

# Great Ouse Catchment Flood Management Plan

Summary Report January 2011

# managing flood risk



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Published by:

Environment Agency  
Kingfisher House  
Goldhay Way, Orton Goldhay  
Peterborough PE2 5ZR  
Tel: 08708 506 506  
Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

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January 2011

# Introduction

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**I am pleased to introduce our summary of the 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, groundwater, 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 that 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 around 17,750 properties currently at risk with defences from the 1% annual probability river flood across the Great Ouse catchment. In King's Lynn and within the Fens there are a further 108 properties currently at risk from the 0.5% annual probability tidal flood. There are also additional properties at risk of flooding from other sources, such as groundwater and surface water run-off (especially in urban areas). The impact of climate change will continue to increase the risk of flooding in the future.

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. For example, in parts of the catchment Internal Drainage Boards (IDBs) have an important role in managing flood risk. We will work in partnership with the IDBs to agree the most effective way to manage flood risk in the future. We also work with many other organisations, groups and individuals with an interest in how flood risk is managed. These include local authorities, 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](mailto:enquiries@environment-agency.gov.uk) or telephoning 08708 506 506. Alternatively, paper copies can be viewed at any of our offices in Anglian.

A handwritten signature in black ink that reads "Paul Woodcock". The signature is written in a cursive, slightly slanted style.

**Paul Woodcock**  
Director, Anglian

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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:

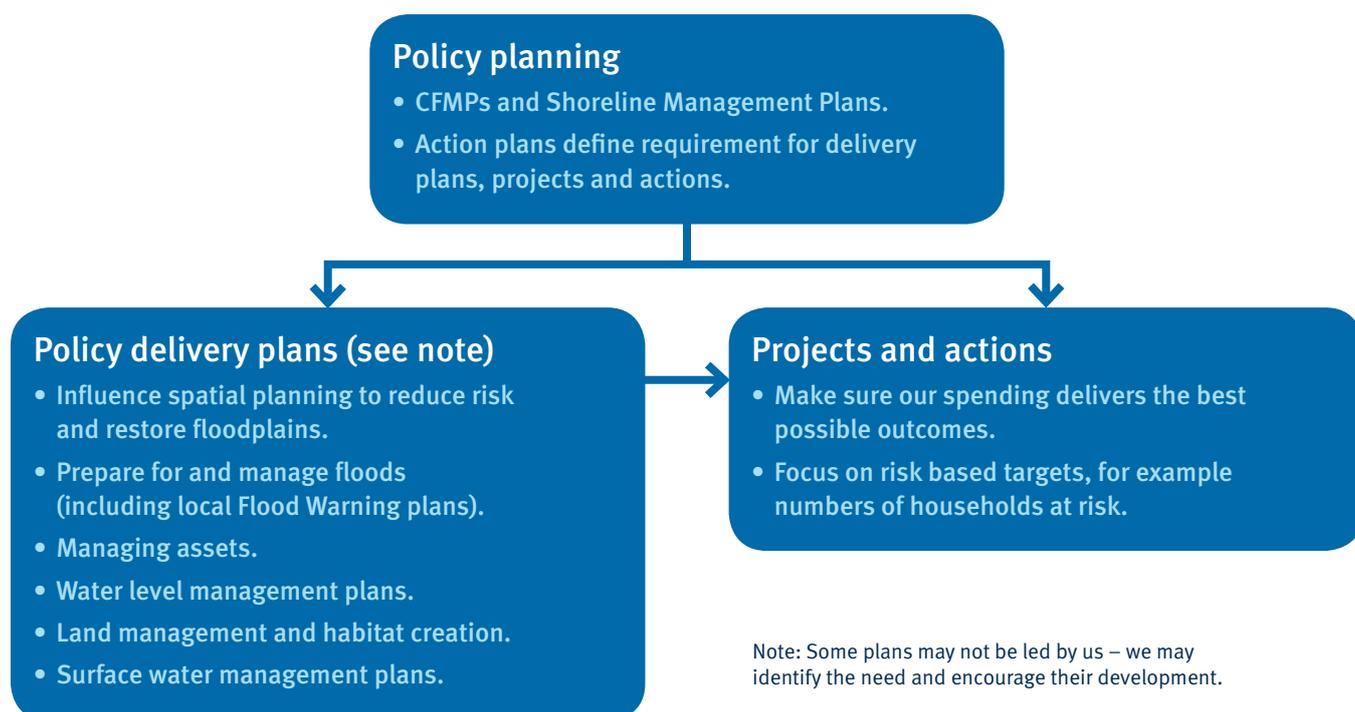
- the Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions;
- planning and local authorities who can use the plan to inform spatial planning activities and emergency planning;

- 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 8,596km<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 north east 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 north west 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 run off, and run off flows directly into the watercourses. In the areas where there is limestone or chalk bedrock, run off 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 are 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 January/February 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, Harrold, Bedford/Kempston, St Neots, Godmanchester, Huntingdon, Houghton, the Hemingfords and St Ives, from the River Great Ouse and River
- flooding within the areas managed by the Internal Drainage Boards, which is generally caused by high rainfall onto already saturated ground;
- 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,

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.

