



# Derwent Catchment Flood Management Plan

Summary Report December 2010

managing  
flood risk

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Published by:

Environment Agency  
Rivers House  
21 Park Square South  
Leeds LS1 2QG  
Tel: 0870 8506506  
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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# Introduction

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

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

The risk of flooding is significant within the Derwent CFMP area. The main risk of flooding comes from river and surface water flows. Analysis shows that during

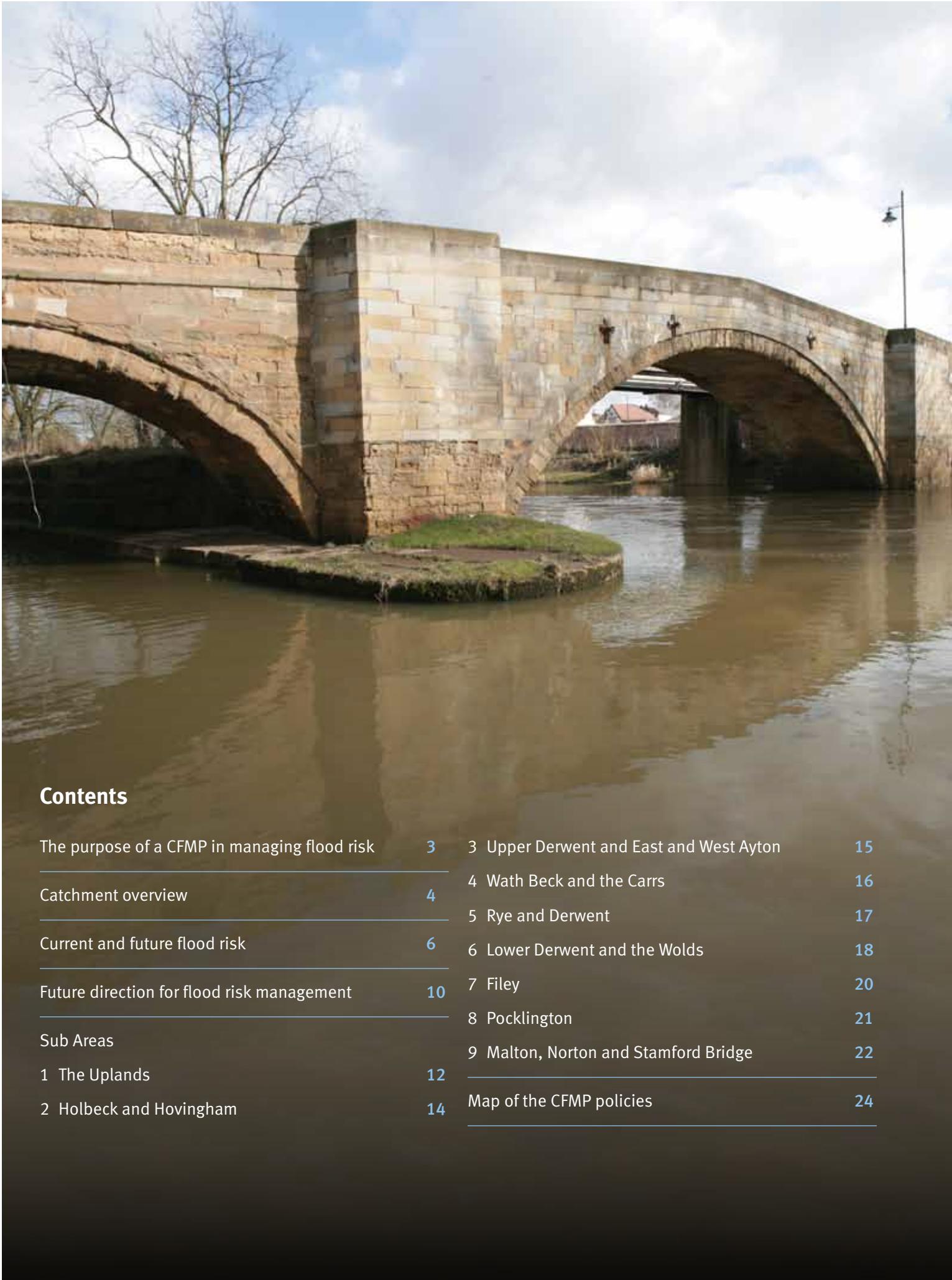
a one per cent annual probability flood from river sources, 3140 properties are at risk of flooding. This figure does not take into consideration the defences which currently reduce risk in the catchment. The risks from surface water have not been fully explored within this CFMP although flooding from surface water has been recorded in the catchment.

We cannot reduce flood risk on our own, we will therefore work closely with all our partners to improve the co-ordination of flood risk activities and agree the most effective way to manage flood risk in the future. We have worked with others including Planning and Local Authorities, Yorkshire Water and Natural England to develop this CFMP.

This is a summary of the main CFMP document, if you need to see the full document an electronic version can be obtained by emailing [necfmps@environment-agency.gov.uk](mailto:necfmps@environment-agency.gov.uk) or alternatively paper copies can be viewed at our Yorkshire offices.

