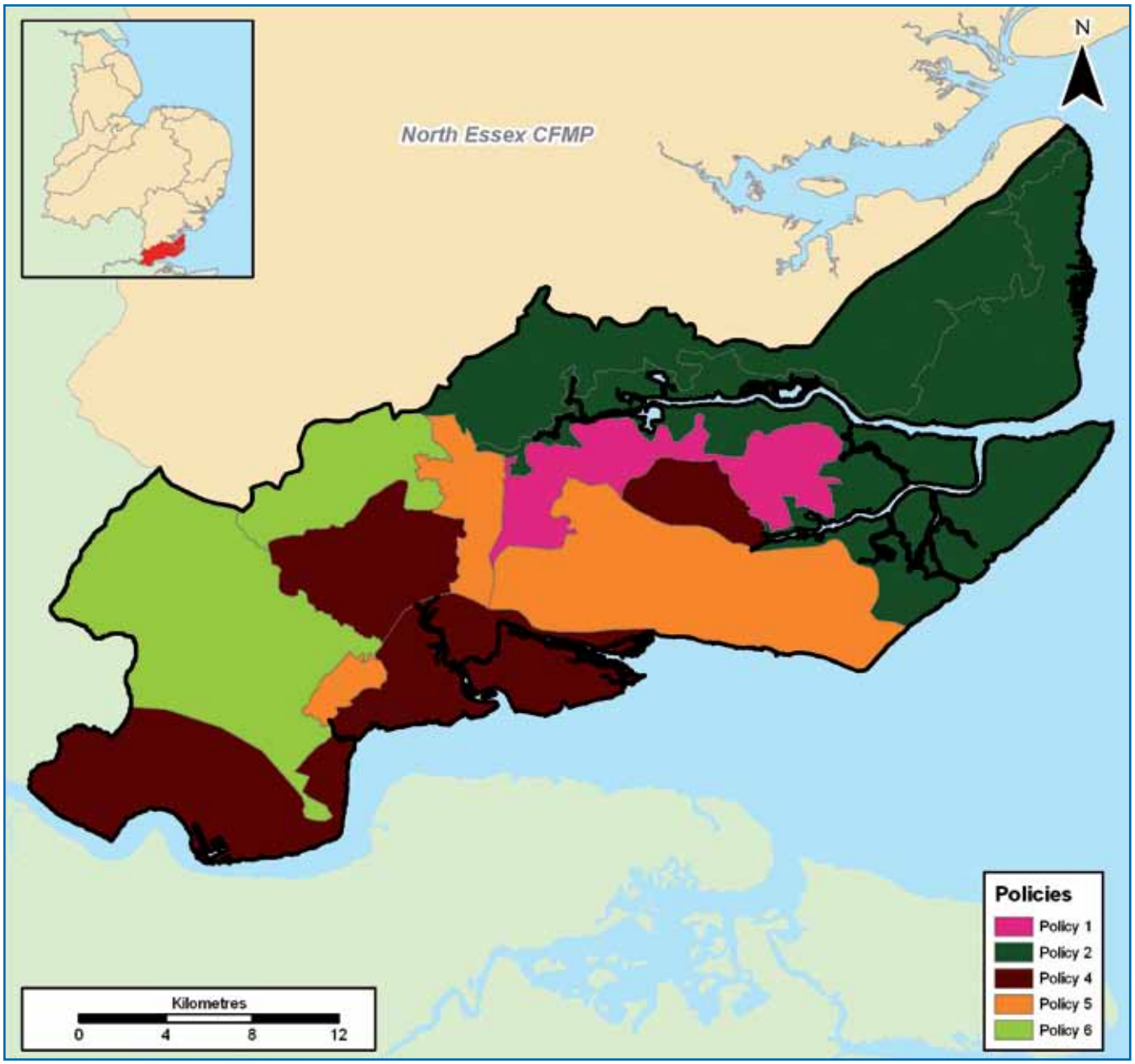
## Proposed actions to implement the preferred policy

- Develop a flood storage study to investigate the feasibility of creating storage areas, natural or engineered, along the river corridor upstream of the town to manage future flood risk.
- Continue current maintenance activities through the town.
- Work with partners to develop an emergency response plan for critical infrastructure and transport links at risk of flooding.
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk. Planners should prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25), and ensure that any new development does not increase the risk to existing development. Any new development or regeneration should provide opportunities to improve the river environment and make space for water.
- Flood forecasting and warning study to improve the current flood warning service.
- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk.
- Work with partners to develop a surface water management plan for Stanford-le-Hope.

↑ Stanford Brook

# Map of CFMP policies

**Map 4** The flood risk management policies for the South Essex CFMP area



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