

# Draft Great Ouse Catchment Flood Management Plan

Summary Report – April 2010 Consultation Draft



# managing flood risk

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April 2010

# Introduction

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

The Great Ouse 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). This 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.

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.

This is a summary of the draft plan and no final decisions have been made. We want to hear from you to help us to identify anything we may have missed in the preparation of this draft plan. The draft Great Ouse CFMP is out for public consultation from 29 March to 18 June 2010. Please share with us your views on our recommended management options and any concerns you may have.

We aim to get responses from interested groups or individuals on our understanding of flood risk within the Great Ouse catchment and the best ways of managing

this risk. This is your opportunity to get involved in the consultation and have your say. Your views are important.

In particular we would like your comments on:

- our intended proposals for policy decisions;
- our intended actions to implement the selected policies.

For more information about the Great Ouse CFMP consultation please go to: <https://consult.environment-agency.gov.uk/portal> and follow the links for the Great Ouse Catchment Flood Management Plan. The full copy of the CFMP document is available to download from the website or to obtain a hard copy of the document, contact Nichola Carter by email: [greatousecfmp@environment-agency.gov.uk](mailto:greatousecfmp@environment-agency.gov.uk) or write to: Nichola Carter, Environment Agency, Kingfisher House, Goldhay Way, Orton Goldhay, Peterborough. PE2 5ZR.

We would prefer you to respond online through our consultation page. This will help us to gather and summarise responses quickly and accurately. Alternatively you can respond by email or in writing to the above address.

We will review all the comments received and use the responses to finalise the Great Ouse CFMP. The completed CFMP will be published in late summer 2010.

A handwritten signature in black ink that reads "Paul Woodcock". The signature is written in a cursive style with a horizontal line underneath the name.

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

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↑ River Great Ouse, Godmanchester

# 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:

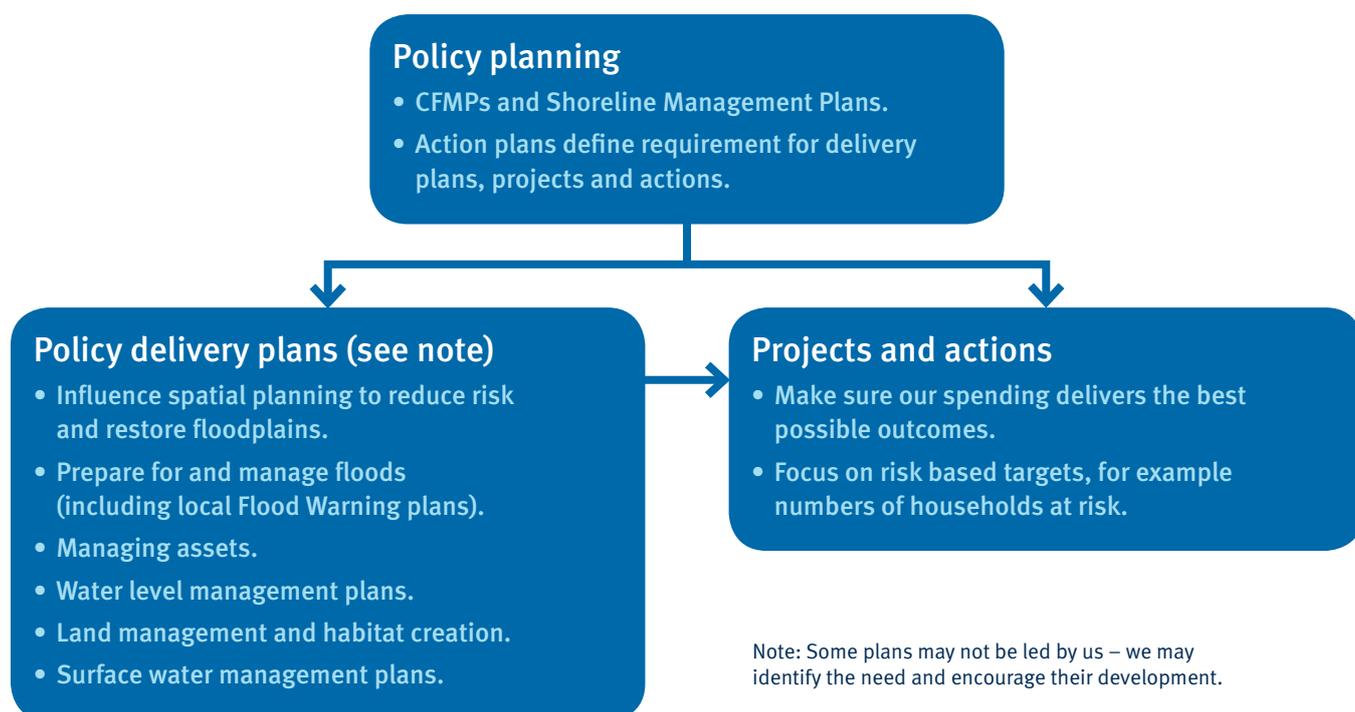
- the Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions;
- regional planning bodies and local authorities who can use the plan to inform spatial planning activities and emergency planning;

- 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



# Catchment overview

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The catchment of the Great Ouse is located in the east of England. The River Great Ouse starts in Northamptonshire near Brackley and passes through several towns before it crosses the Fens and flows into The Wash downstream of King's Lynn. Other significant rivers in the catchment include the Tove (Towcester), Ouzel (south of Milton Keynes), Cam (Cambridge), Ivel (Biggleswade), Lark (Bury St Edmunds/Mildenhall), Little Ouse (Thetford) and Wissey (south and east of Downham Market). Map 1 shows the location and extent of the Great Ouse CFMP area. The downstream limit of the CFMP is located near the confluence with Babingley Brook, at The Wash Shoreline Management Plan (SMP) boundary. The Wash SMP deals with coastal flood management issues from The Wash. The CFMP considers tidal flood risk along the River Great Ouse upstream of the confluence with Babingley Brook, to the tidal limit at Brownhill Staunch near Earith.

The overall catchment area is about 8,596 km<sup>2</sup> and has a population of around 1.7 million people. Although there are large centres of population such as Milton Keynes, Cambridge, Bedford and King's Lynn along with smaller market towns such as St Neots, St Ives and Ely, the catchment is largely rural.

Nearly half (44%) of the agricultural land in the Great Ouse catchment is grade one and two. Grade three makes up a further 45% of agricultural land. Most of the high quality land is located in the Fens.

The landscape of the catchment varies significantly. Land is highest to the west of Milton Keynes and in the southern parts of the catchment. The River Great Ouse flows east through relatively steep land around Buckingham before flowing northeast towards Bedford. From Bedford, the river flows over a relatively moderate gradient in a north easterly direction towards Earith before entering the embanked tidal reach across the Fens. The Fens are approximately one fifth of the total catchment area. Much of the Fens lie at or below sea level and depend on pumping stations for drainage. Internal Drainage Boards play an important role in managing water levels and flood defences within these low-lying areas.

The underlying geology of the Great Ouse catchment is limestone in the extreme west around Buckingham and Towcester. There are mudstones to the northwest around St Neots, Huntingdon and March and chalk towards the south east of the catchment around Bury St Edmunds, Thetford and Saffron Walden. Where the underlying

rock is non-porous mudstones, there are higher rates of rainfall runoff, and runoff flows directly into the watercourses. In the areas where there is limestone or chalk bedrock, runoff may infiltrate the rock delaying the response of rivers to rainfall and reducing peak flows. There is also a risk from groundwater flooding in these areas. In the headwaters of the catchment the underlying limestone and chalk is covered by till deposits which make the rivers respond more quickly. In the lower fenland areas in the east of the catchment, the peat soils and low gradients mean that water moves slowly to the river channels.