A handwritten signature in blue ink, appearing to read "David Dangerfield".

David Dangerfield  
Yorkshire and North East Regional Director



## Contents

The purpose of a CFMP in managing flood risk	3	3 Upper Derwent and East and West Ayton	15
Catchment overview	4	4 Wath Beck and the Carrs	16
Current and future flood risk	6	5 Rye and Derwent	17
Future direction for flood risk management	10	6 Lower Derwent and the Wolds	18
Sub Areas		7 Filey	20
1 The Uplands	12	8 Pocklington	21
2 Holbeck and Hovingham	14	9 Malton, Norton and Stamford Bridge	22
		Map of the CFMP policies	24

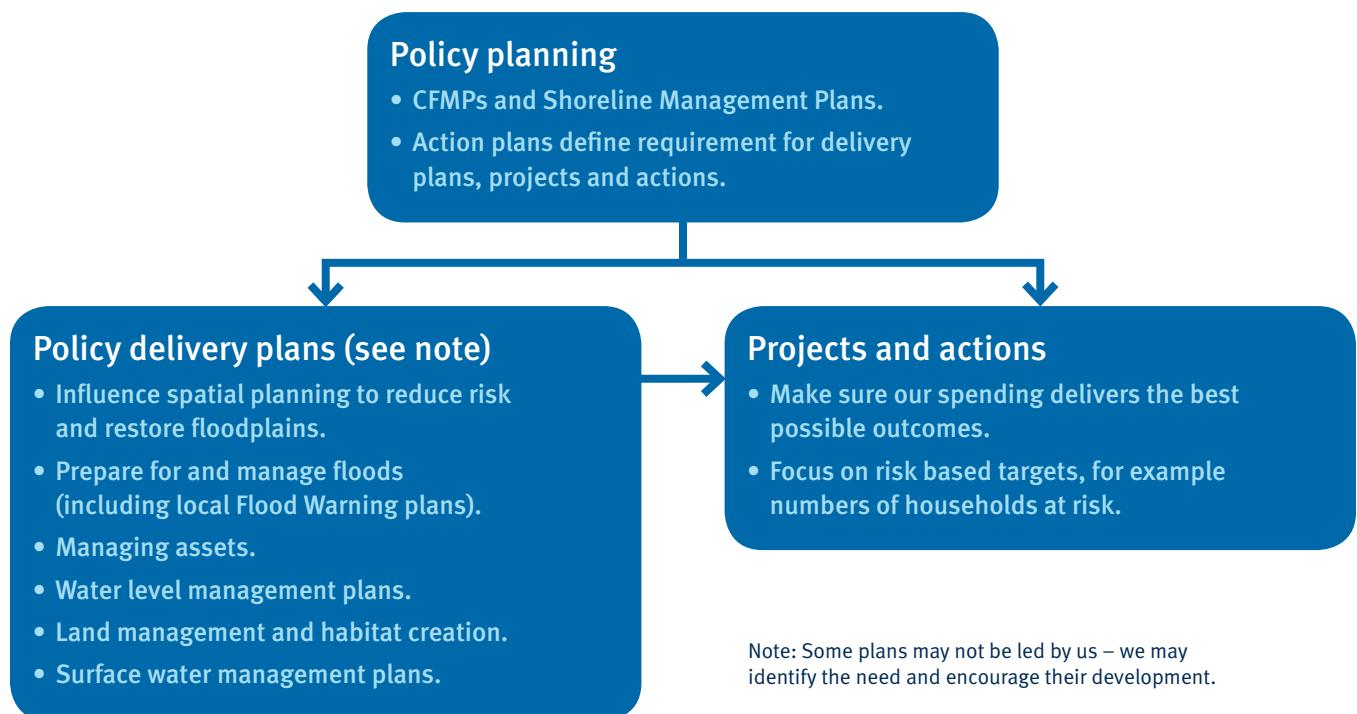
# The purpose of a CFMP in managing flood risk

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;
- IDBs, water companies and other utilities to help plan their activities in the wider context of the catchment;
- transportation planners;
- landowners, 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. The following actions and their implementation will be subject to further appraisal and funding, and prioritised by their supporting evidence. The CFMP is a living document and actions will be updated as necessary to reflect changing responsibilities and delivery mechanisms.

Figure 1 shows the relationship between CFMPs, delivery plans, projects and actions