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 37,500 people and 17,750 residential and commercial properties at risk from the 1% annual probability river flood. Around 230 people and 108 residential and commercial properties are at risk from the 0.5% annual probability tidal flood. These estimates take into account the current flood defences and are calculated using a combination of broadscale and detailed modelling. This means that 2% of the total population living in the catchment are currently at risk of flooding. There is 3,391km<sup>2</sup> of grade one and two agricultural land in the catchment; approximately 100km<sup>2</sup> (3%) of this is at risk of flooding.

It is difficult to assess the current impact of flooding to environmental and historic 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 affect 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.

Historic 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 in 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 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.

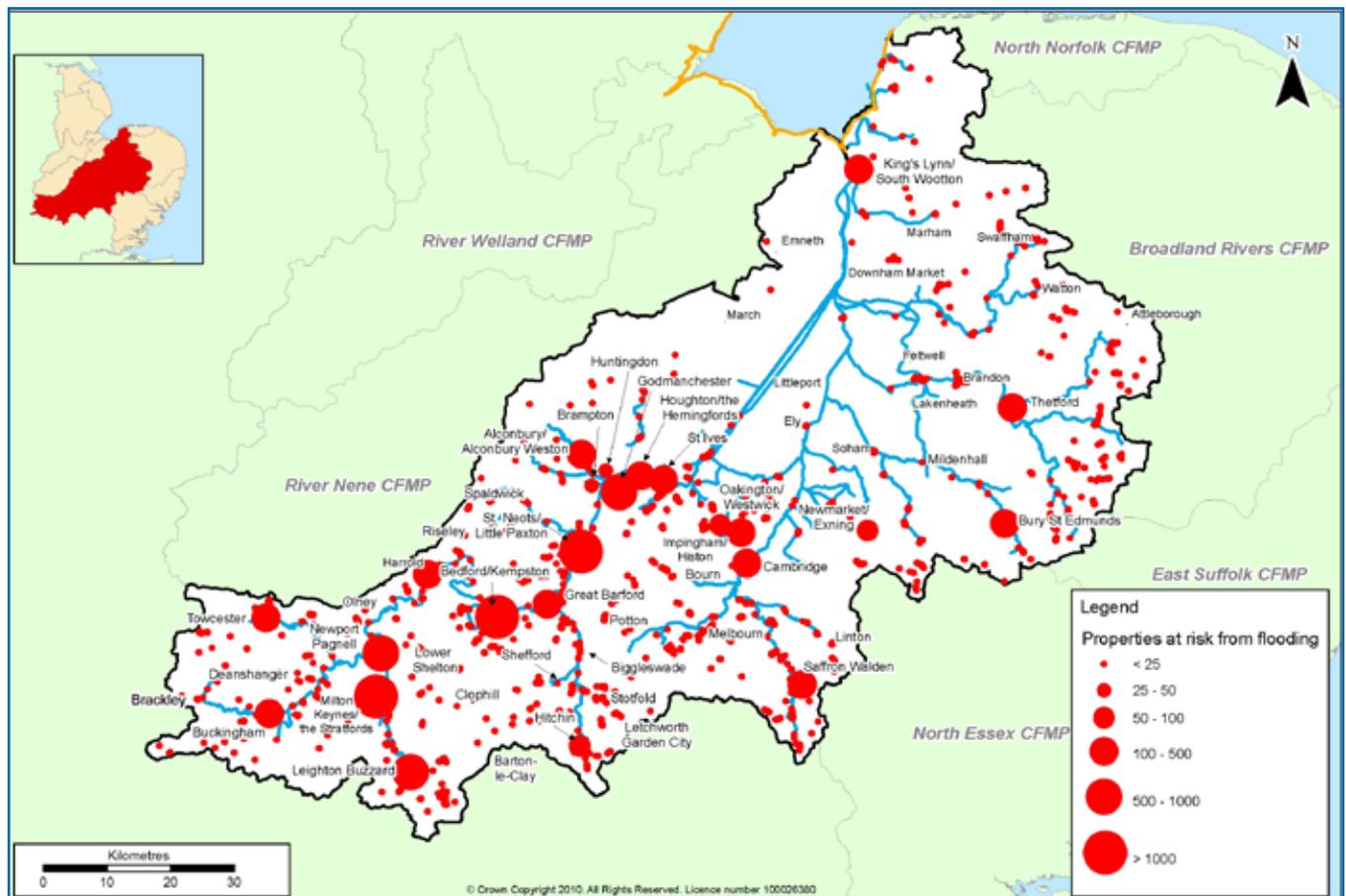
**Table 1 Locations of towns and villages with 25 or more properties at risk in a 1% annual probability river flood**

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
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 Edlesborough and Eaton Bray, Harrold
50 to 100	Oakington/Westwick, Newmarket/Exning, Hitchin
25 to 50	Huntingdon, Brampton

**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
70 electricity sub-stations; 32 sewage treatment works; one telephone exchange; two fire stations; 17km of A road and 2km of railway.	one sewage treatment works; 1 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 flood plain 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 times of flood;
- promoting resilience and resistance measures for those properties already in the flood plain.