Within the Great Ouse catchment there are a number of sites designated for their environmental importance including seven Ramsar sites, three Special Protection Areas (SPAs), 11 Special Areas of Conservation (SACs) and 241 Sites of Special Scientific Interest (SSSIs). The Ouse Washes (Ramsar, SPA and SAC) is an important site in the CFMP area. It is one of the few remaining areas of extensive washland habitat in the UK. The CFMP contains small parts of two Areas of Outstanding Natural Beauty (AONBs) designated for their landscape value. Scheduled Monuments (SMs) and listed buildings, designated for their heritage value, are distributed across the CFMP area.

Map 1 Location and extent of the Great Ouse CFMP area



↑ Houghton Mill, River Great Ouse

# 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% or 100 to 1 chance of occurring in any one year, and a 0.5% annual probability flood has a 0.5% or 200 to 1 chance 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. The most significant river flood in the catchment occurred in March 1947 where there was widespread flooding. In more recent years the most significant river flooding occurred in Easter 1998 and October 2001. Significant tidal flooding, affecting the coastline at Hunstanton, Heacham, Snettisham, the town of King's Lynn and the Fens occurred in 1953 and January 1978.

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

- river flooding from the River Great Ouse in Buckingham, Clapham, Harrod, Bedford/Kempston, St Neots, Godmanchester, Huntingdon, Houghton, the Hemingfords and St Ives, from the River Great Ouse and River

Ouzel in Newport Pagnell and Milton Keynes/the Stratfords, from the River Tove in Towcester, from the River Ouzel and Clipstone Brook in Leighton Buzzard, from Alconbury Brook in Alconbury/Alconbury Weston, from the River Ivel in Biggleswade and Sandy, from the River Flit in Shefford, from the River Purwell in Hitchin, from the River Cam in Cambridge, from the Slades in Saffron Walden, and from the River Nar, Pierpoint Drain and Gaywood river in King's Lynn.

- flooding within the areas managed by the Internal Drainage Boards, which is generally caused by high rainfall onto already saturated ground;
- flooding along the tidal Great Ouse: because of the defences we currently have in place to protect against the tide, very few areas are at risk of tidal flooding;
- breaching/failure of embankments, which could be a problem along rivers across the fenland area of the catchment. This type of flooding is difficult to predict but could cause rapid flooding to areas immediately behind the embankments.
- surface water flooding is thought to be a risk in: Buckingham, Beachampton, Towcester, Bedford/Kempston, Hitchin, Leighton Buzzard, Mursley, Milton Keynes/the Stratfords,

St Neots/Little Paxton, Ampthill, Flitwick, Potton, Sandy, Cambridge, Cambourne, Bury St Edmunds, Thetford, Little Downham, Littleport, Little Harwood, Soham and King's Lynn/South Wootton;

- groundwater flooding has occurred in Bury St Edmunds, Burwell and Newmarket, when there are high groundwater levels in the underlying chalk rock.

## What is at risk?

At present there are around 39,500 people and 18,000 residential and commercial properties at risk from the 1% annual probability river flood. Around 228 people and 103 residential and commercial properties are at risk from the 0.5% annual probability tidal flood. These estimates take into account the current flood defences. This means that 2% of the total population living in the catchment are currently at risk of flooding. There is 3,391 km<sup>2</sup> of grade one and two agricultural land in the catchment; approximately 100 km<sup>2</sup> (3%) of this is at risk of flooding.

It is difficult to assess the current impact of flooding to environmental and historical features. However, within the Great Ouse CFMP there are six Ramsar sites, eight SACs, three SPAs and 90 SSSIs at risk of flooding during a 1%

annual probability river flood. At Woodwalton Fen and Wicken Fen (Ramsar sites) along with Portholme, Fenland, Waveney and the Little Ouse Fens and the Norfolk Valley Fens (SAC sites), flooding with water of poor quality may have a negative impact on these sites. Increased summer flooding is having a negative impact on the Ouse Washes (SAC, SPA, Ramsar site). River flooding could have a detrimental impact on The Wash (SAC, SPA, Ramsar site) if changes in flow and water quality effect potentially sensitive habitats and species. Flooding may have a negative impact on the dry grassland and heath communities of the Breckland (SAC, SPA). The Ouse Washes (SAC, SPA, Ramsar site) is also at risk from the 0.5% annual probability tidal flood. At this site and at Berry Fen SSSI prolonged saline flooding could have a negative impact on the habitats and species of the sites.

Historical features currently at risk include 204 Scheduled Monuments and around 1,000 listed buildings.

## Where is the risk?

Around a quarter of the people and properties that are at risk within the catchment from a 1% annual probability river flood (taking into account current flood defences) are located in Bedford. A further 10% are located in St Neots/Little Paxton. Other significant locations at risk from river flooding include Milton Keynes, Leighton Buzzard, Hitchin and Godmanchester. All of the people and properties at risk from a 0.5% annual probability tidal flood are scattered throughout the low-lying Fens.

The distribution of properties at risk from a 1% annual probability river flood, taking into account current flood defences, is shown on Map 2. Table 1 summarises where there is flood risk to more than 25 properties. Table 2 summarises the critical infrastructure that is at risk from

a 1% annual probability river flood and 0.5% annual probability tidal 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.

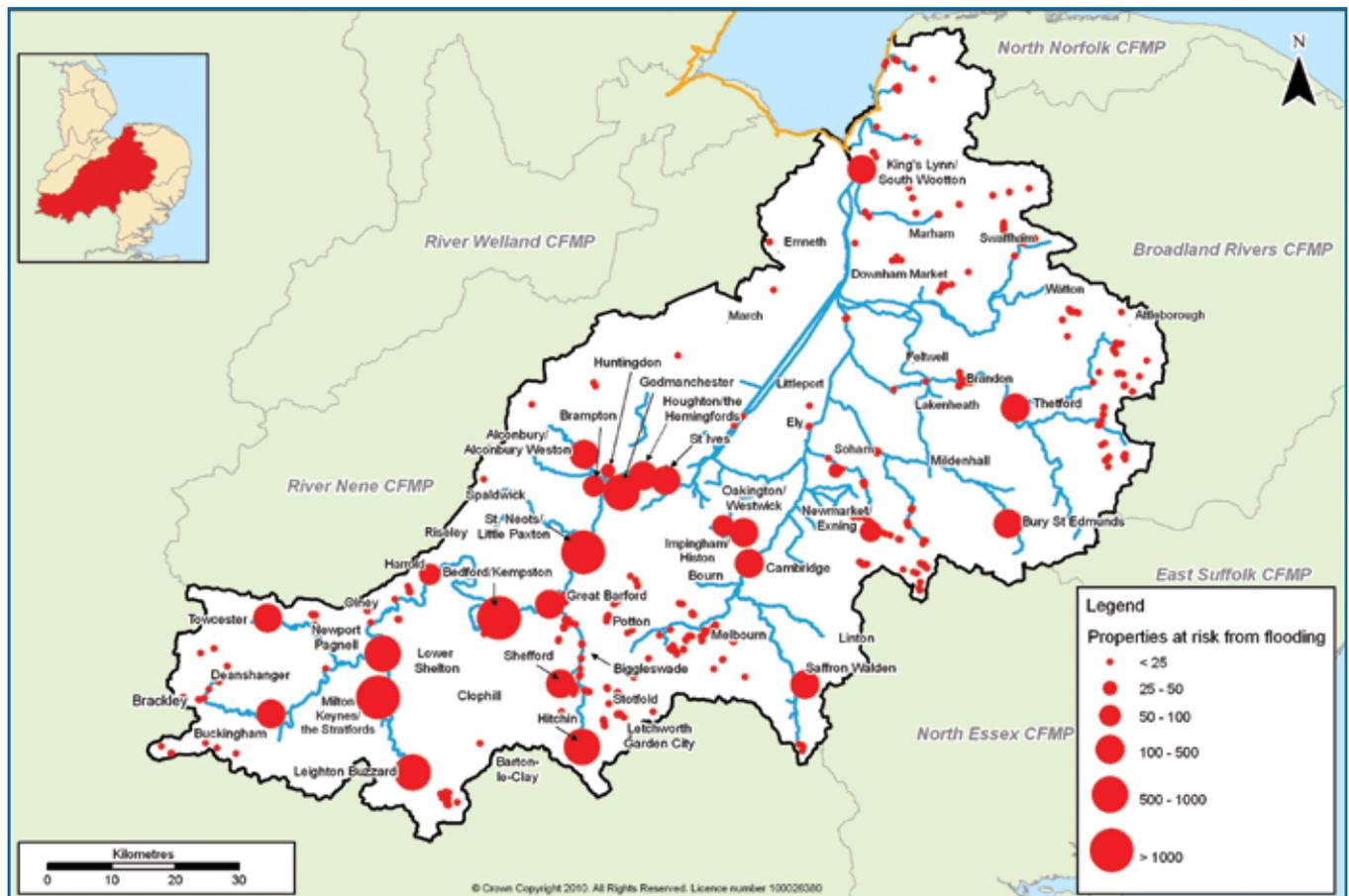
**Table 1 Locations of towns and villages with 25 or more properties at risk in a 1% annual probability river flood**

