

# River Welland Catchment Flood Management Plan

Summary Report December 2009



managing  
flood risk

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December 2009

# Introduction

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

The River Welland 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.

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

There are different sources of flood risk in the catchment. River flooding from the River Welland and its tributaries can affect Peterborough, Market Harborough, Stamford and villages such as Great Easton and Medbourne. Tidal flooding can occur from overtopping of the embankments

of the tidal River Welland between Spalding and Fosdyke Bridge. This could cause flooding to large parts of Spalding. Breaching/failure of embankments that carry the main upland rivers across the fenland area of the catchment could cause significant flood risk. Surface water and sewer flooding can affect parts of Market Harborough, Bourne and Stamford. Parts of the River Glen subcatchment and areas around Stamford could experience groundwater flooding.

We cannot reduce flood risk on our own. We will therefore work closely with all our partners to improve the co-ordination of flood risk activities. 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. This includes 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 Region.

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 Welland, Stamford

# 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:

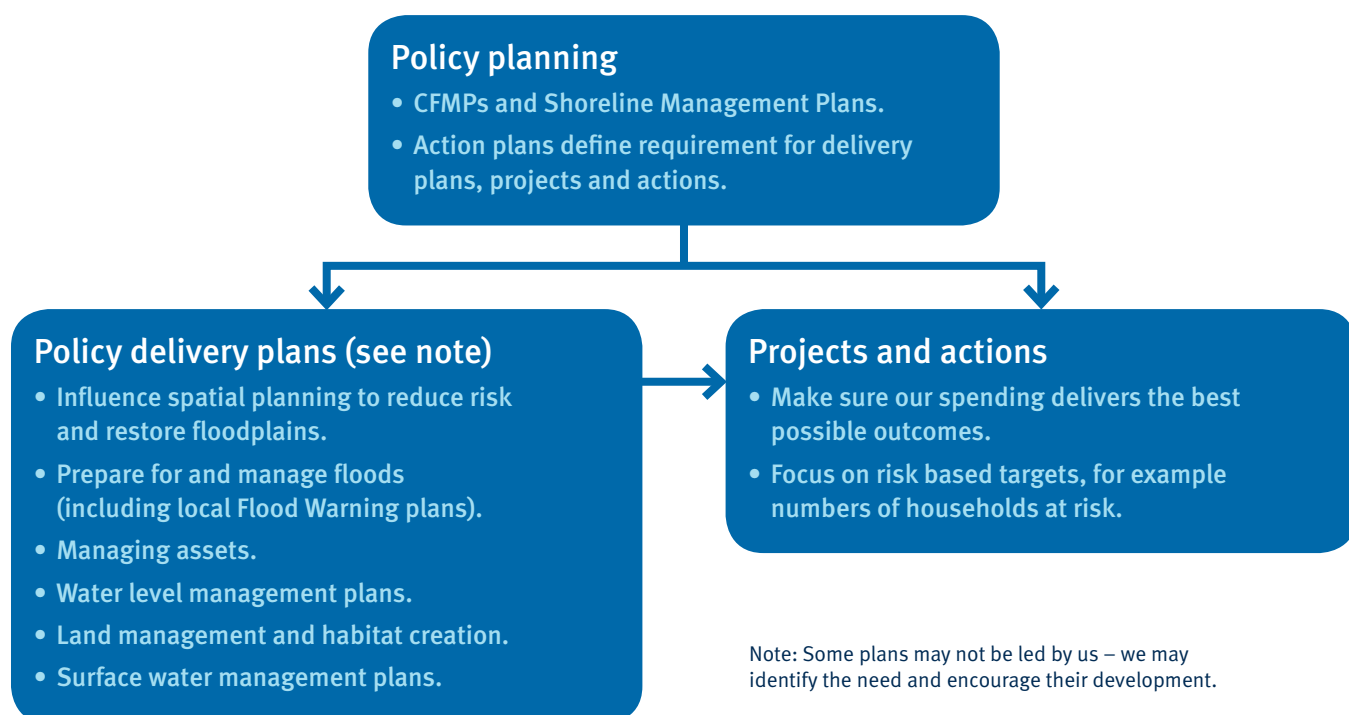
- the Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions;
- regional planning bodies and local authorities who can use the plan to inform spatial planning activities and emergency planning;

- 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 River Welland is located in the east of England. It extends from the river's headwaters around Market Harborough and flows eastwards through Stamford and Spalding to its outfall into the Wash. Map 1 shows the location and extent of the River Welland CFMP area. It includes the major tributaries of the West Glen and East Glen Rivers, plus a number of other tributaries including Eye Brook, the River Chater and River Gwash. The downstream limit of the CFMP area is located at Fosdyke Bridge which is The Wash Shoreline Management Plan (SMP) boundary. The Wash SMP deals with coastal flood risk management, while the CFMP considers tidal flood risk along the River Welland upstream of Fosdyke Bridge to the tidal limit in Spalding.

The overall catchment area is about 1,680 km<sup>2</sup>, and has a population of around 250,000. It is predominantly rural with the majority of the catchment (approximately 80%) being used for arable crop production. There is a large proportion of high grade agricultural land particularly in The Fens. The main urban areas are Market

Harborough, Oakham, Stamford, Market Deeping, Bourne, Spalding and the northern part of Peterborough, which includes the areas of Bretton, Dogsthorpe, Gunthorpe, New England, Ravensthorpe, Walton and Werrington.