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 48,100 people and 25,920 properties across the catchment may be at risk from the 1% annual probability river flood. Around 8,700 people and 4,200 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

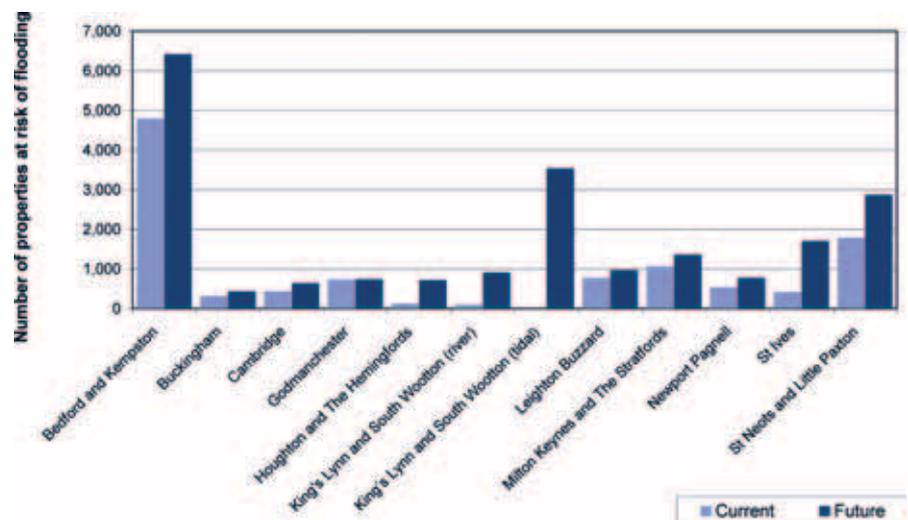
Figure 2 shows the difference between current and future flood risk from a 1% annual probability river flood at key locations in the CFMP area, and for a 0.5% annual probability tidal flood in King’s Lynn/South Wootton. Following on from the CFMP, organisations need to work together to investigate flood 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 86 electricity sub-stations, 31 sewage treatment works, two telephone exchanges, four police stations, two fire stations, 20km of A road and

2km of railway line will be at risk of flooding. During a 0.5% annual probability tidal flood it is estimated that there will be 2km of A road and 1km 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