# Catchment overview

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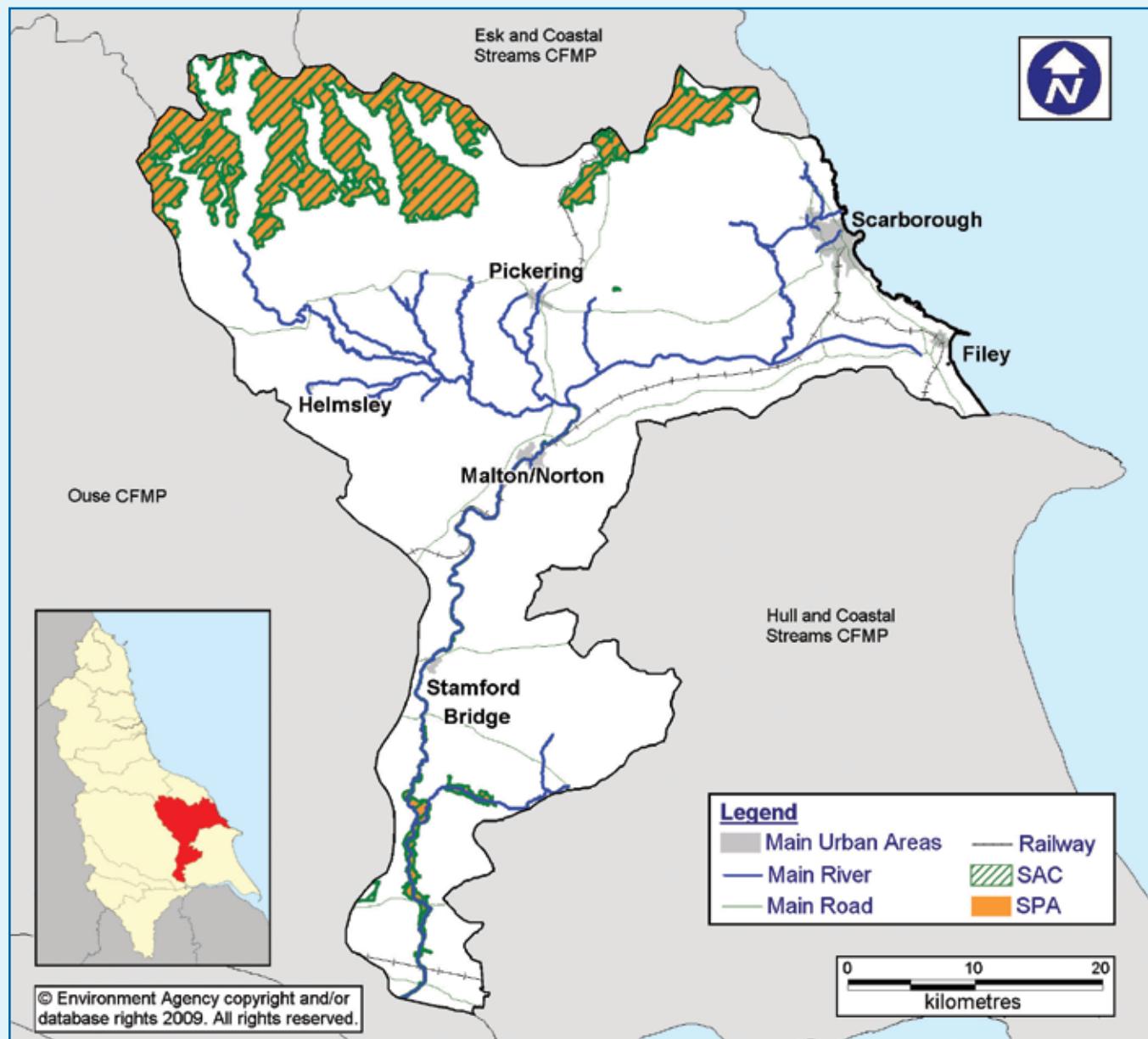
The Derwent catchment covers approximately 1,993 square kilometres and includes 7 sub-catchments; the Upper Derwent, Middle Derwent, Lower Derwent, Rye, Seph and Rye, Seven and Pickering Beck and Hodge and Dove. There are nearly 167,000 people living in the CFMP area. The River Derwent flows for 115.5 kilometres from its source near the coast on Fylingdales Moor southwards as far as its confluence with the river Hertford then westwards through the Vale of Pickering, south through Kirkham Gorge and the Vale of York and joins the River Ouse at Barmby on the Marsh. Downstream of Elvington lock the River Derwent was formerly tidal until the construction of the Barmby Barrage in 1975. The Barmby Barrage impounds the natural flow of the Derwent so that its water can be abstracted by Yorkshire Water for public water supply. The headwaters of the CFMP area are characterised by swift-flowing upland streams, which drain the North Yorkshire Moors National Park. In the lower part of the catchment, the river gradient becomes much gentler and the river meanders through the Vale of Pickering and lower Derwent Valley. Within this low-lying section of the River Derwent agricultural land is particularly important as shown by the ‘grade’ which rises to between grade 1 and 3: excellent to moderate quality productive land.

The CFMP area covers the six districts of Selby, Ryedale Scarborough, Hambleton, York and East Riding of Yorkshire. Urban land use occupies 0.5 per cent of the CFMP area and includes the settlements of Scarborough, Malton, Norton, Pickering, Pocklington and Stamford Bridge.

The CFMP area has a wealth of environmental and culturally recognised sites that are exposed to flooding. These include the North Yorkshire Moors National Park, 82 Sites of Special Scientific Interest, (SSSI) six Special Areas of Conservation (SAC) and two Special Protection Areas, (SPAs). Culturally there are 1,145 Scheduled Ancient Monuments (SAM) and 11 Registered Parks and Gardens.