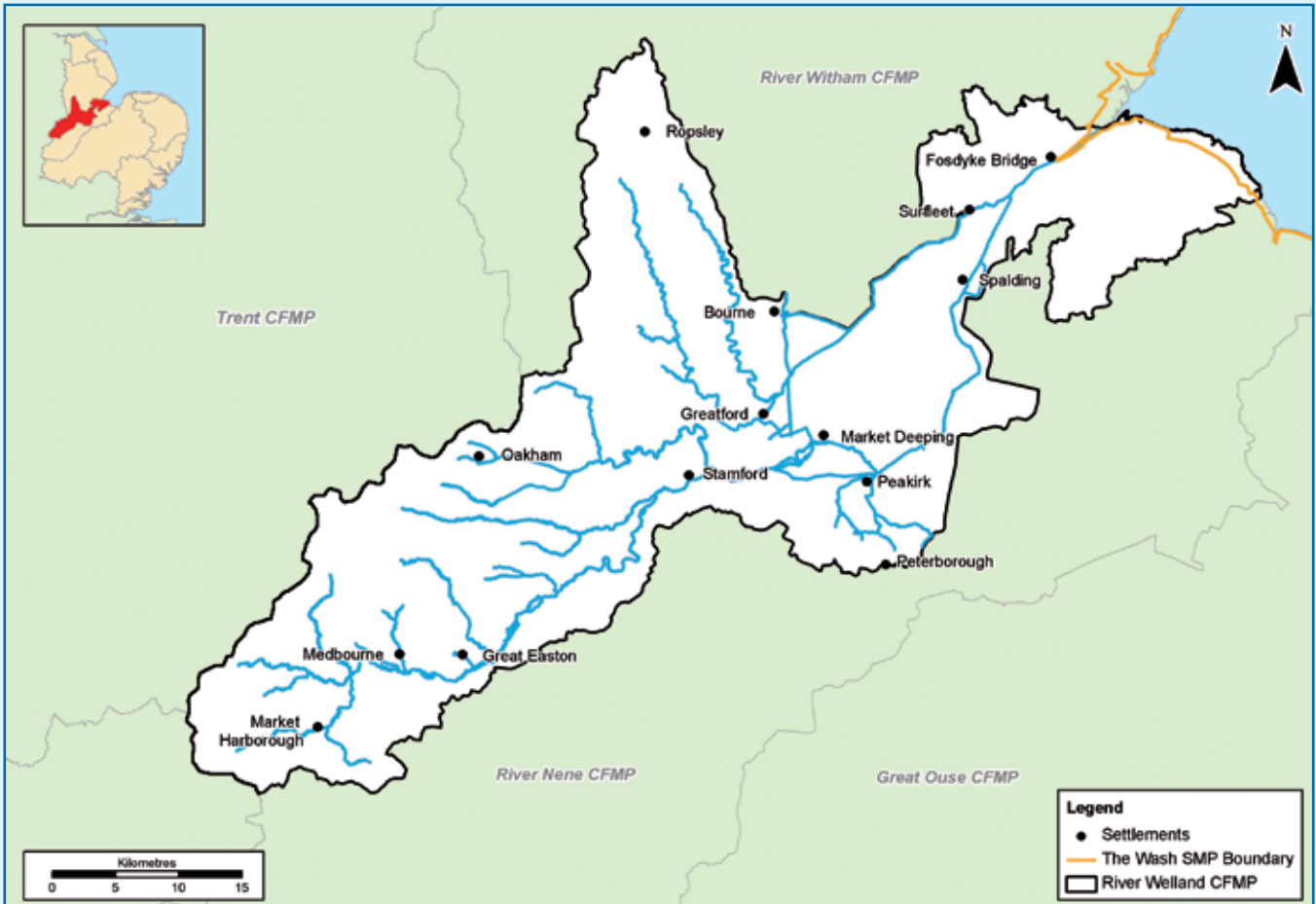
The landscape of the catchment varies significantly. Upstream of Stamford it is relatively hilly. Downstream of Stamford, the river has raised embankments, to carry water through the low-lying fenland. The Fens are drained mainly by pumping and discharging water into the Welland because large areas are at or below sea level. However, there are some watercourses which drain into the sea via outfalls using gravity. Internal Drainage Boards (IDBs) have an important role in managing land drainage within these low-lying fenland areas.

The underlying geology of the area is dominated by mudstone to the west of Rutland Water and Uppingham, and limestone and sandstone to the east. In the hilly areas to the west of the catchment, where the underlying rock is non-

porous clay, there are higher rates of rainfall runoff, and runoff flows directly into the watercourses. In the areas where there is limestone or sandstone bedrock, runoff may infiltrate the rock, delaying the response of rivers to rainfall and reducing peak flood flows. There is also a risk from groundwater flooding in these areas. In the lower fenland areas in the east of the catchment, the peat soils and the low gradients mean that water moves slowly to the river channels.

Within the River Welland catchment, there are a number of sites designated for their environmental importance including Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites. Important environmental sites in the catchment include Rutland Water (Ramsar, Site of Special Scientific Interest (SSSI), SPA) and The Wash (Ramsar, SAC, SPA, SSSI). There are 57 SSSIs throughout the catchment, some of which are designated for their geological importance. Scheduled Monuments (SMs), designated for their heritage values, are distributed across the catchment area.

Map 1 Location and extent of the River Welland CFMP area



↑ Rutland Water

# Current and future flood risk

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## Overview of the current flood risk

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

The catchment has a history of flooding. The most significant river flood in the catchment occurred in march 1947 where there was widespread flooding. More recent river floods have been localised and impacted a few properties, for example in November 2000. In 2004 Stamford and Market Harborough experienced surface water and sewer flooding.

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

- river flooding from the River Welland and its tributaries, particularly in the northern part of Peterborough, and towns of Market Harborough and Stamford;
- tidal flooding from the River Welland between Spalding and Fosdyke Bridge, where tidal water could rise over the top of the embankments;
- breaching/failure of embankments, which could be a problem along rivers that cross the fenland area of the catchment. This type of flooding is difficult to predict but could cause rapid flooding of areas immediately behind the embankments, which could result in a loss of life to people;
- surface water drainage and sewer flooding, has occurred in parts of Market Harborough, Bourne and Stamford. Due to its geology, the northern part of Peterborough has the potential to be at risk from surface water flooding;
- groundwater flooding is a risk for parts of the River Glen catchment and for areas around Stamford, when there are high groundwater levels within the underlying rock.