Number of properties	At risk from a 1% annual probability river flood
Over 1,000	Milton Keynes/the Stratfords, Bedford/Kempston, St Neots/Little Paxton
500 to 1,000	Leighton Buzzard, Newport Pagnell, Godmanchester, Hitchin
100 to 500	Towcester, Alconbury/Alconbury Weston, Great Barford, Houghton/the Hemingfords, Shefford, Saffron Walden, Impington/Histon, Bury St Edmunds, Thetford, Buckingham, St Ives, Cambridge, King's Lynn/South Wootton
50 to 100	Brampton, Oakington/Westwick, Harrold, Newmarket/Exning
25 to 50	Soham, Huntingdon

**Table 2 Critical infrastructure at risk in the catchment**

Critical Infrastructure at risk from a 1% annual probability river flood	Critical Infrastructure at risk from a 0.5% annual probability tidal flood
72 electricity sub-stations; 31 sewage treatment works; five telephone exchanges; two hospitals, four police stations; three fire stations; 30 km of railway and three stations; a short section of the A1(M) motorway and 6 km of A road	3 km of A road and 1 km of railway line

**Map 2 Flood risks 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 catchment has a history of flooding, generally due to high rainfall which has led to watercourses and drains being overwhelmed, flood defences overtopping or raised embankments breaching. Over the last 60 years numerous engineering schemes have been implemented to reduce flood risk in the catchment, including:

- a number of flood storage areas are used to manage flood risk. The most important flood storage area is the Ouse Washes which provides protection to the surrounding fenland. The Ely Ouse Flood Protection Scheme was built to protect the South Level from flooding following
- the 1947 floods. The system includes the Cut-off Channel, the Relief Channel and two breaching sections. The Towcester flood alleviation scheme includes a reservoir upstream of the town to give protection up to a 2% annual probability river flood. The Nar flood alleviation scheme is a channel which diverts flood flows from the River Nar to prevent the embankments from overtopping during a 4% or lower annual probability river flood;
- the Milton Keynes Balancing Lakes are a storm-water balancing lake system along the River Ouzel. They are designed to mitigate the effects of the Milton Keynes development;
- construction of walls and embankments in Buckingham, Bedford, St Neots, Hemingford/St Ives, Houghton/Wyton, Spaldwick, Waterbeach and through the Ely Ouse system provide protection up to a 1% annual probability flood. Flood embankments in Newport Pagnell and from Woodstone to Milton Keynes provide protection up to a 2% annual probability flood. Flood walls and banks provide protection in Leighton Buzzard up to a 25% annual probability flood, in Over and Fen Drayton up to a 20% annual probability flood, in Swavesey up to a 0.75% annual probability flood, and in Holywell and Earith up to a 5% annual probability flood;

- construction of flood walls, flood gates and pumps along the tidal Great Ouse system provide a minimum standard of protection against a 1% annual probability flood.

These measures have all reduced flood risk and around 60% of the total catchment population currently live 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 Internal Drainage Boards and 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. Investigations are ongoing to identify which activities are likely to be most effective and appropriate in different parts of the catchment area in the future.



↑ River Cam, The Backs, Cambridge

## 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 and tidal models we tested the sensitivity of the catchment to these drivers.

For urbanisation, we tested the following increases in urbanisation up to 2110 for different parts of the Great Ouse catchment:

- 4% increase in urbanisation within the River Cam sub-catchment;
- 2% increase in urbanisation within the upper and lower Bedford Ouse sub-catchments;
- 1% increase in urbanisation within the Fens, Eastern Rivers and North West Norfolk sub-catchments.

For climate change we tested the following changes up to 2110:

- 20% increase in peak flow in all watercourses. This will increase the probability of large-scale flood risk;
- a total sea level rise of 1050 mm by the year 2110. This will increase the probability of tidal flooding and increase the length of time that 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 Great Ouse CFMP the scenario used to model future flood risk was based on climate change and urbanisation as described.

Using river and tidal models we estimate that by 2110, around 60,400 people and 26,600 properties across the catchment may be at risk from the 1% annual probability river flood. Around 8,600 people and 3,906 properties may be at risk from the 0.5% annual probability tidal flood. These figures take account of current flood defences. Flood risk from rivers increases mainly in Bedford/Kempston, Houghton/the Hemingfords, St Ives, St Neots/Little Paxton and King's Lynn/South Wootton. The greatest increase in tidal flood risk occurs in King's Lynn/South Wootton.



↑ River Great Ouse, Bedford

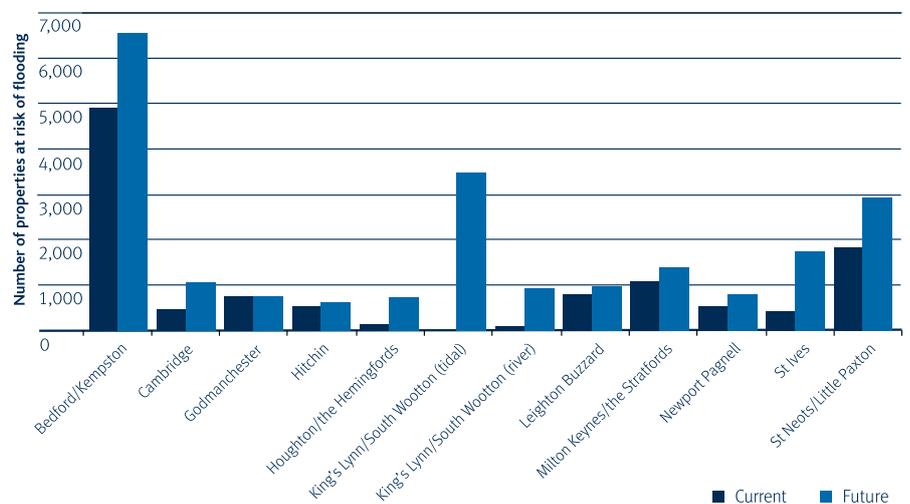
Figure 2 shows the difference between current and future flood risk from a 1% annual probability river flood at key locations in the CFMP area, and for a 0.5% annual probability tidal flood in King's Lynn/South Wootton. Following on from the CFMP, organisations need to work together to investigate flood risk from other sources (for example surface water and groundwater) in more detail.