The Derwent CFMP is bordered by the Esk and Coastal Streams, Tees, Ouse, Hull and Coastal Streams CFMPs. The CFMP is also bordered by the River Tyne to Flamborough Head Shoreline Management Plan.

Map 1. The location and extent of the Derwent CFMP area



# 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 one per cent flood has a one per cent chance or 0.01 probability of occurring in any one year.

As part of the CFMP process, we have developed a catchment wide broadscale model to determine the risk of flooding from both main and non-main rivers, if defences were not in place. It is vital that we understand this level of risk in the event that defences are overtapped or fail. The flood risk quoted in this report is for the one per cent probability flood.

There is a long history of flooding within the catchment. In June 2007 around 100 properties flooded in Pocklington and Pickering, in 2005 almost 170 properties flooded in Malton and Norton. In 2005 around 140 properties flooded from surface water drainage in Scarborough and Filey.

Currently the main sources of flood risk within the catchment are:

- from rivers, throughout the CFMP area;
- surface water drainage and sewers have the potential to affect most urban areas in the catchment has been recorded in Filey and Scarborough;

## What is at risk?

Within the Derwent catchment there 3140 properties at risk from a one per cent annual probability flood caused by river water, without taking into account flood defences. There are over 236 separate flood defence structures that reduce the probability of flooding in some communities.

The analysis of flooding to environmental sites shows there are over 15.5 square kilometres of SSSI (30 sites), 13 square kilometres of SAC (four sites) and 11 square kilometres of SPA (2 sites) that are at risk during a one per cent probability flood. Of these only 3.8 square kilometres of one SAC is impacted negatively by flooding, whereas six SSSI are positively affected by flooding.

## Where is the risk?

Flood risk is spread throughout the Derwent CFMP area. Table 1 below outlines some of the key communities with over 100 properties at risk of flooding, not taking into consideration defences. The areas with highest risk include Helmsley, Malton and Norton.

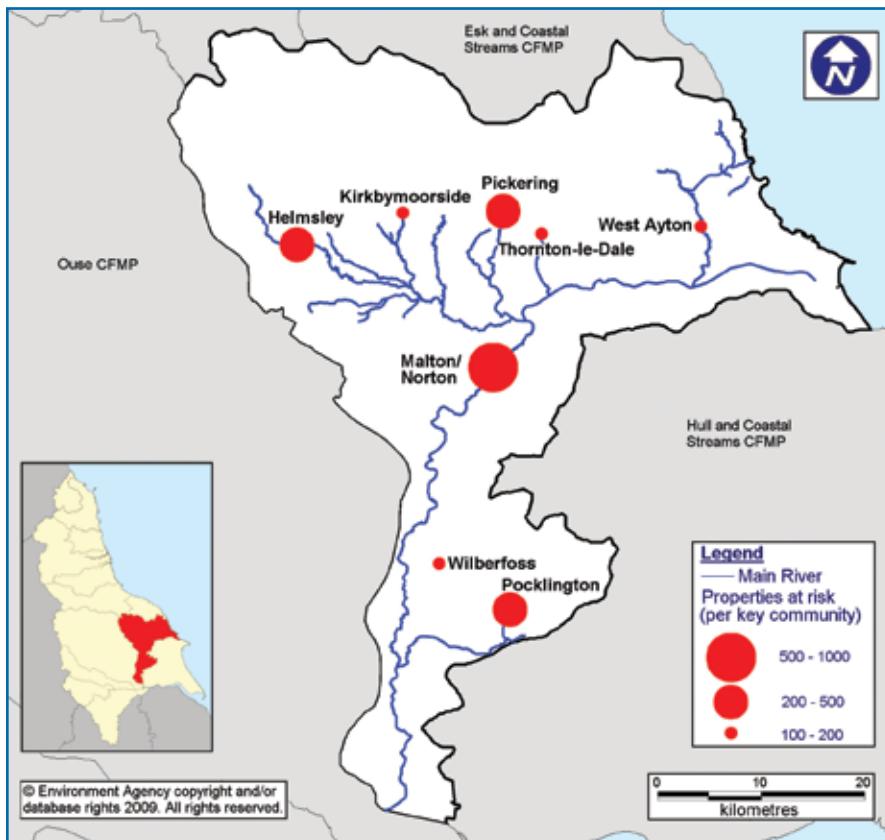
**Table 1. Locations of towns and villages with 100 or more properties at risk in a 1 per cent annual probability river flood if there were no defences in place**

Number of properties at risk	Locations
500 to 1000	Malton/Norton
200 to 500	Helmsley, Pocklington, Pickering
100 to 200	Thornton-le-Dale, Kirbymoorside, West Ayton, Wilberfoss

**Table 2. Critical infrastructure at risk:**

15 gas and electricity assets
9 educational facilities
14 health facilities
7 wastewater treatment works
1 emergency services buildings

**Map 2. Properties at risk of flooding in the Derwent catchment**



## How we currently manage flood risk in the catchment

The catchment has a long history of flooding which has resulted in a number of engineering schemes being implemented to reduce the risk of flooding. Within the Derwent catchment there are currently 236 defences and 71 other structures such as screens, culverts and sluices. These defences offer various standards of protection within the Derwent catchment but the majority offer a standard of protection of a one in a 50 year probability flood. Defences are located in the main urban areas including Malton, Norton, Stamford Bridge and Pickering.