## What is at risk?

Using river models we estimate that at present there are around 580 people and 250 properties at risk in the whole catchment from a 1% annual probability river flood, taking into account current flood defences. This means that 0.2% of the total population living in the catchment are currently at risk from flooding. There is 581 km<sup>2</sup> of grade one and two agricultural land in the catchment; approximately 1.5% of this is at risk from flooding in 1% annual probability river flood.

It is difficult to assess the current impact of flooding to environmental features but the internationally important sites of The Wash and Rutland Water and 19 other SSSIs may be at risk from the impacts of flooding. Seven Scheduled Monuments may also be at risk of flooding.



## Where is the risk?

Around half 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 the northern part of Peterborough. A further 15% are located within the chalet style housing at Surfleet Reservoir, which is particularly vulnerable to deep flooding.

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 shows the critical infrastructure at risk in a 1% annual probability river flood. We recognise that there is also a potential risk from surface water and groundwater flooding. However, further studies following on from the CFMP are needed by us and our partners to quantify this potential risk.

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

Number of properties at risk	Locations
100 to 500	Peterborough
50 to 100	None
25 to 50	Surfleet

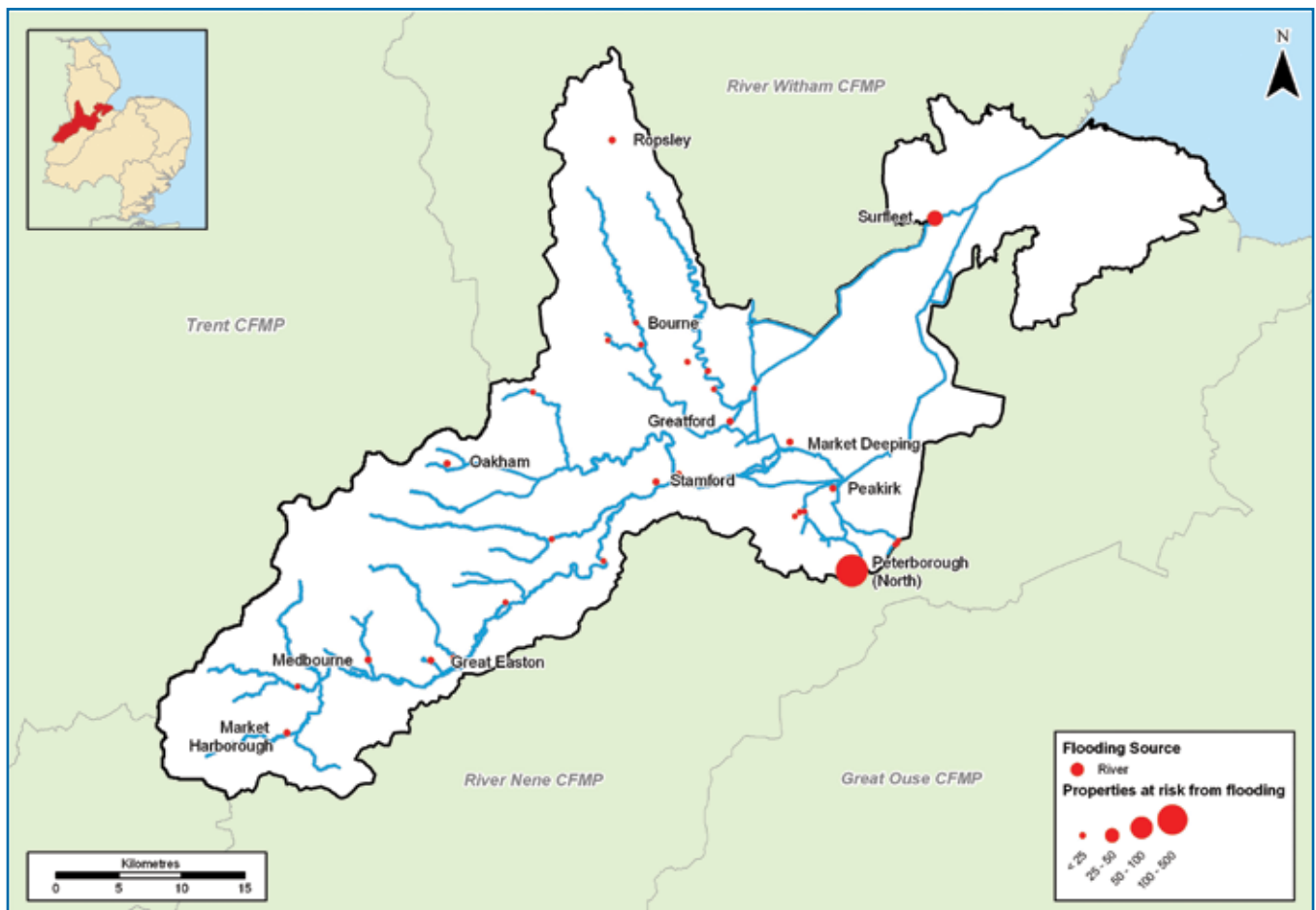
**Table 2** Critical infrastructure at risk in the catchment

	Risk from a 1% annual probability river flood
Critical infrastructure at risk	One electricity sub-station, One Wastewater Treatment Works



↑ River Glen, Pinchbeck

**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 flood risk, generally due to high rainfall that can lead to flooding of the river valleys and the breaching/overtopping of flood defences. Over the last 50 years numerous engineering schemes have been implemented to reduce flood risk in the catchment, including:

- the widening, straightening and embanking of rivers. Embanked rivers within The Fens area of the catchment provide protection up to a 1% annual probability river and tidal flood. Flood banks in Peterborough provide protection up to a 3.3% annual probability river flood. A flood bank at Manthorpe provides protection up to a 2% annual probability river flood;
- building flood bypass channels. The bypass channel at Greatford provides protection up to a 1% annual probability river flood;
- constructing reservoirs. Flood storage reservoirs upstream of Market Harborough, Medbourne and Great Easton provide protection up to a 2% annual probability river flood;
- flood alleviation schemes. The flood walls at Stamford and Market Harborough provide protection up to a 1% annual probability river flood.