Flood risk to infrastructure or transport services also increases. During a 1% annual probability river flood, it is estimated that 95 electricity sub-stations, 38 sewage treatment works, two telephone exchanges, two hospitals, five police stations, three fire stations

and sections of the M1, M11, A1(M), 21 km of A road and 30 km of railway line will be at risk of flooding. During a 0.5% annual probability tidal flood it is estimated that there will be 2.7 km of A road and 1 km of railway line at risk of flooding.

Generally, it is unlikely that the impact of flooding on environmental sites will change significantly in the future, although the extent of flooding is likely to increase.

**Figure 2** Current and future (2110) flood risk to property from a 1% annual probability river flood at key locations in the CFMP area and from a 0.5% annual probability tidal flood at King's Lynn/South Wootton, taking into account current flood defences



↑ River Ouzel, Newport Pagnell

# Future direction for flood risk management

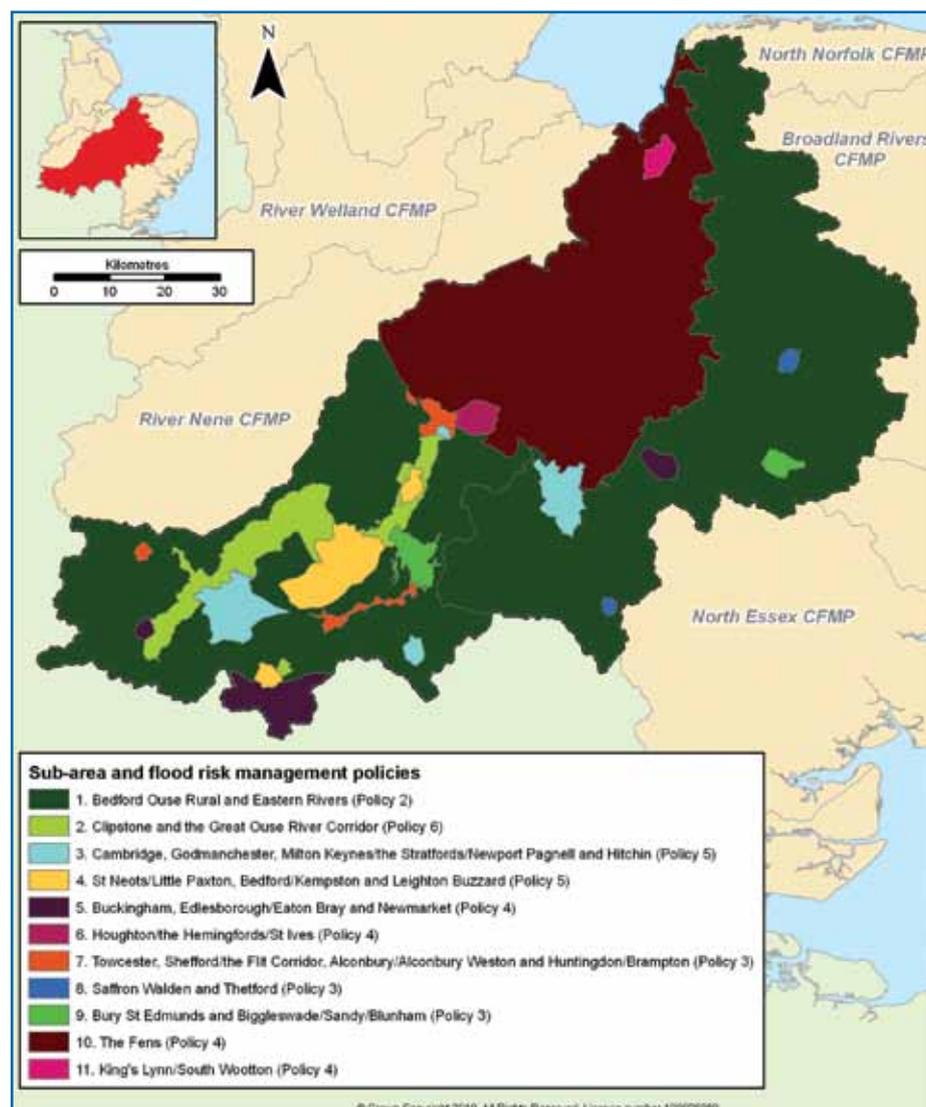
## Approaches in each sub-area

We have divided the Great Ouse catchment into 11 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.

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#### → 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.

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#### → 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.

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#### → 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.

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#### → 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.

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#### → 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.

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# Bedford Ouse Rural and Eastern Rivers

## Our key partners are:

### Local Authorities

Bedford Group of Internal Drainage Boards

Water Management Alliance

East Harling Internal Drainage Board

Anglian Water

Natural England

## The issues in this sub-area

Within this large sub-area, which is approximately 5,211 km<sup>2</sup> (around 61% of the total catchment area), risks to people and property are located in villages or in isolated areas scattered throughout the rural area. Currently 3,616 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is 34 km<sup>2</sup> of grade one and two agricultural land at risk from flooding in this sub-area. There are 12 electricity sub-stations, 17 sewage treatment works, two landfill sites, two police stations, a telephone exchange and sections of the M1, M11, a number of A roads and railway line at risk within the current 1% annual probability river flood. Table 4 details flood risk to property in this sub-area.

**Table 4** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Bedford Ouse Rural	1,603	1,854
Eastern Rivers	2,013	2,453

## 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 reaches 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 the sub-area. Where flood risk is more concentrated (for example in towns and villages) existing actions to manage flooding will be continued. The preferred policy is to reduce current flood risk management activities 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 policy will also help improve the flow between the river and its floodplain and so improve wetland and aquatic habitats.

## 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 flood risk management activities will help naturalise rivers and improve the flow between the river and its floodplain.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- Investigate options to reduce current flood risk management activities. However, where flood risk is more concentrated (for example in towns and villages) existing actions to manage flooding may be continued.
- Continue with the flood warning service including the maintenance of flood warning infrastructure.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store floodwater.
- Produce land management plans to explore opportunities to change land use and develop sustainable land management practices.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.

### Actions specific to Bedford Ouse Rural:

- Continue with current levels of flood risk management through Little Horwood and Leckhampstead.
- Continue maintenance of Graftham Water and Foxcote Reservoir. Anglian Water must carry out their duties under the Reservoirs Act.

### Actions specific to Eastern Rivers:

- Continue levels of maintenance along the Award drains.



↑ River Cam, Great Chesterford

# Clipstone and the Great Ouse River Corridor

## Our key partners are:

Local Authorities

Bedford Group of Internal Drainage Boards

Natural England

## The issues in this sub-area

Within this large sub-area, which is approximately 323 km<sup>2</sup>, flood risk to people and property is located in small towns and villages scattered throughout the area. Currently, 1,166 properties within this sub-area are at risk from the 1% annual probability river flood. The majority of properties at risk are concentrated within Stony Stratford, Harrold and Great Barford.