In addition activities are carried out to reduce the probability of flooding:

- maintaining the above defences, including regular inspection to ensure condition is maintained;
- maintaining over 268 kilometres of river channels including removal of blockages likely to increase flood risk;
- working with local authorities to influence the location and layout of development, ensuring that inappropriate development is not allowed in the floodplain through the application of PPS25.

Further activities are carried out which reduce the consequences of flooding in the catchment including:

- understanding where flooding is likely to occur by flood risk mapping including detailed

modelling of the rivers and recording major flooding in the catchment;

- providing a flood forecasting and warning service via 16 separate flood warnings to over 2200 properties across the CFMP area. This warning service also alerts our professional partners and emergency responders to activate flood response;
- promoting awareness of flooding to organisations and members of the public so they are prepared in case they need to take action at times of flooding;
- promote resilience and resistance measures for those properties already in the floodplain.

## The impact of climate change and future flood risk

The effect that flooding will have in the future is influenced by a range of issues such as climate change, changes in land use (e.g. development), and changes in how land is managed.

Within the Derwent catchment we carried out a catchment sensitivity analysis for a number of future flood risk drivers. These drivers included:

- slowing runoff by large scale changes to agricultural practices;
- increased urbanisation;
- impact of climate change.

Changes in agricultural land management were shown to have the potential to decrease flows by up to 10 per cent indicating that the catchment was sensitive to land management change. To gain this benefit in downstream flood risk locations, changes across the catchment would be required.

However, some benefits to locations with a smaller upstream catchment are achievable. This would also

help to reduce sediment input into rivers which would help farmers and landowners.

The catchment was not sensitive to increased urban development as the total area of urban development is small compared to the total catchment area. And the implementation of PPS25 reduces development within flood risk areas and controls the drainage from new development.

The Derwent catchment is most sensitive to the impacts of climate change. The key predictions for the impact of climate change are:

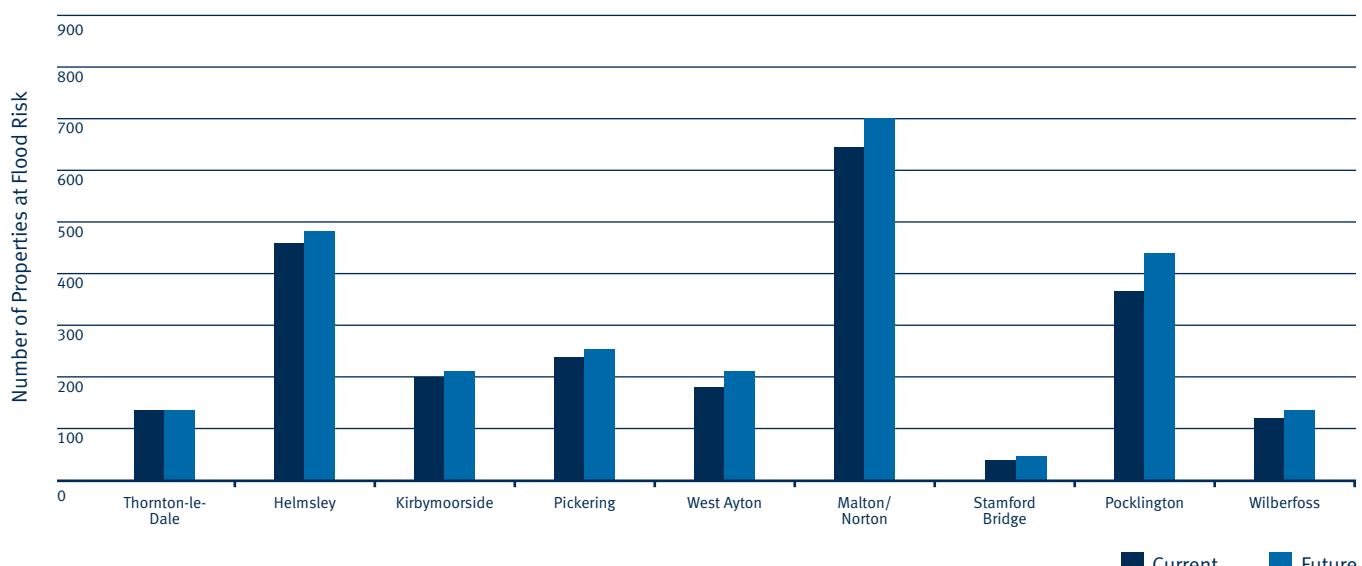
- more frequent and intense storms causing more widespread and regular flooding from drainage systems and some rivers;
- increased winter rainfall increasing the likelihood of large-scale flood events.