These measures have all reduced flood risk and around 23% of the total catchment population currently live in areas that benefit from flood defences.

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 (IDBs) and landowners;
- maintenance of road drainage and sewers.

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.



↑ Gwash North Arm, Oakham

## The impact of climate change and future flood risk

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

For urbanisation, we tested the sensitivity of the rivers in the catchment to a 56% increase in urban growth up to 2100. Increasing urbanisation had an impact on flood risk.

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

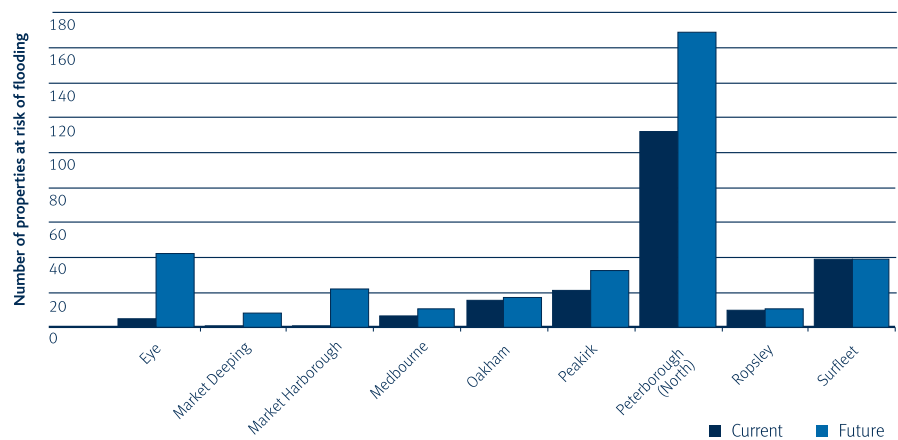
- 20% increase in peak flow in all watercourses. This will increase the probability of large-scale flood risk;
- a total sea level rise of 905 mm by the year 2100. This will increase the probability of tidal flooding and increase the length of time watercourses will not be able to flow freely to the sea at high tide (tide-locked). Climate change was shown to have a significant impact on flood risk.

For rural land management, we adjusted the river models to represent the effect of reducing and increasing intensive farming practices. At a catchment scale this had a limited impact on flood risk.

In the River Welland CFMP, climate change and urbanisation were shown to have the greatest impact on flood risk. Therefore, the scenario used to model future flood risk was based on the current rural land management situation and the changes in urbanisation and climate change as described.

Using river models we estimate that by 2100, around 1,000 people and 500 properties across the catchment may be at risk from a 1% annual probability river flood, and 60 people and 25 properties may be at risk from a 1% annual probability tidal flood. These figures take into account current flood defences.

Figure 2 Current and future (2100) flood risk to property from a 1% annual probability river flood, taking into account current flood defences



Flood risk from rivers increases mainly in the northern part of Peterborough, Eye and Peakirk. By 2100 flood risk in Spalding is expected to increase during a 0.1% annual probability tidal flood. Figure 2 shows the difference between current and future flood risks from

a 1% annual probability river flood at key locations in the catchment. Following on from the CFMP, organisations need to work together to investigate flood risk from other sources (for example surface water and groundwater flooding) in more detail.

In general, it is unlikely that the impact of flooding to infrastructure, transport services, or impact on environmental sites will increase significantly.