Currently there is approximately 11 km<sup>2</sup> of grade one and two agricultural land at flood risk. There are six electricity sub-stations, four sewage treatment works and sections of the M1, a number of A roads and railway line at risk in the current 1% annual probability river flood. Table 5 details flood risk to property in this sub-area.

**Table 5** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Clipstone	5	5
Great Ouse River Corridor	1,161	1,326

## 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 runoff in locations that provide overall flood risk reduction or environmental benefits.

In this largely rural area 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 policy 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, we need to work with local planning authorities to encourage development outside of the floodplain.

## The key messages

- We plan to use the undeveloped floodplain in this sub-area to store floodwater. This will help to reduce unsustainable long term dependence on raised flood defences across the catchment.
- We need to work with local planning authorities to encourage development outside of the floodplain in this sub-area so that it can be maintained as an area to store floodwater.
- 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:

- Encourage planners to locate new development outside the floodplain. The floodplain should be maintained as an asset to make space for water.

### Actions specific to Clipstone:

- Continue with and implement the recommendations from the Leighton Buzzard flood alleviation scheme to create flood storage along Clipstone Brook.

- Phase out flood risk management activities on all watercourses where flood storage cannot be carried out.

### Actions specific to the Great Ouse River Corridor:

- Investigate developing a strategic flood storage study to consider creating/developing storage within the Great Ouse river corridor. The study should investigate the most appropriate storage options and locations for floodplain storage.
- Consider opportunities to reduce flood risk maintenance activities along the rural corridor between the main settlements.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service and through the creation of community based flood warnings.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to flood warnings.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store floodwater.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.



↑ River Great Ouse, Turvey

# Cambridge, Godmanchester, Milton Keynes/the Stratfords/ Newport Pagnell and Hitchin

## Our key partners are:

Local Authorities

Bedford Group of Internal Drainage Boards

Anglian Water

Natural England

## The issues in this sub-area

This is a predominantly urban sub-area where the towns are situated within the natural floodplain. Currently, 3,026 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is approximately 2 km<sup>2</sup> of grade one and two agricultural land at flood risk. There are 10 electricity sub-stations, a sewage treatment works, a fire station and sections of M1, a number of A roads and railway line at risk in the current 1% annual probability river flood. Stretches of raised defences have been constructed in areas of Milton Keynes and Newport Pagnell to reduce the risk of river flooding. Table 6 details flood risk to property in this sub-area.

**Table 6** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Cambridge	643	938
Godmanchester	631	650
Milton Keynes/The Stratfords/ Newport Pagnell	1,251	1,628
Hitchin	501	629

## 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 policy is about reducing the risk where the existing flood risk is too high. We need to take action in the short term to reduce this level of risk.

In this densely populated urban sub-area the preferred approach to manage flood risk is to produce flood risk studies. These studies should look at how we can reduce the flood risk, which may include the possibility of building new flood defences.

Flood risk management planning needs to be linked closely with new development and redevelopment 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. Any new development should not increase the risk to existing development, in particular a strategic Sustainable Drainage System should be adopted in Milton Keynes.

## The key messages

- The existing flood risk is too high. We need to take action to reduce the number of people and property at risk, along with the cost of flood damage.
- We need to work with local planning authorities to ensure that urban development does not increase flood risk. Opportunities should be taken to link flood risk management planning with development and urban regeneration so that the location, layout and design of development can help to manage flood risk.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- Develop flood risk studies to investigate options to reduce flood risk, this may include the possibility of building new flood defences.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.

### Actions specific to Cambridge:

- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service and through the creation of community based flood warnings.

- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.

### Actions specific to Hitchin:

- Investigate the feasibility of creating a flood warning service for Hitchin.
- Develop an environmental enhancement project to continue with investigations to improve the ecological status of the Rivers Purwell and Hiz.

### Actions specific to Godmanchester:

- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.

### Actions specific to Milton Keynes/the Stratfords/ Newport Pagnell:

- Manage the risk of future flooding by maintaining the standard of protection given by the existing defences in Newport Pagnell.
- Develop a groundwater flood risk study for Stony Stratford.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to flood warnings.
- Develop a surface water management plan for Milton Keynes.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.

# St Neots/Little Paxton, Bedford/Kempston and Leighton Buzzard

## Our key partners are:

Local Authorities

Bedford Group of Internal Drainage Boards

Natural England

## The issues in this sub-area

This is a predominantly urban sub-area where the towns are situated within the natural floodplain. Currently, 7,512 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is approximately 4 km<sup>2</sup> of grade one and two agricultural land at flood risk. There are 34 electricity sub-stations, a sewage treatment works, a police station, two landfill sites, one COMAH site and sections of A road and railway line at risk in the current 1% annual probability river flood. Raised defences have been constructed within these settlements to reduce flood risk. Table 7 details flood risk to property in this sub-area.

**Table 7** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
St Neots/Little Paxton	1,792	2,865
Bedford/Kempston	4,887	6,395
Leighton Buzzard	833	954

## 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 policy is about reducing the risk where the existing flood risk is too high. We need to take action in the short term to reduce this level of risk.

In this densely populated urban sub-area the preferred approach to manage flood risk is to develop flood risk studies. The flood risk studies should look at how we can manage the probability of flooding by storing water on the floodplain upstream, in combination with actions in the towns to reduce flood risk further. This may include building new flood defences.

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 in St Neots and Bedford/Kempston.

Other measures need to be taken to manage the consequences of flooding. Within the towns the urban environments need to be adapted to make them 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

- The existing flood risk is too high. We need to take action to reduce the number of people and property at risk, along with the cost of flood damage.

- Where possible, we plan to reduce unsustainable long term dependence on raised flood defences by taking opportunities to store floodwater on the undeveloped floodplain upstream of the settlements at flood risk.
- We need to work with local planning authorities to ensure that urban development does not increase flood risk. Opportunities should be taken to link flood risk management planning with development and urban regeneration so that the location, layout and design of development can help to manage flood risk.
- Within St Neots and Bedford/Kempston organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- Investigate developing flood storage studies to manage flood risk within these towns through upstream storage. The Leighton Buzzard flood alleviation scheme to create upstream flood storage should be continued.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.

### Actions specific to St Neots/Little Paxton:

- Develop a flood risk study for St Neots/Little Paxton to investigate creating new flood defences to reduce current flood risk.
- Manage the risk of future flooding by maintaining the standard of protection given by the existing defences.
- Continue with improvements to the flood warning service by creating community based flood warnings.
- Complete the review of the existing Strategic Flood Risk Assessment for Huntingdonshire District Council.
- Ensure that St Neots is included within a detailed water cycle study.
- Develop a surface water management plan for St Neots.

### Actions specific to Bedford/Kempston:

- Develop a flood risk study for Bedford to investigate creating new flood defences to reduce current flood risk.
- Continue with improvements to the flood warning service by creating community based flood warnings.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store floodwater.

### Actions specific to Leighton Buzzard:

- Develop a flood risk study for Leighton Buzzard to confirm the flood flow from the River Ouzel and its interaction with the Grand Union Canal embankments.

# Buckingham, Edlesborough/ Eaton Bray and Newmarket

## Our key partners are:

### Local Authorities

Bedford Group of Internal Drainage Boards

Anglian Water

## The issues in this sub-area

This sub-area contains a number of small market towns. Currently, 701 properties are at risk from the 1% annual probability river flood.