To represent this an increase of 20 per cent was applied to predicted river flows. The predicted

rainfall increases were input into the broadscale modelling of the catchment. In total the properties at risk of flooding from rivers rises from 3140 currently to 3758 in the future during the one per cent flood, which is around a 20 per cent increase in properties at risk. This indicates that the catchment is sensitive to climate change with increases in the number of properties at risk as the increased rainfall in the catchment will not be attenuated by the steep upland catchments and results in large increases in flow in the middle and lower catchments. The frequency of flooding is also identified as increasing with over 3200 properties being at risk during the five per cent flood in the future, more than currently at risk during the one per cent flood. Figure 2 below shows the increase in flood risk from rivers across the catchment for the one per cent flood probability.

The increased intensity of rainfall will increase the occurrence of surface water and sewer flooding as existing drainage networks will be stretched to cope with the additional volumes of water.

**Figure 2. Current and future (2100) flood risk to property from a one per cent annual probability river flood, not taking into account current flood defences.**



# Future direction for flood risk management

## Approaches in each sub-area

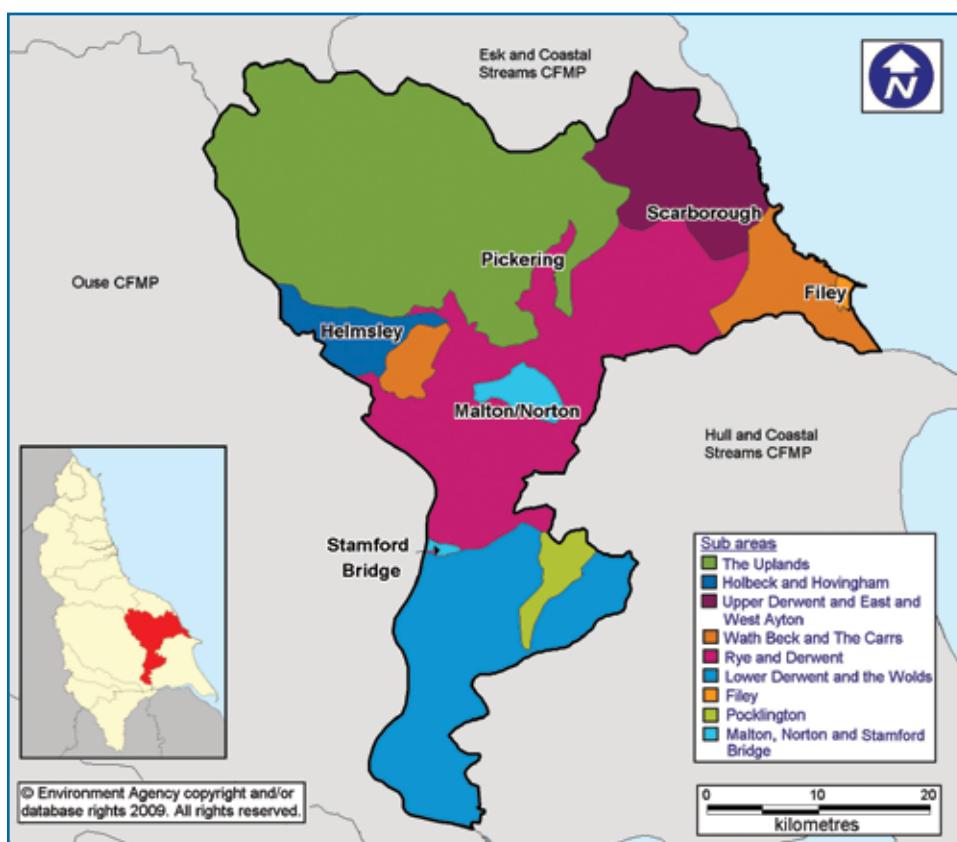
Flood risk is not the same in all of the catchment. We have divided the Derwent catchment into nine sub areas which have similar physical characteristics, sources of flooding and level of risk. We have identified the most appropriate approach to managing flood risk for each of the sub-areas and allocated 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.

In the following sections we outline the approach in each sub area by highlighting:

- key issues and messages for each sub area
- our policy and vision for future management
- key actions to deliver the policy

Map 3. Catchment sub areas



### **Table 3 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.

# The Uplands

## Our key partners are:

Vale of Pickering Internal  
Drainage Boards

North York Moors National Park

Natural England

Royal Society for the Protection  
of Birds

Ryedale District Council

Land owners

National Farmers' Union

Country Land and Business  
Association

Currently within the sub area there are 1314 properties identified as at risk of flooding during a one per cent probability flood, assuming no defences. This may rise to 1413 properties in the future. Although there are raised defences in this sub area.

## The key messages

- Where possible we will look to use the naturally occurring processes, enhancing and restoring these to reduce runoff from the moors.
- The majority of the flow of the Derwent in lower parts of the catchment originates from this sub-area.
- The lower parts of the sub area are naturally wet areas that can be used to reduce the effects of flooding on populated areas downstream.
- Land use changes can reduce flow from the Moors.
- Our long term intention is to restore the natural storage within the sub area.
- For dispersed properties localised resilience measures could be appropriate to reduce the effects of flooding to property.