↑ Maxey Cut

# Future direction for flood risk management

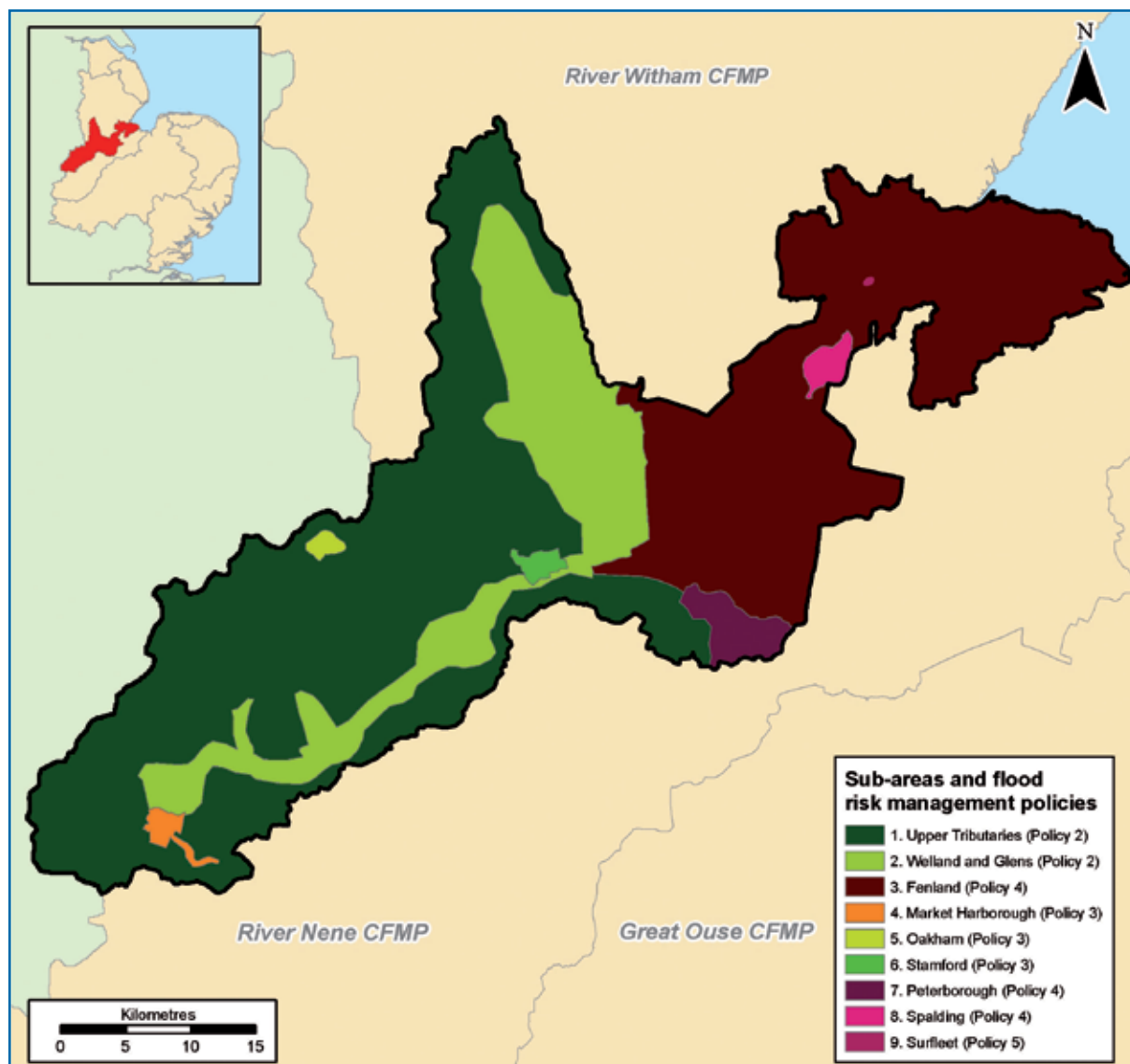
## Approaches in each sub-area

We have divided the River Welland catchment into nine distinct sub-areas which have similar physical characteristics, sources of flooding and level of risk. We have identified

the most appropriate approach to managing flood risk for each of the sub-areas and allocated one of six generic flood risk management policies, shown in Table 3.

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

Map 3 Sub-areas and flood risk management policies



**Table 3 Flood risk management policy options**

**→ Policy 1**

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

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

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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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# Upper Tributaries

## Our key partners are:

South Kesteven District Council

Harborough District Council

Daventry District Council

Kettering Borough Council

Corby Borough Council

East Northamptonshire Council

Rutland County Council

Peterborough City Council

Anglian Water

## The issues in this sub-area

There is low risk to people and property in this rural sub-area. Currently one property within this sub-area is at risk from the 1% annual probability river flood. There is a small amount of agricultural land at risk of flooding in the lower reaches of the tributaries during the 1% annual probability river flood, but no critical infrastructure is at risk. Table 4 details flood risk to people and property in this sub-area.

**Table 4 Risk to people and property within the Upper Tributaries sub-area during a 1% annual probability river flood, taking into account current flood defences**

	Current	Future (2100)
Number of people at risk	2	12
Number of properties at risk	1	6

## 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, however where flood risk is more concentrated (for example in towns and villages) existing actions to manage flooding may be continued.

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

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

## The key messages

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



## Proposed actions to implement the preferred policy

- Investigate options to cease current bank and channel maintenance and flood defence maintenance. In addition, changes in land use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in flooding in the future.
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans.
- Continue maintenance of Rutland Water. Anglian Water must carry out their duties under the Reservoirs Act.
- Encourage planners to develop policies to prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be targeted to areas with lowest flood risk, must not increase risk to existing development and should provide opportunities to improve river environments.



↑ River Gwash, Empingham

# Welland and Glens

## Our key partners are:

South Kesteven District Council

Harborough District Council

Rutland County Council

Reservoir owner (Corus)

## The issues in this sub-area

There is low risk to people and property located in small towns and villages, or in isolated areas scattered throughout this rural sub-area. Currently 56 properties within this sub-area are at risk from the 1% annual probability river flood. There is a small amount of agricultural land at risk of flooding in the upper reaches of the River Welland in the 1% annual probability river flood, but no critical infrastructure is at risk. Table 5 details flood risk to people and property in this sub-area.

**Table 5 Risk to people and property within the Welland and Glens sub-area during a 1% annual probability river flood, which includes flood protection given by flood storage reservoirs in Medbourne and Great Easton, and the Greatford Cut flood bypass**

	Current	Future (2100)
Number of people at risk	115	130
Number of properties at risk	56	62

## 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, however where flood risk is more concentrated (for example in towns and villages) existing actions to manage flooding may be continued.

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

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

## The key messages

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

## Proposed actions to implement the preferred policy

- Investigate options to cease or reduce current bank and channel maintenance and flood defence maintenance. In addition, changes in land use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in flooding in the future.
- Identify opportunities where existing water level control structures, such as mills and sluices, can be removed to improve fish passage and improve aquatic habitats.
- Continue maintenance and inspection of Medbourne Brook and Great Easton Brook flood storage reservoirs and Greatford Cut Sluice.
- Continue maintenance of Eye Brook Reservoir. Corus must carry out their duties under the Reservoirs Act.
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans.
- Carry out an investigation into the extent and impact of groundwater flooding and identify possible mitigation measures to reduce the current risk and raise awareness.
- Encourage planners to develop policies to prevent development in the River Welland valley, defined by the 0.1% undefended flood extent. The floodplain should be maintained as an asset to make space for water.



↑ Greatford Cut

# Fenlands

## Our key partners are:

South Holland District Council

Welland and Deepings Internal Drainage Board

South Holland Internal Drainage Board and  
North Level Internal Drainage Board

## The issues in this sub-area

Currently 27 properties within this sub-area are at risk from the 1% annual probability river flood. The properties at risk are concentrated in the towns towards the west of the fenland area such as Market Deeping, Eye and Peakirk. There is grade one and two agricultural land at risk in the Fens in the 1% annual probability river flood, but no critical infrastructure is at risk. These lowland areas are mainly rural, where historically much of the land has been drained for agriculture. Embanked watercourses carry water from upstream across these areas to outfall along the coast. The probability of flooding has been significantly reduced in these areas through actions taken primarily for land drainage purposes. There is a perception of little or no risk. However flood defences can fail or be overwhelmed which means that some areas have significant residual risk and the consequences of flooding have the potential to be serious. Table 6 details flood risk to people and property in this sub-area.