Currently there is no grade one and approximately 0.2 km<sup>2</sup> of grade two agricultural land at flood risk. There is a sewage treatment works and sections of A road and railway line at risk during the current 1% annual probability river flood. In Buckingham the probability of flooding has been reduced by the presence of an embankment. Table 8 details flood risk to property during a river flood in this sub-area.

**Table 8** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Buckingham	332	427
Edlesborough/Eaton Bray	310	423
Newmarket	59	306

## 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.

In these settlements flood risk is expected to increase in the future to people and property. The preferred approach to manage future flooding is by producing flood risk studies for these settlements.

## The key messages

- We need to better understand the flood risk in this sub-area through further investigations and where appropriate put in place measures to mitigate an increased risk from climate change.

## Proposed actions to implement the preferred policy

### Actions specific to Buckingham:

- Develop a flood risk study for Buckingham to investigate options to manage future flooding.
- Provide local property protection for the town of Buckingham to reduce flood risk in low magnitude flood events.
- Continue with works to reinstate and maintain the Linden village flood bank.

- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.

#### Actions specific to Edlesborough/Eaton Bray:

- Develop a flood risk study to confirm the level of risk in Edlesborough and Eaton Bray and investigate options to manage this risk.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.

#### Actions specific to Newmarket:

- Develop a flood risk study for Newmarket to investigate options to manage future flooding.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.
- Investigate the feasibility of creating a groundwater flood warning service for Newmarket.



↑ River Great Ouse, Buckingham

# Houghton/the Hemingfords/ St Ives

## Our key partners are:

Local Authorities

Anglian Water

Natural England

## The issues in this sub-area

The probability of river flooding has been reduced in this sub-area by the construction of the Houghton flood alleviation scheme and the Hemingfords/St Ives flood alleviation scheme. Currently, 580 properties are at risk from the 1% annual probability river flood. There is a significant increase in the number of people and properties at risk in the future as existing flood defences are overtopped.

Currently there is no grade one and approximately 0.5 km<sup>2</sup> of grade two agricultural land at flood risk. There are two electricity sub-stations, a sewage treatment works and two landfill sites at risk during the current 1% annual probability river flood. Table 9 details flood risk to property in this sub-area.

**Table 9** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Houghton/the Hemingfords/ St Ives	580	2,402

## 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.

This policy has been selected because although the risk is currently managed appropriately, it is expected to rise significantly in the long term. In these circumstances, we need to do more in the future to reduce the expected increase in risk.

Historically defences have been constructed to reduce the probability of flooding in this sub-area. However, flood defences can fail or be overwhelmed and may become less effective in the future. 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. The preferred approach is to manage the probability of river flooding by storing water on the floodplain upstream in combination with investigations to maintain the standard of protection given by the existing defences.

Different approaches are required for the different sources of flooding, as river defences do not reduce the risk from urban drainage and surface water flooding. Organisations need to work together to manage the urban drainage and surface water flood risk.

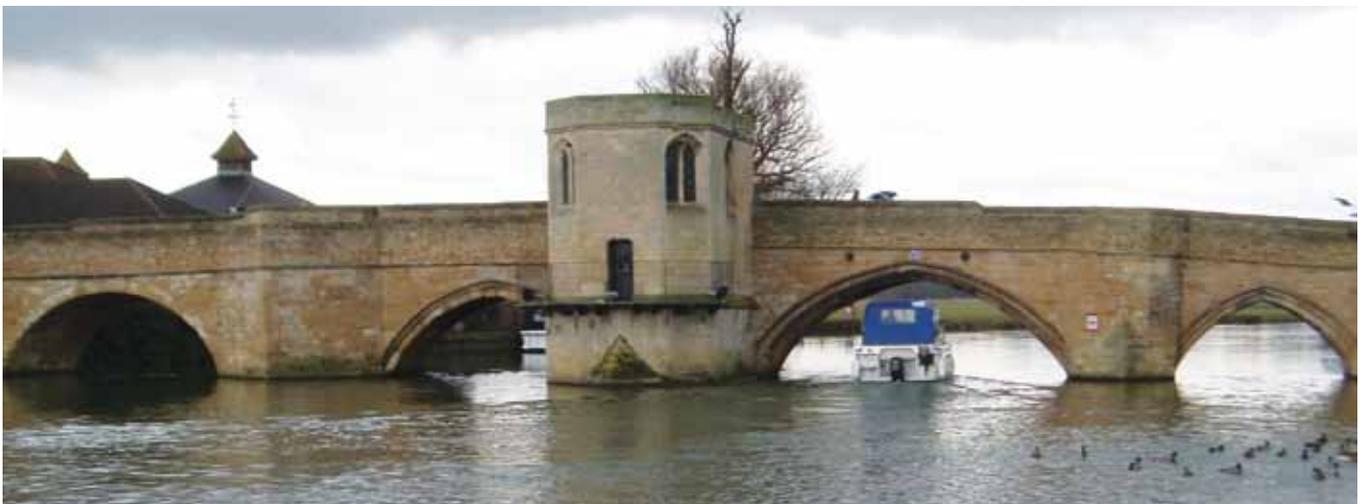
The risk of flooding cannot be completely removed. Other measures need to be taken to manage the consequences of flooding. Within the towns flood risk planning needs to be linked closely with development so that flood resilience can be incorporated into the location, layout and design of development to help reduce flood risk.

## The key messages

- The current flood risk is acceptable but future changes, for example climate change, are expected to have a significant impact as existing flood defences will be overtopped. Flood risk management activities need to respond to the potential increases in flood risk.
- Where possible, we plan to reduce unsustainable long term dependence on raised flood defences by taking opportunities to store floodwater on the undeveloped floodplain upstream of the settlements at flood risk.
- Development and regeneration provide an opportunity to help manage flood risk by increasing the flood resilience of urban areas.
- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store floodwater.
- Within the Huntingdonshire water cycle strategy investigate the impact of increased discharge on Parsons Drove Drain.
- Develop a surface water management plan for Houghton, the Hemingfords and St Ives.
- Work with partners to develop emergency response plans for the critical infrastructure at risk from flooding.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.

## Proposed actions to implement the preferred policy

- Investigate developing flood storage studies to manage future flood risk within this sub-area.
- Manage the risk of future flooding by maintaining the standard of protection given by the existing defences.



↑ River Great Ouse, St Ives

# Towcester, Shefford/the Flit Corridor, Alconbury/Alconbury Weston and Huntingdon/Brampton

## Our key partners are:

Local Authorities

Bedford Group of Internal Drainage Boards

Anglian Water

Natural England

## The issues in this sub-area

This sub-area contains a number of small towns and villages. Currently, 795 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is approximately 2 km<sup>2</sup> of grade one and two agricultural land at flood risk. There are four electricity sub-stations, two sewage treatment works, a police station and sections of A road and railway line at risk within the current 1% annual probability river flood. The probability of river flooding has been reduced in Towcester by the construction of a flood alleviation scheme. Table 10 details flood risk to property in this sub-area.

**Table 10** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Towcester	186	245
Shefford/the Flit Corridor	287	448
Alconbury/Alconbury Weston	160	182
Huntingdon/Brampton	162	241

## The vision and preferred policy

**Policy option 3:** Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.

The settlements in this sub-area have been built in the floodplain and as a result have a history of flooding. In the past flood defences have been constructed in Towcester and maintenance work carried out here and in other settlements throughout this sub-area to reduce flood risk. Although flood risk is not expected to increase significantly in the future, as there is a concentration of people and property within the floodplain, it is still feasible and effective to continue with the current level of flood risk management. This will be achieved by continuing with existing flood risk management activities.