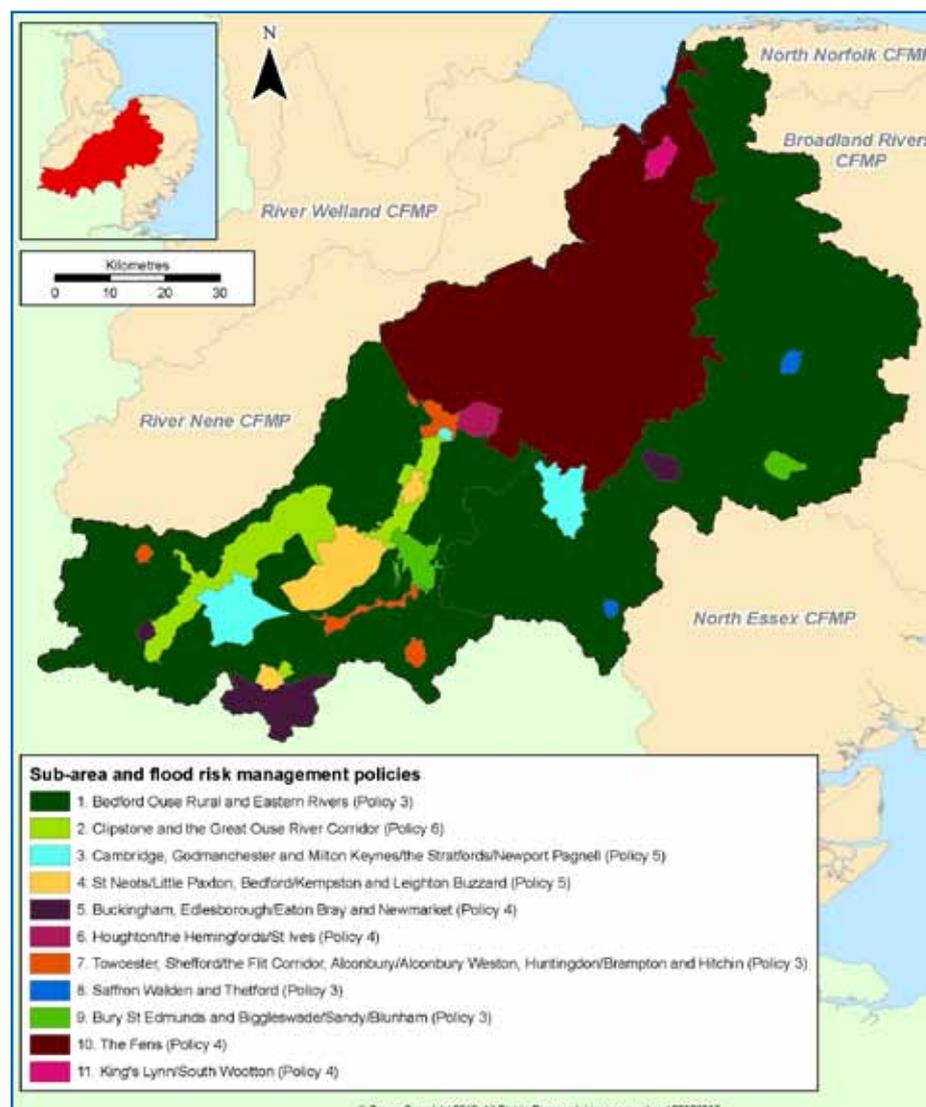
## Approaches in each sub-area

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

For a full list of partners and the policy justifications please see the main CFMP document.

## 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), there are risks to people and property that are located in villages or in isolated areas scattered throughout the rural area. Currently 3,627 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 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	1,610	1,862
Eastern Rivers	2,017	2,457

## The vision and preferred policy

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

Within this sub-area there are a number of main rivers and ordinary watercourses that are managed by different risk management authorities. Across this sub-area the risk of flooding varies. There are some local communities which have experienced regular flooding while in other areas there maybe opportunities for flood risk management activities to be reduced. Therefore, the key to managing flood risk across this sub-area will be working in partnership.

Selecting a policy option 3 will be the most pragmatic approach to manage flood risk. It will allow each risk management authority to exercise their powers to continue routine maintenance and carry out essential works on watercourses to benefit local communities. This policy will also give risk management authorities flexibility to use their local knowledge and experience to manage flooding either through existing or alternative actions. For the Environment Agency, alternative measures will include investigations to reduce flood risk maintenance in parts of the sub-area where there is a low risk of flooding and prioritising resources to areas where flood risk is more concentrated.

## The key messages

- Organisations must work together to continue current levels of flood risk management where flood risk is more concentrated (for example in towns and villages) and seek opportunities to review the approach in areas where the flood risk is lower.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- Investigate opportunities to reduce current levels of flood risk management on the main rivers in this sub-area.
- Continue with current levels of flood risk management on all ordinary watercourses (including Award Drains) in this sub-area.
- Continue with, and implement, the recommendations from the Cambridgeshire County Council Surface Water Management Scoping Study.
- 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 and through the creation of community-based flood warnings.
- Work with partners to develop emergency response plans for critical infrastructure, community facilities 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 flood water.
- 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 maintenance of Grafham Water and Foxcote Reservoir. Anglian Water must carry out their duties under the Reservoirs Act.
- Consider developing surface water management plans.



↑ 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

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

Within this large sub-area, which is approximately 323km<sup>2</sup>, there are risks to people and property that are located in small towns and villages scattered throughout the area. Currently, 1,169 properties within this sub-area are at risk from the 1% annual probability river flood. The majority of properties at risk are concentrated in Stony Stratford, Harrold and Great Barford.

Currently, there is about 11km<sup>2</sup> of grade one and two agricultural land at flood risk. There are six electricity sub-stations, four sewage treatment works, two landfill sites and a number of A roads 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	1,164	1,330

## 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 this largely rural area, the aim is to manage flood risk by maximising the potential of the flood plain to retain water to benefit locations elsewhere in the catchment. Storing water on these flood plains can reduce flood risk to settlements downstream such as Leighton Buzzard, St Neots/Little Paxton, Bedford/Kempston and Houghton/the Hemingfords/St Ives. This policy may involve:

- restoring river channels, water meadows and the natural flood plain;
- reducing run off from agricultural land;
- structural measures to control water levels and retain more water on the flood plains;
- engineered schemes to store flood water. Locally, the flood plain 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 flood plain to store water by improving the flow between the river and its flood plain. 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 flood plain for flood risk management, we need to work with local planning authorities to encourage development outside of the flood plain.

## The key messages

- We plan to use the undeveloped flood plain in this sub-area to store flood water. This will reduce flood risk to settlements downstream such as Leighton Buzzard, St Neots/Little Paxton, Bedford/Kempston and Houghton/the Hemingfords/St Ives.
- We need to work with local planning authorities to encourage development outside of the flood plain in this sub-area so that it can be maintained as an area to store flood water.
- Maintenance work on rivers should aim to increase the capacity of the flood plain to retain water.
- Storing water on the flood plain 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 flood plain. The flood plain should be maintained as an asset to make space for water.
- Work with partners to develop emergency response plans for critical infrastructure, community facilities and transport links at risk from flooding.