**Table 6 Risk to people and property within the Fenlands during a 1% annual probability river flood, taking into account current flood defences**

	Current	Future (2100)
Number of people at risk	62	377
Number of properties at risk	27	168

## 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 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 at the current level of flood risk management. 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 management 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 management into the future.

Within the Fens sub-area, the preferred approach is to produce a flood risk management strategy to develop a sustainable, integrated and long term flood risk management approach. The strategy should investigate how flood risk varies across the Fens and the best approach to manage this risk, which may include making space for water. The strategy 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 strategy, flood risk from breaching of the existing defences should be considered. To develop a sustainable flood risk management approach the strategy must bring together organisations and other plans and projects across the Fens. This included considering flood risk from the rivers Witham, Welland, Nene, Great Ouse along with tidal risk and the policies set within The Wash SMP.

## The key messages

- In the short term, it is still feasible and effective to maintain the existing flood defences at the current level of flood risk management.
- Produce a strategy to develop a sustainable, integrated and long term flood risk management approach for the Fens.

## Proposed actions to implement the preferred policy

- Produce a flood risk management strategy for the Fens to investigate how flood risk varies across the area and the best approach to manage this risk.



↑ River Welland, Fosdyke

# Market Harborough

## Our key partners are:

Anglian Water

Harborough District Council

## The issues in this sub-area

There are currently 4 properties within this sub-area at risk from the 1% annual probability river flood. There is no agricultural land at risk but one Wastewater Treatment Works and two electricity sub-stations at risk of flooding in the 1% annual probability river flood. Table 7 details flood risk to people and property in this sub-area.

**Table 7 Risk to people and property within the Market Harborough sub-area during a 1% annual probability river flood, which includes protection given by upstream storage reservoirs and concrete channels through the town**

	Current	Future (2100)
Number of people at risk	10	53
Number of properties at risk	4	25

## The vision and preferred policy

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

Market Harborough has a history of river and surface water flooding. 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. In the short term, this will be achieved by continuing with existing flood risk management activities. However,

in the long term, alternative, more appropriate ways to manage flood risk at the current level should be applied. Studies should be carried out to investigate whether the flood walls in the town centre need to be replaced at the end of their design life. An alternative more sustainable approach, could be to change the layout and design of properties in the town centre as they are redeveloped to make the buildings more resilient to flooding. Another alternative measure may include studies to investigate the extent and impact of surface water flooding including previous improvements carried out by Anglian Water.

## The key messages

- The current level of flood risk management should be continued.
- Investigate alternative, more appropriate ways to manage flood risk at the current level. In particular, whether to replace the flood wall in the town centre at the end of its design life.

## Proposed actions to implement the preferred policy

- In the short term, continue with the current flood risk management activities.
- In the longer term, investigate maintaining the flood walls in the town centre when they reach the end of their designed life.
- Continue maintenance and inspection of Little Bowden and Braybrooke flood storage reservoirs.
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans.

- Work with partners to develop a Surface Water Management Plan for Market Harborough.
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk. Planners should prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25), and ensure that any new development does not increase the risk to existing development. Any new development or regeneration should provide opportunities to improve the river environment and make space for water.
- Work with planners to influence the location, layout and design of new and redeveloped property. Ensure that only appropriate development is allowed on the floodplain through the application of Planning Policy Statement 25 (PPS25).
- Work with partners to develop an emergency response plan to manage flooding in Market Harborough during an extreme flood.
- Work with partners to investigate the impact and extent of flooding to critical infrastructure at risk.



↑ River Welland, Market Harborough

# Oakham

## Our key partners are:

Rutland County Council

Anglian Water

## The issues in this sub-area

There are currently 16 properties within this sub-area at risk from the 1% annual probability river flood. There is no agricultural land at risk but there is one Wastewater Treatment Works at risk in the 1% annual probability river flood. Table 8 details flood risk to people and property in this sub-area.

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

	Current	Future (2100)
Number of people at risk	36	38
Number of properties at risk	16	17

## 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 Oakham 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. 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 current level of flood risk management should be continued.
- 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.

## Proposed actions to implement the preferred policy

- Investigate options to reduce flood risk maintenance activities where the risk of flooding is low.
- Investigate the feasibility of expanding culverts at critical locations on the river where flood risk is more concentrated.
- Continue with the flood warning service including the maintenance of flood warning infrastructure (such as river flow gauging stations) and public awareness plans.
- Work with partners to investigate the impact and extent of flooding to critical infrastructure at risk.
- Work with planners to influence the location, layout and design of new and redeveloped property. Ensure that only appropriate development is allowed on the floodplain through the application of Planning Policy Statement 25 (PPS25).



# Stamford

## Our key partners are:

Anglian Water

South Kesteven District Council

Stamford Town Council

## The issues in this sub-area

Currently 1 property within this sub-area is at risk from the 1% annual probability river flood. There is no agricultural land at risk but there is one Wastewater Treatment Works at risk in the 1% annual probability river flood, but no agricultural land is at risk. Table 9 details flood risk to people and property in this sub-area.

**Table 9 Risk to people and property within the Stamford sub-area during a 1% annual probability river flood, which includes protection given by flood walls along the River Welland**

	Current	Future (2100)
Number of people at risk	2	7
Number of properties at risk	1	5

## 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 and maintenance work 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

- The current level of flood risk management should be continued.
- Continue current flood risk management activities.