## The key messages

- As the risks are currently managed appropriately and flooding is not expected to increase significantly, the overall level of investment and flood risk activities will remain the same.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- Continue with the current flood risk management activities.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.

### Actions specific to Towcester:

- Develop a flood risk study for Wood Burcote Brook to confirm the level of flood risk along this watercourse particularly from low magnitude flood events.
- Continue with improvements to the flood warning service by creating community based flood warnings.

- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.

### Actions specific to Shefford/the Flit Corridor:

- Continue with improvements to the flood warning service by creating community based flood warnings.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store floodwater.
- Develop an environmental enhancement project to improve the natural state of the rivers and their habitats.

### Actions specific to Alconbury/Alconbury Weston:

- Provide local property protection for the villages of Alconbury and Alconbury Weston to reduce flood risk in low magnitude flood events.

### Actions specific to Huntingdon/Brampton:

- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.



↑ Alconbury Brook, Alconbury

# Saffron Walden and Thetford

## Our key partners are:

Local Authorities

Anglian Water

Natural England

## The issues in this sub-area

The sub-area is predominantly urban covering the towns of Saffron Walden and Thetford. Currently, 303 properties are at risk from the 1% annual probability river flood.

Currently there is no high grade agricultural land at flood risk. A sewage treatment works, a fire station and some sections of the A11 are at risk during the current 1% annual probability river flood. Table 11 details flood risk to property in this sub-area.

**Table 11** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Saffron Walden	185	208
Thetford	118	177

## The vision and preferred policy

**Policy option 3:** Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.

The settlements in this sub-area have been built in the floodplain and as a result have a history of flooding. Maintenance work is carried out to reduce flood

risk. Although flood risk is not expected to increase significantly in the future, as there is a concentration of people and property within the floodplain, it is still feasible and effective to continue with the current level of flood risk management. This will be achieved by continuing with existing flood risk management activities.

## The key messages

- As the risks are currently managed appropriately and flooding is not expected to increase significantly, the overall level of investment and flood risk activities will remain the same.

## Proposed actions to implement the preferred policy

General actions across the sub-area:

- Continue with the current flood risk management activities.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.

Actions specific to Saffron Walden:

- Carry out an investigation to confirm responsibility for the Saffron Walden town culvert (the Slade) and assess its current condition.
- Reduce the consequences of flooding by improving public awareness of flooding.
- Investigate the feasibility of creating a flood warning service for Saffron Walden.

### Actions specific to Thetford:

- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service and through the creation of community based flood warnings.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Develop a surface water management plan for Thetford.



↑ The Slade, Saffron Walden

# Bury St Edmunds and Biggleswade/Sandy/Blunham

## Our key partners are:

Local Authorities

Bedford Group of Internal Drainage Boards

Anglian Water

Natural England

## The issues in this sub-area

The settlements within this sub-area are located in and around river floodplains, which are at risk from river flooding. Currently, 297 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is approximately 3.4 km<sup>2</sup> of grade one and two agricultural land at flood risk. There are two electricity sub-stations, a sewage treatment works, a fire station and sections of A road and railway line at risk within the current 1% annual probability river flood. Table 12 details flood risk to property in this sub-area.

**Table 12** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
Bury St Edmunds	179	213
Biggleswade/Sandy/Blunham	118	168

## The vision and preferred policy

**Policy option 3:** Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.

In the past, maintenance work has been carried out on the rivers flowing through the settlements in this sub-area. Although flood risk is not expected to increase significantly in the future, as there is a concentration of people and property within the floodplain, it is still feasible and effective to continue with the current level of flood risk management. The preferred approach is to achieve this by carrying out alternative more appropriate ways to manage flood risk at the current level. Alternative measures may include reducing flood risk maintenance in parts of the sub-area where there is a low risk of flooding, and targeting resources at critical locations where flood risk is more concentrated.

## The key messages

- The risks are currently managed appropriately and flooding is not expected to increase significantly. We will retain our current levels of investment but review our approach to ensure that we are managing the risk efficiently and that our actions are sustainable in the longer term.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- As an alternative approach to managing flood risk consider reducing maintenance activities where flood risk is low and targeting resources to areas where the risk is more concentrated.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.

### Actions specific to Bury St Edmunds:

- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.

### Actions specific to Biggleswade/Sandy/Blunham:

- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service and through the creation of community based flood warnings.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store floodwater.
- Develop an environmental enhancement project to investigate potential areas suitable for floodplain restoration.



↑ River Lark, Bury St Edmunds

# The Fens

## Our key partners are:

Local Authorities

Water Management Alliance

Middle Level Commissioners

Ely Group of Internal Drainage Boards

Downham Market Group of Internal Drainage Boards

Natural England

RSPB

## The issues in this sub-area

This large sub-area is predominantly flat, low-lying fenland containing scattered small towns and villages. River and tidal defences have been constructed within this sub-area to reduce the risk of flooding. Currently 375 properties within this sub-area are at risk from the 1% annual probability river flood and 108 properties are at risk from the 0.5% annual probability tidal flood.

Currently over 40 km<sup>2</sup> of grade one and two agricultural land is at risk in a 1% annual probability river flood and 2 km<sup>2</sup> from the 0.5% annual probability tidal flood. There are three electricity sub-stations, three sewage treatment works and sections of A road and railway line at risk within the current 1 % annual probability river flood. There is a sewage treatment works and sections of A road and railway line at risk within the current 0.5% annual probability tidal flood. Tables 13 and 14 detail flood risk to property during a river and tidal flood in this sub-area.

**Table 13** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
The Fens	375	987

**Table 14** Number of properties at risk during a 0.5% annual probability tidal flood, taking into account current defences

	Current	Future (2110)
The Fens	108	507

## 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, the Fens have been heavily managed by a number of organisations to drain the land and to reduce the probability of river and tidal flooding. Flood risk is expected to increase in the future to people, property and the environment. In the short term it will be feasible and effective to maintain the existing flood defences. However, in the future the protection given by these defences may decline as future flooding is expected to become more intense. It may be difficult to maintain the current level of flood risk into the future for all low-lying areas. Where it is technically, environmentally and economically viable, the policy is to undertake further activities to maintain the current level of flood risk into the future.

Within the Fens sub-area a flood risk management plan should be produced in order to develop a sustainable, integrated and long term flood risk management approach. The plan should investigate how flood risk varies across the Fens and the best options to manage this risk, which may include making space for water. The plan may highlight the need to carry out further work in some areas, while in others we may be able to continue with or reduce our flood risk management activities. As part of this plan, flood risk from breaching of the existing defences should be considered. To

develop a sustainable flood risk management approach the plan must bring together organisations and other plans and projects across the Fens. This should include flood risk from the Rivers Witham, Welland, Nene and Great Ouse along with tidal risk and the policies set within The Wash SMP.

The plan will also include working in partnership with Internal Drainage Boards to gain a better understanding of the level of risk and activities they carry out within their lowland systems. Environmental enhancement projects must also be incorporated into the plan to ensure that flood risk management planning maintains and enhances existing wetlands along with creating new wetlands. This should be linked to the objectives of the 50th Year Wetland Vision, the Great Ouse Wetland Vision and the biodiversity action plan targets.

## The key messages

- We need to better understand the flood risk in this sub-area through further investigations and where technically, environmentally and economically viable put in place measures to mitigate an increased risk from climate change.
- Organisations must work together to achieve a long term integrated flood risk management approach for this unique landscape.