### Actions specific to Clipstone:

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

- Investigate opportunities to reduce flood risk management activities on watercourses that are not part of the flood storage measures.

### 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 flood plain storage.
- In the short-term continue with current activities to manage flooding through the settlements, and outside of these areas investigate opportunities to reduce maintenance activities.
- Continue with, and implement, the recommendations from the Cambridgeshire County Council Surface Water Management Scoping Study.
- 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 flood water.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.



↑ River Great Ouse, Turvey

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

## Our key partners are:

### Local authorities

Bedford Group of Internal Drainage Boards

Anglian Water

Natural England

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

This is a predominantly urban sub-area where the towns are situated in the natural flood plain. Currently, 2536 properties in this sub-area are at risk from the 1% annual probability river flood.

Currently there is approximately 1.5km<sup>2</sup> of grade one and two agricultural land at flood risk. There are nine electricity sub-stations, a fire station, a landfill site and a number of A roads 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	646	942
Godmanchester	635	653
Milton Keynes/The Stratfords/ Newport Pagnell	1,255	1,634

## 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 existing flood risk is too high. We need to investigate options to reduce the probability of flooding. However, large-scale interventions may not be technically, environmentally and economically viable for all communities at risk so we must also take action to manage the consequences of flooding.

The most sustainable way of reducing flood risk will be through flood plain management especially where large scale interventions may not be appropriate. In areas being developed and redeveloped, policies should be put in place to create green corridors and to incorporate flood resilience measures into the location, lay-out and

design of development. Any new development should not increase the risk to existing development. For example, 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, lay-out and design of development can help to manage flood risk.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- In the short-term, continue with current levels of flood risk management on all watercourses.
- Work with partners to develop emergency response plans for critical infrastructure, community facilities 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 Cambridge:

- Develop a flood risk study for Cambridge to investigate options to reduce flooding. This study should focus on the River Cam.
- Develop a flood risk study for Vicars Brook to investigate options to reduce flooding.
- Continue with improvements to the flood warning service by creating community-based flood warnings.
- Continue with, and implement, the recommendations from the Cambridge and Milton Surface Water Management Plan.

- Continue with, and implement, the recommendations from the Cambridgeshire County Surface Water Management Scoping Study.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.

### Actions specific to Godmanchester:

- Continue with investigations for the Godmanchester Flood Defence Improvement Scheme to create new flood defences.
- Continue with, and implement, the recommendations from the Cambridgeshire County Council Surface Water Management Scoping Study.

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

- Develop a flood risk study for Milton Keynes, the Stratfords and Newport Pagnell to investigate options to reduce flooding.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond, to flood warnings.
- Consider developing a surface water management plan for Milton Keynes.
- Develop environmental enhancement projects to improve the natural state of the rivers and their habitats.
- Ensure any policies within the Local Development Framework or any revisions are in line with the CFMP policy.

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

## Our key partners are:

### Local authorities

Bedford Group of Internal Drainage Boards

### Natural England

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

This is a predominantly urban sub-area where the towns are situated within the natural flood plain. Currently, 7,535 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is about 4.5km<sup>2</sup> of grade one and two agricultural land at flood risk. There are 34 electricity sub-stations, two sewage treatment works, a police station, two landfill sites, a 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	1,798	2,873
Bedford/Kempston	4,903	6,417
Leighton Buzzard	834	956

## 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 existing flood risk is too high. We need to investigate options to reduce the probability of river flooding. In particular we should consider storing water on the flood plains upstream of communities at risk. Organisations must also work together to manage the risk off surface water flooding in St Neots and Bedford/Kempston.

We should also consider taking action to manage the consequences of flooding by adapting urban environments to make them more resilient to flooding. For example, as commercial sites are redeveloped, the location and lay-out 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.
- We plan to store water upstream in the Clipstone and the Great Ouse River Corridor sub-area to reduce flood risk in St Neots/Little Paxton, Bedford/Kempston and Leighton Buzzard.
- 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, lay-out 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 flood storage to manage flood risk within this sub-area through upstream storage. The Leighton Buzzard flood alleviation scheme to create upstream flood storage along Clipstone Brook should be continued.
- In the short-term, continue with current levels of flood risk management on all watercourses.
- Work with partners to develop emergency response plans for critical infrastructure, community facilities 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 in 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 to investigate options to reduce flooding in St Neots/Little Paxton. This study must be developed in conjunction with the flood storage investigation.
- 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.
- Continue with, and implement, the recommendations from the Cambridgeshire County Surface Water Management Scoping Study.

### Actions specific to Bedford/Kempston:

- Develop a flood risk study for Bedford/Kempston to investigate options to reduce flooding. This study must be developed in conjunction with the flood storage investigation.
- Continue with improvements to the flood warning service by creating community-based flood warnings.
- Consider developing a surface water management plan for Bedford/Kempston.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store flood water.

### 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.
- Consider developing a surface water management plan for Leighton Buzzard.