## Proposed actions to implement the preferred policy

- Continue with the current flood risk management activities.
- Continue with the flood warning service including the maintenance of flood warning infrastructure such as river flow gauging stations.
- Work with partners to develop a Surface Water Management Plan for Stamford.
- Carry out an investigation into the extent and impact of groundwater flooding and identify possible mitigation measures to reduce the current risk and raise awareness.
- Work with planners to influence the location, layout and design of new and redeveloped property. Ensure that only appropriate development is allowed on the floodplain through the application of Planning Policy Statement 25 (PPS25).
- Carry out an environmental enhancement project to improve the state of the river and its habitat. Reducing maintenance activities along Stamford Meadows will provide the opportunity to improve the flow between the river and its floodplain and to improve wetland and aquatic habitats.

# Peterborough

## Our key partners are:

Peterborough City Council

Welland and Deepings Internal Drainage Board

## The issues in this sub-area

This sub-area covers the northern part of Peterborough, which includes the areas of Bretton, Dogsthorpe, Gunthorpe, New England, Ravensthorpe, Walton and Werrington. The southern part of Peterborough is covered by the River Nene CFMP. The probability of flooding from the river has been reduced in many places by channel modifications and water level control structures. There are currently 116 properties within this sub-area at risk from the 1% annual probability river flood in the River Welland catchment. The majority of the properties at risk are located in the New England area of Peterborough. There is agricultural land at risk of flooding in the North of Peterborough and around Glinton and Peakirk and one electricity sub-station at risk of flooding in the 1% annual probability river flood. Table 10 details flood risk to people and property in this sub-area.

**Table 10 Risk to people and property within the Peterborough sub-area during a 1% annual probability river flood, taking into account current flood defences**

	Current	Future (2100)
Number of people at risk	262	347
Number of properties at risk	116	176

## 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 this densely populated urban sub-area the most sustainable approach to manage future flood risk would be to open up river channels and re-create river corridors, so that there is more space for rivers to flow through the towns. To achieve this a combination of improvements to the channel capacity by increasing the size of culverts and active land use planning should be considered.

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

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

The risk of flooding cannot be reduced entirely, therefore flood awareness must continue to be promoted amongst these communities.

## The key messages

- Future flood risk should be managed by opening up river channels and re-creating river corridors so there is more space for rivers to flow.
- Flood risk management planning should be linked closely with regeneration and redevelopment so that the location and layout of development can help to reduce flood risk.

- Organisations must work together to provide an integrated approach to urban drainage issues and surface water flooding.
- Flood awareness plans will be used to manage the consequences of flooding.

## Proposed actions to implement the preferred policy

- In the short term, continue with the current flood risk management activities.
- Investigate the feasibility of increasing the passage of water along Paston Brook and Werrington Brook to manage future flood risk.
- Continue with the flood warning service including the maintenance of flood warning infrastructure such as river flow gauging stations.
- Encourage planners to develop policies for new development and regeneration (including commercial sites) to incorporate resilience measures so that the location, layout and design of development can help to reduce flood risk. Planners should prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25), and ensure that any new development does not increase the risk to existing development. Any new development or regeneration should provide opportunities to improve the river environment and make space for water.
- Reduce the consequences of flooding by: improving public awareness of flooding; encouraging people to sign up to, and respond to, flood warnings; and by improving local emergency planning for critical infrastructure at risk.
- Work with partners to develop a Surface Water Management Plan for Peterborough.



↑ Paston Brook, Peterborough

# Spalding

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## Our key partners are:

South Holland District Council

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National Flood Forum

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Emergency Services

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## The issues in this sub-area

Spalding is situated on the low-lying fenlands in the lower reaches of the River Welland and is protected by a series of flood defences. These include raised embankments through the town, the Coronation Channel and the Crowland and Cowbit washlands upstream of the town. There are no people and properties, agricultural land or critical infrastructure at risk in the 1% annual probability flood in this sub-area. However, there is a significant risk to people from the future 0.1% annual probability tidal flood. This is due to overtopping of the flood embankments. As well as the increase in future flooding from overtopping of the defences, as flood flows increase, the risk of failure of the flood embankments will increase. Flood embankments will be more liable to breach in the future as higher flows place increasing pressure on defences.

## The vision and preferred policy

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

Historically, flood defences have been constructed to reduce the probability of 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 Spalding the preferred approach is to take further action to sustain the current level of flood risk by raising the flood embankments through the town. This will reduce the risk from overtopping of the defences in the future. However, it is important to note that the flood defences in Spalding could fail. The density of people and property in Spalding means that this could have significant consequences. The risk to people and property behind the defences should be managed with flood awareness and emergency response plans.

## The key messages

- In the short term, continue with the current flood risk management activities.
- Future flood risk should be managed by improving the existing flood defences through the town.
- Flood awareness and emergency response plans should be used to manage the consequences of flooding from the existing defences failing.

## Proposed actions to implement the preferred policy

- Work with partners in the short term to maintain any structures that are effective at reducing flood risk and continue current maintenance activities. Investigate and consider options to manage the risk of breaching.
- Investigate the feasibility of improving the existing defences through the town to manage future flood risk.
- Continue with the flood warning service including the maintenance of flood warning infrastructure such as river flow gauging stations.
- Encourage planners to prevent development within the rapid inundation zone. This zone is an area where flood waters may flow rapidly with limited time to evacuate people safely if the defences were to breach. Within other parts of Spalding, planners should be encouraged to develop policies that prevent inappropriate development in the floodplain using measures set out in Planning Policy Statement 25 (PPS25). Any new development should be targeted to areas with lowest flood risk.
- Reduce the consequences of flooding by improving public awareness of flooding and encouraging people to sign up to, and respond to, flood warnings. Flood awareness plans will inform people about the risk of defences breaching and the actions they can take to protect themselves and their property.