## Proposed actions to implement the preferred policy

- Develop a flood risk management plan for the Fens to investigate how flood risk varies across the area and the best approach to manage this risk.
- Continue with and implement the recommendations from the Great Ouse Tidal River Strategy.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Continue with and implement the recommendations of the Earith to Mepal Area action plan along with the Cranbrook/Counter Drain flood risk management strategy.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service and through the creation of community based flood warnings.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to flood warnings.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.



↑ New Bedford River, taken from Earith road bridge

# King’s Lynn/South Wootton

## Our key partners are:

Local Authorities

Water Management Alliance

## The issues in this sub-area

The probability of river and tidal flooding has been reduced in this sub-area by the construction of flood defences. Currently, 102 properties are at risk from the 1% annual probability river flood and no properties are at risk from the 0.5% annual probability tidal flood. There is a significant increase in the number of people and properties at risk in the future as existing flood defences are overtopped, particularly as a result of an increase in sea level rise.

Currently there is no grade one and approximately 0.9 km<sup>2</sup> of grade two agricultural land at risk from river flooding. There is currently no high grade agricultural land at risk from tidal flooding. There is an electricity sub-station and sections of A road at risk during the current 1% annual probability river flood. There is no critical infrastructure or transport links at risk during the current 0.5% annual probability tidal flood. Tables 15 and 16 detail flood risk to property during a river and tidal flood within this sub-area.

**Table 15** Number of properties at risk during a 1% annual probability river flood, taking into account current flood defences

	Current	Future (2110)
King’s Lynn/South Wootton	102	918

**Table 16** Number of properties at risk during a 0.5% annual probability tidal flood, taking into account current defences

	Current	Future (2110)
King’s Lynn/South Wootton	0	3,574

## 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 action to keep pace with climate change.

This policy has been selected because although the risk is currently managed appropriately, it is expected to rise significantly in the long term. In these circumstances, we need to do more in the future to reduce the expected increase in risk.

Historically, flood defences have been constructed to reduce the probability of river and tidal flooding. In the future the protection given by these defences may decline as future flooding is forecast to become more intense. 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 King’s Lynn the preferred approach is to produce a strategic review of the existing flood defences. This review will look at how we can manage future flood risk and investigate the possibility of maintaining or improving the standard of protection given by the existing defences.

The risk of flooding cannot be completely removed. Other measures need to be taken to manage the consequences of flooding. Flood risk management planning needs to be linked closely with development and regeneration, so that policies can be put in place to create green corridors, and to incorporate resilience measures into the location, layout and design of development. Flood awareness plans should also be produced to encourage people to sign up to and respond to flood warnings.

## The key messages

- The current flood risk is acceptable but future changes, particularly from a rise in sea level, are expected to have a significant impact as existing flood defences will be overtopped. Flood risk management activities need to respond to the potential increases in flood risk.
- We need to better understand the flood risk in this sub-area through further investigations and put in place measures to mitigate an increased risk from climate change.
- We need to work with local planning authorities to ensure that urban development does not increase flood risk. Opportunities should be taken to link flood risk management planning with development and urban regeneration so that the location, layout and design of development can help to manage flood risk.

## Proposed actions to implement the preferred policy

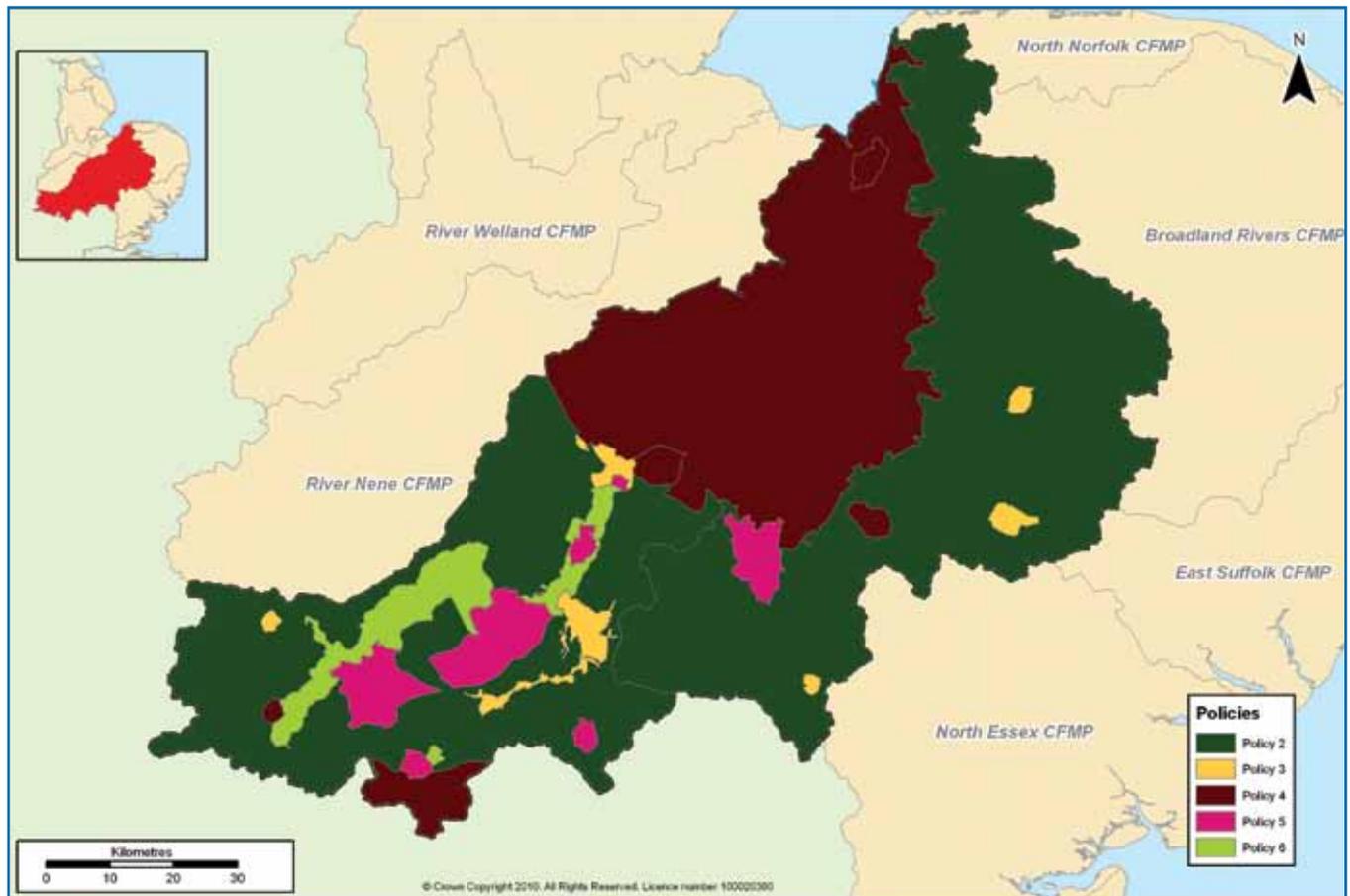
- Undertake a strategic review of the flood defences in King's Lynn to investigate options to manage future flood risk.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to flood warnings.
- Continue with the River Nar restoration strategy and the Gaywood River restoration project.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk from flooding.



↑ King's Lynn taken from river bank in South Lynn

# Map of CFMP policies

Map 4 The flood risk management policies for the Great Ouse CFMP area





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