# Buckingham, Edlesborough/ Eaton Bray and Newmarket

## Our key partners are:

### Local authorities

Bedford Group of Internal Drainage Boards

Anglian Water

For a full list of partners and the policy justifications please see the main CFMP document.

## 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 about 0.2km<sup>2</sup> of grade two agricultural land at flood risk. There is a sewage treatment works and a section of A road 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	428
Edlesborough/Eaton Bray	310	424
Newmarket	59	122

## 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 to people and property is expected to increase in the future. We need to carry out further investigations to understand the risk of flooding better. For some locations this may include more detailed studies of surface and groundwater flooding. Where appropriate we need to consider options to reduce the probability of flooding.

Managing the consequences of flooding will also be very important in this sub-area. Particularly in locations that are susceptible to rapid or frequent flooding or where there are several sources of flooding. Methods may include adapting urban environments to make them more resilient to flooding, improving the flood warning service or developing emergency response plans.

## The key messages

- We need to understand the flood risk in this sub-area better 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

### General actions across the sub-area

- In the short-term, continue with current levels of flood risk management on all watercourses.

### Actions specific to Buckingham:

- Develop a flood risk study for Buckingham to investigate options to manage future flooding.
- Provide local property-level flood mitigation for the town of Buckingham to reduce flood risk in low magnitude flood events.
- Consider developing a surface water management plan for Buckingham.
- 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 at risk from flooding.

### Actions specific to Newmarket:

- Consider developing a surface water management plan for Newmarket. In particular this should look at flood risk from overland flow, groundwater flooding and options to mitigate future flood risk from the Newmarket Number 1 and 2 Drains.
- 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 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

For a full list of partners and the policy justifications please see the main CFMP document.

## 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 0.5km<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	2,412

## 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.

Within this sub-area the risk of flooding is currently managed appropriately as historically defences have been constructed to reduce the probability of flooding. However, the risk is expected to rise significantly in the future. In these circumstances we need to do more in the long-term to reduce the expected increase in risk. We need to investigate options to sustain the current level of flood risk into the future. In particular, we should consider storing water on the flood plains upstream of communities at risk. Organisations must also work together to manage the urban drainage and surface water flood risk.

As flood defences can fail or be overwhelmed, other measures need to be taken to manage the consequences of flooding. In areas being developed and redeveloped, flood resilience should be incorporated into the location, lay-out and design of development to help reduce flood risk.

## The key messages

- Flooding is currently managed appropriately 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.
- We plan to store flood water upstream in the Great Ouse River Corridor sub-area to help manage the future flood risk in Houghton/the Hemingfords/St Ives.

- 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.

## Proposed actions to implement the preferred policy

- Investigate developing a strategic flood storage study to manage future flood risk in this sub-area.
- Develop a flood risk study for Houghton/the Hemingfords/St Ives to investigate options to manage future flood risk. This study should be developed in conjunction with the flood storage investigation.
- Develop a flood risk mapping study for Houghton Field Drain to confirm the level of flood risk along this watercourse.
- In the short-term, continue with current levels of flood risk management on all watercourses.
- 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 flood water.
- Within the Huntingdonshire Water Cycle Strategy, investigate the impact of increased discharge on Parsons Drove Drain.
- Continue with, and implement, the recommendations from the Cambridgeshire County Surface Water Management Scoping Study.
- 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.



↑ River Great Ouse, St Ives

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

## Our key partners are:

Local authorities

Bedford Group of Internal Drainage Boards

Anglian Water

Natural England

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

This sub-area contains a number of towns and villages. Currently, 617 properties within this sub-area are at risk from the 1% annual probability river flood.

Currently there is about 2km<sup>2</sup> of grade one and two agricultural land at flood risk. There are two electricity sub-stations, two sewage treatment works, a police station, a landfill site and sections of A road 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	188	250
Shefford/the Flit Corridor	51	94
Alconbury/Alconbury Weston	160	182
Huntingdon/Brampton	163	242
Hitchin	55	72

## 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 flood plain and, as a result, have a history of flooding. In the past, flood defences have been constructed in Towcester and maintenance work has been 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 in the flood plain, it is still feasible and effective to maintain the current level of flood risk management. This will be achieved by continuing with existing flood risk management activities as well as adopting new and more sustainable methods to manage the risk.

## The key messages

- As the risks are currently managed appropriately, and flooding is not expected to increase significantly, the current level of risk will be maintained.

## Proposed actions to implement the preferred policy

### General actions across the sub-area:

- Continue with the current flood risk management activities.

### 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.
- Consider developing a surface water management plan for Towcester.
- 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.
- Work with partners to develop emergency response plans for critical infrastructure, community facilities and transport links at risk from flooding.

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

- Consider developing a surface water management plan.
- 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.
- Work with partners to develop emergency response plans for critical infrastructure at risk from flooding.
- Ensure that opportunities are taken within minerals and waste development/action plans to use mineral extraction sites to store flood water.