## The issues in this sub-area

The landscape of the catchment results in fast responding rivers draining the North York Moors. Flood waters rapidly reach towns and villages at the base of the moors where flooding can affect properties on a frequent basis. Downstream of the towns the landscape is flat with drained agricultural land restricting the available floodplain area. The majority of the flow of the River Derwent in the lower parts of the catchment originates from this sub-area.

## The vision and policy

Utilising **Policy Option 6**, we will seek opportunities to reduce run off and store water within the sub area. Upland habitats can be improved to help reduce runoff and manage flood risks as part of a catchment wide approach to flood risk management that exploits natural processes wherever possible.

We will seek opportunities to restore the natural flood storage by allowing the river to reconnect with the floodplain to slow the passage of water out of the area. Consequently, we will contribute to wider environmental benefits, reduce the effects of flooding on populated areas at risk in other parts of the catchment, and restore the natural storage to reduce the effects of flooding. Alternative land uses need to be explored for currently drained areas as these will become wetter as a result of climate change regardless of any planned action to manage change.

## Actions to implement the policy

- Produce a system asset management plan to determine the requirements for maintaining current infrastructure and channel structure whilst reducing surface runoff and increasing flood storage.
- Carry out a flood warning feasibility study to extend our flood warning service coverage.
- Work with landowners and other organisations to change the way land is managed to slow the rate at which floods are generated, e.g. Slowing the Flow project at Pickering.
- Work in partnership to provide information and advice to property owners on improving flood resilience and flood proofing of properties.
- Put in place policies in local development plans to ensure there is no future development in the floodplain.
- Form a multi agency approach to reconnect the floodplain with the river through the sub area and restoring wetland areas.



↑ The North York Moors

# Holbeck and Hovingham

## Our key partners are:

Local Authorities

Property Owners

Vale of Pickering Internal  
Drainage Boards

## The issues in this sub-area

This sub area falls almost entirely within the Howardian Hills Area of Natural Beauty (AoNB). The area runs from the western edge of the Derwent catchment area along the watershed of Yearsley Moor. The catchment is largely rural but dotted with small villages. There are a number of rural floodbanks within the sub area. Flood risk is limited, with 52 properties potentially at risk during the undefended one per cent probability flood, there is only a small increase to 56 properties in the future. Recent flood defence works in Hovingham provide a one per cent standard of protection to 17 properties.

## The vision and policy

**Policy Option 3** has been selected for this sub area. The flood banks at the lower end of the sub area are part of a complex network of embankments along the length of the River Rye and Middle Derwent.

Until we understand how this network of banks influences the level of flood flow in the river, we will continue to maintain and monitor the condition of the banks and undertake reactive debris clearance. Where possible we will allow natural processes to take place unhindered by activities. We will continue to monitor and advice those people at risk. We will continue our limited activities within the sub area and will review our approach following a more detailed study of the sub area and the role of defences in the sub area.

## Actions to implement the policy

- Produce a system asset management plan to determine the most sustainable approach to managing assets to ensure that the current standard of protection is maintained at the current level. We will continue to provide channel maintenance in the sub area.
- Following the improved understanding of defences within the sub area, we will reassess the most sustainable approach to managing flood risk.
- Undertake a detailed strategic study of all watercourses within the Vale of Pickering to determine the long-term approach to managing flood banks and assets throughout the area.

## The key messages

- The risk of flooding from the Holbeck is low. The greater risk comes from the River Rye blocking the flow of the Holbeck and the Rye flowing into the lower Holbeck catchment when the Rye is in flood.
- The effects of overtopping of flood banks in the lower reaches of the River Rye are uncertain.
- The selected policy will be reviewed following investigation of the complex network of embankments.

# Upper Derwent and East and West Ayton

## Our key partners are:

Scarborough Borough Council

Yorkshire Water

IDBs

Yorkshire Electricity Distribution PLC

## The issues in this sub-area

The sub area sits in the north east of the catchment and has a coastal boundary. The main river in the sub area is the River Derwent. The Sea Cut which is an old route of the Derwent headwaters allows flood flows from the Derwent to be diverted directly to the coast reducing flood risk downstream in East and West Ayton.

Within the sub area the main risk areas are around Burniston, Scalby, Newby and East and West Ayton, the current risk from the undefended one per cent flood is 285 properties which could increase to 336 in the future.

## The vision and policy

Following Policy Option 3, our vision for the sub area is to continue with current actions to manage the risk of flooding to ensure the properties continue to

have a long term benefit from our actions. Recent actions to improve the condition of the Sea Cut and its long term maintenance mean that a high standard of protection is maintained. In continuing to use the Sea Cut to divert flows, less intensive flood risk management actions will be required further down the catchment. Once there is a greater understanding of the risk from surface runoff, we will support other organisations in developing plans to manage these risks. Local defences will be maintained and will continue to be sufficient at managing risk to properties. We do not believe that climate change will result in a significant increase in the risk of flooding in this sub area.

the downstream risk areas.

- We will continue with our current activities in this sub area and continue to maintain the Sea Cut channel.