↑ The River Welland at Spalding

# Surfleet

## Our key partners are:

South Holland District Council

Local residents

## The issues in this sub-area

Surfleet Reservoir is a unique sub-area in the Anglian Region; properties are located within the flood embankments that protect the surrounding fenland. Currently there is risk to 39 properties in the 1% annual probability river flood. The 39 residential properties are at risk from river flooding in low magnitude floods, when the flood coincides with a high tide. This results in backing up of the flood waters to large depths behind the tidal sluice. There is no agricultural land or critical infrastructure at risk in the 1% annual probability flood. By 2100, although there is no increase in the number of people or property at risk in Surfleet Reservoir, the depth of flooding is estimated to increase significantly. Table 11 details flood risk to people and property in this sub-area.

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

	Current	Future (2100)
Number of people at risk	94	94
Number of properties at risk	39	39

## 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.

Surfleet Reservoir is a unique sub-area in the Anglian Region; properties are located within the flood embankments that protect the surrounding fenland. As these properties flood during low magnitude floods and experience high flood depths which are expected to increase in the future, it is important to take further action to reduce flood risk. The preferred approach is to take immediate action to improve flood warning and awareness to the community living in Surfleet Reservoir. However, in the long term the most sustainable way of reducing flood risk will be to work with the community and partner organisations to remove vulnerable development from the reservoir.

## The key messages

- In the short term, it is still feasible and effective to maintain the flood defences.
- The long term focus will be to manage the consequences of flooding using flood awareness and resilience measures.
- Work with the community to prepare for flooding.

## Proposed actions to implement the preferred policy

For this unique sub-area, the policy is to take further action to reduce flood risk by the following actions:

### In the short term:

- Continue the current operation and maintenance of Surfleet Seas End Sluice.
- Develop a programme to prepare the community for a flood event.

- Work with partners to develop an emergency response plan to manage flooding within Surfleet Reservoir.
- Develop a community based flood warning service to enable the community to produce a flood warning plan.
- Encourage planners to prevent any further development within the reservoir.

### In the long term:

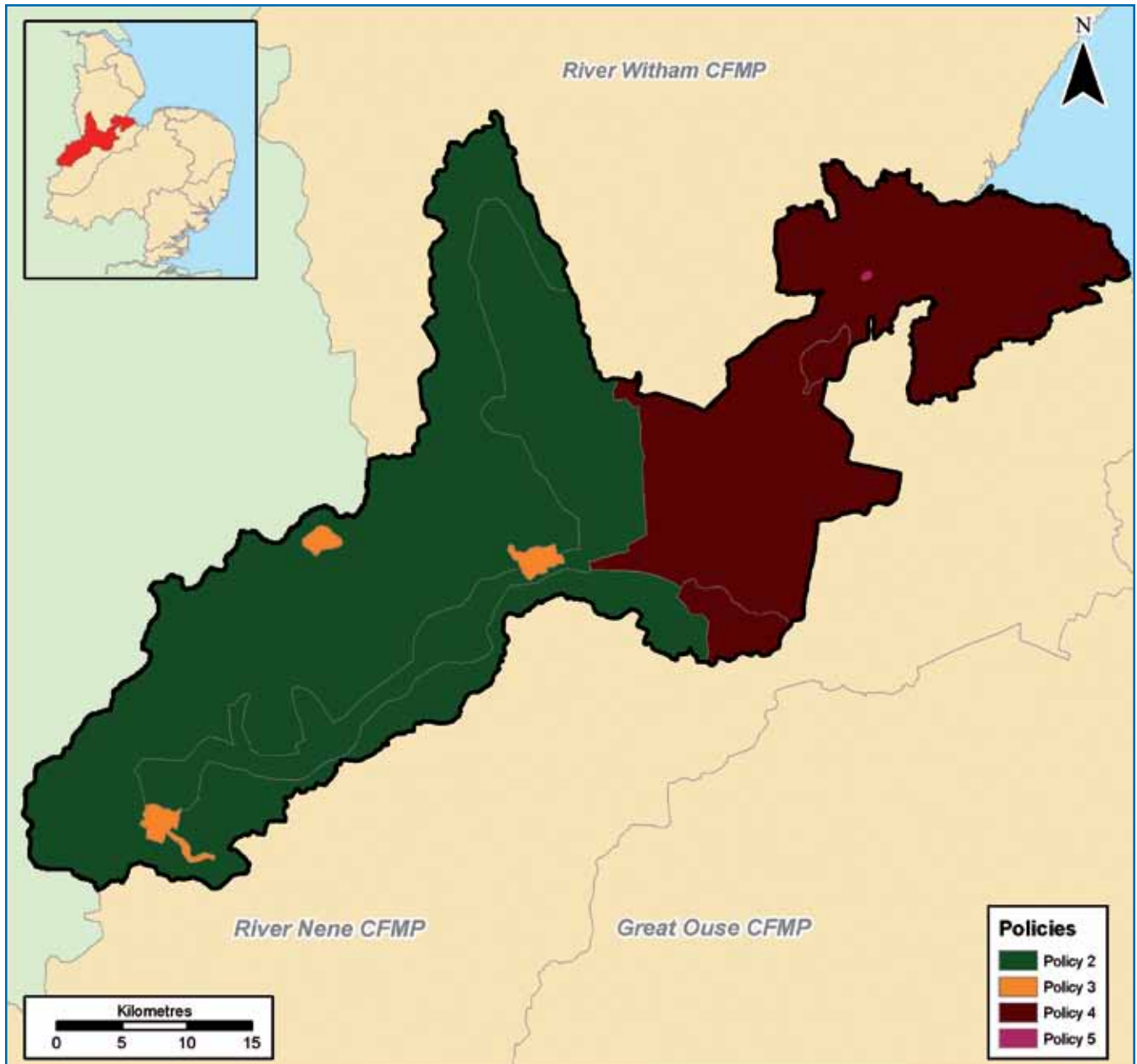
- Work with the community and partner organisations to relocate the settlement away from the reservoir.



↑ The River Glen at Surfleet

# Map of CFMP policies

Map 4 The flood risk management policies for the River Welland CFMP area





# Notes

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# Notes

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