- ↑ 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-level flood mitigation for the villages of Alconbury and Alconbury Weston to reduce flood risk in low magnitude flood events.
- Continue with, and implement, the recommendations from the Cambridgeshire County Surface Water Management Scoping Study.
- Continue with improvements to the flood warning service by extending the current Floodline Warnings Direct service.
- Work with partners to develop emergency response plans for the community facilities at risk from flooding.

### Actions specific to Huntingdon/Brampton:

- Investigate options to provide local property-level flood mitigation for Huntingdon and Brampton to reduce flood risk in low magnitude flood events.
- Continue with improvements to the flood warning service by extending the current Flood Warnings Direct service.
- 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, community facilities and transport links at risk from flooding.
- Continue with, and implement, the recommendations from the Cambridgeshire County Surface Water Management Scoping Study.

### Actions specific to Hitchin:

- Consider developing a surface water management plan for Hitchin.
- Ensure any policies within the Local Development Framework, or any revisions, are in line with the CFMP policy.
- Develop an environmental enhancement project to improve the natural state of the rivers and their habitats.

# Saffron Walden and Thetford

## Our key partners are:

### Local authorities

Anglian Water

Natural England

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

The sub-area is mainly urban, covering the towns of Saffron Walden and Thetford. Currently, 306 properties are at risk from the 1% annual probability river flood.

Currently there is no grade one and about 0.1km<sup>2</sup> of grade two agricultural land at flood risk. A sewage treatment works and a fire station are at risk in 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	188	214
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 flood plain 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 in the flood plain, it is still feasible and effective to maintain the current level of flood risk management.

This will be achieved by continuing with existing flood risk management activities as well as adopting new and more sustainable methods to manage the risk. For example, by managing the consequences of flooding through flood warning, flood awareness and adapting urban environments to make them more resilient to flooding.

## The key messages

- As the risks are currently managed appropriately and flooding is not expected to increase significantly, the current level of risk will be maintained.

## Proposed actions to implement the preferred policy

General actions across the sub-area:

- Continue with current levels of flood risk management on all watercourses.

#### 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.
- Continue investigations on flood risk and surface water run-off from the highways.
- Work with partners to develop emergency response plans for critical infrastructure and community facilities at risk from flooding.

#### 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.
- Consider developing 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

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

The settlements in this sub-area are located in and around river flood plains, which are at risk from river flooding. Currently, 192 properties in this sub-area are at risk from the 1% annual probability river flood.

Currently there is about 3.3km<sup>2</sup> of grade one and two agricultural land at flood risk. An electricity sub-station, a sewage treatment works and a section of A road are 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	150	195
Biggleswade/Sandy/Blunham	42	70

## 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 in the flood plain, 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 on main rivers, investigate opportunities to reduce activities where flood risk is low and target resources in areas where the risk is more concentrated.
- Continue with current levels of flood risk management on all ordinary watercourses.
- Consider developing a surface water management plan.
- Work with partners to develop emergency response plans for critical infrastructure, community facilities 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 flood water.
- Develop an environmental enhancement project to investigate potential areas suitable for flood plain 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

For a full list of partners and the policy justifications please see the main CFMP document.

## The issues in this sub-area

This large sub-area is mainly flat, low-lying fenland containing scattered small towns and villages. River and tidal defences have been constructed in this sub-area to reduce the risk of flooding. Currently, 377 properties in 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 41km<sup>2</sup> of grade one and two agricultural land is at risk in a 1% annual probability river flood and 2.3km<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 in 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	377	991

**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	508

## 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 to people, property and the environment is expected to increase in the future. 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 sustain the current level of flood risk into the future.

Within the Fenlands, all flood risk management organisations and other key partners must come together as a partnership to develop a sustainable, integrated and long-term flood risk management approach. These organisations need to investigate how flood risk varies across the Fens and the best options to manage this risk, which may include making space for water. These investigations 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 the investigations, flood risk from breaching of the existing defences should be considered.

Any assessment of flood risk in the Fens must consider neighbouring river catchments along with tidal risk and the policies set in The Wash Shoreline Management Plan. Environmental enhancement projects must also be incorporated into any flood risk management solutions to ensure that existing wetlands are maintained and enhanced and new wetlands created. This should be linked to the objectives of the 50th Year Wetland Vision and biodiversity action plan targets.

## The key messages

- The Great Ouse catchment is one of the most productive agricultural areas in the country. In total, the Fens area (which spreads across Lincolnshire and East Anglia) accounts for half of the nation's best quality land, produces one-third of our vegetable crop and supports a thriving food and drink sector.
- We need to understand the flood risk in this sub-area better 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

- In the short-term, continue with current levels of flood risk management on all watercourses.
- 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, community facilities 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

For a full list of partners and the policy justifications please see the main CFMP document.

## 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 about 0.9km<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 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	922

**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	3,591

## 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.

In this sub-area the risk of flooding is currently managed appropriately as, historically, defences have been constructed to reduce the probability of river and tidal flooding. However, flood risk to people and property is expected to rise significantly in the future. In these circumstances we need to do more in the long-term to reduce the expected increase in risk. We need to investigate options to sustain the current level of flood risk into the future.

As flood defences can fail or be overwhelmed, other measures need to be taken to manage the consequences of flooding. In areas being developed and redeveloped, flood resilience and green corridors should be incorporated into the location, lay-out and design of development to help reduce flood risk. Flood awareness plans should also be produced to encourage people to sign up to, and respond to, flood warnings.

## The key messages

- Flooding is currently managed appropriately 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 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, lay-out and design of development can help to manage flood risk.

## Proposed actions to implement the preferred policy

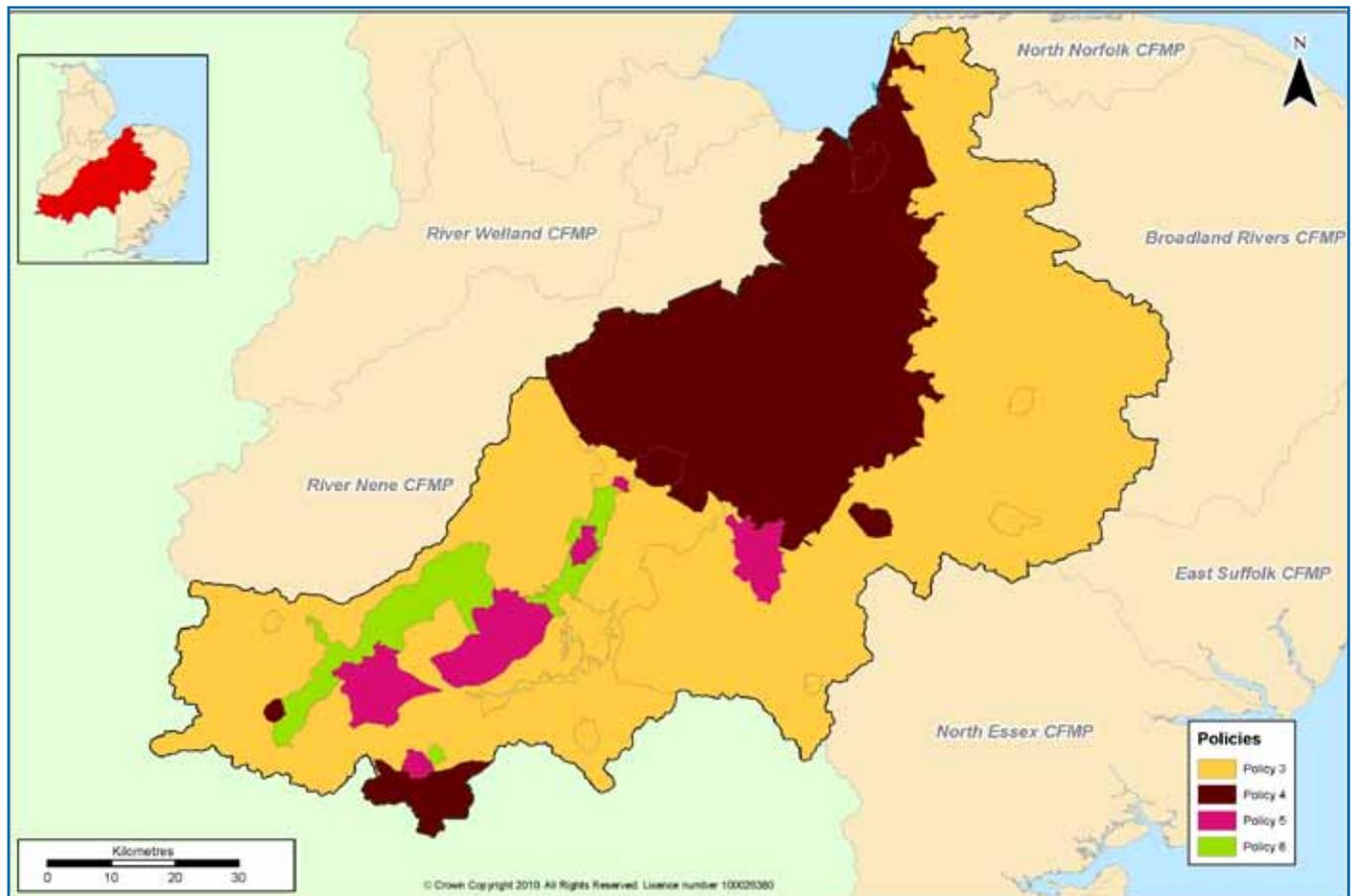
- In the short-term continue with current levels of flood risk management on all watercourses.
- Develop flood risk studies for King's Lynn to investigate options to manage future flood risk from the tidal main river and the IDB drains.
- Ensure any policies within the Local Development Framework or 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.
- Consider developing a surface water management plan for King's Lynn/South Wootton.
- 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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