## Actions to implement the policy

- Produce a system asset management plan to determine the most sustainable approach to managing assets to ensure that the current standard of protection is maintained at the current level. This should also ensure that the Sea Cut Diversion retains the current level of conveyance.
- Establish and maintain a register of structures and features which are likely to have a significant effect on flood risk in the area. Use this register to identify pinch points where flood water may overspill.
- Work in partnership with Scarborough Borough Council to reduce the risk of flooding from surface water.

# Wath Beck and Carrs

## Our key partners are:

Internal Drainage Boards  
and landowners

North Yorkshire County Council

The Cayton and Flixton Carrs Project

## The issues in this sub-area

This sub area includes two separate geographical areas (Wath Beck and The Carrs) which both have a low risk of flooding from the river systems. In total there are currently only 9 properties at risk during the one per cent probability flood, if undefended. This may increase to 12 in the future due to increased flows in the rivers. Scarborough has been subject to surface water flooding in the past. Reducing maintenance and allowing natural processes to re-establish could reduce flows and benefit downstream sub areas.

## The vision and policy

We have chosen **Policy Option 1** for this sub-area. Our vision for the sub area is to allow natural processes on Wath Beck and the River Hertford to take place unhindered by our maintenance activities, however we will continue to monitor and advise those people at risk. This could include removing the River Hertford from the main river network and handing over its responsibility to North Yorkshire County Council. We will review the policy once the review of all flood banks in the catchment has been completed.

## The key messages

- Flow from the River Hertford does not have an impact on flows elsewhere in the catchment.
- Our current activities on the River Hertford aid land drainage and do not provide any flood risk management benefit.
- The long term future of the flood banks in the lower reaches of Wath Beck will be decided following a detailed study of the River Rye and River Derwent system.

## Actions to implement the policy

- Produce a system asset management plan for both watercourses to determine whether maintenance for flood risk management can be reduced or ceased entirely.
- Undertake a detailed strategic study of all watercourses within the Vale of Pickering to determine the long-term sustainable approach to managing flood banks and assets in the area, including Wath Beck.
- We will consider removing the River Hertford from the main river network.

# Rye and Derwent

### Our key partners are:

Vale of Pickering Internal  
Drainage Boards

Landowners

Natural England

### The issues in this sub-area

This sub area stretches from downstream of West Ayton in the north east and Rye Dale in the west to Stamford Bridge in the south. This sub area does not include Malton and Norton as they are a separate sub area.

The Rye and Derwent have flood embankments along almost the entire length of river upstream of Old Malton, here there is an extensive floodplain along the Vale of Pickering. Below the Malton/Norton urban area the river slowly meanders through a much more constrained valley which limits the area of natural floodplain.

Flood risk is generally located within small urban areas including Allerston, Ebberston and Snainton. There are approximately 160 properties at risk of river flooding currently, if undefended. Climate change will increase the risk of river flooding to a total of 231 properties.

### The vision and policy

We have chosen **Policy Option 3** for this sub area. We will continue our current management actions such as maintaining the flood banks. We need to consider a more sustainable strategic approach to long term management. We will undertake a detailed study of the River Rye and River Derwent to fill the gaps in our understanding of how flood banks affect downstream risk. By carrying out this review in partnership with other organisations in the Vale of Pickering, benefits may be identified for both property and the local environment. This study will build upon recent work to provide us with a clear picture of the benefits that can be gained from lowering, maintaining and strengthening banks in different areas. We will look to see how natural processes can be used to maximum benefit in managing local and catchment-wide flood risk ahead of maintaining defences.

### The key messages

- The sub area is a large complex system and is not fully understood at present.
- It is our intention to review how we can gain local and catchment wide benefits from changes to flood banks in the area.

- We are confident that the current practices will change in the future. We do not yet know the detail of how. This will be clear once a detailed study of the area is undertaken.
- There are environmental benefits that could be gained from reconnecting the river with the floodplain.

### Actions to implement the policy

- Produce a system asset management plan for the sub area to determine the most sustainable approach to managing assets to ensure that the current standard of protection is maximised under current levels of investment.
- Undertake a detailed strategic study of all watercourses within the Vale of Pickering to determine the long term sustainable approach to managing flood banks and assets throughout the area. Ensure that this study feeds into the long-term management of the sub area.
- Implement the River Derwent Restoration Plan to recover the SSSI section of the river to an unfavourable recovering or favourable condition in partnership with Natural England and others.

# Lower Derwent and the Wolds

## Our key partners are:

York City Council

East Riding of Yorkshire Council

Natural England

Royal Society for the Protection of Birds

Yorkshire Wildlife Trust

Wilberfoss and Thornton IDB

## The vision and policy

We have chosen **Policy Option 3** for this sub area. The vision for the sub area is that flood risk will remain limited through effective management. We will continue with our current activities in the area. Our approach will ensure that flood risk remains low in the area. Due to the location of villages and the natural extent of the floodplain, we do not expect that climate change will increase flood risk.

In the long term we will need to address the condition of the flood banks. Whilst they control flood waters they are built of poor engineering material which prevents us from carrying out maintenance works with machinery. This is not an issue for stability of the floodbanks in the short to medium term but will need to be considered in more detail in the future.

## The key messages

- The level of flood risk in this part of the catchment is determined by flood flows generated upstream in the area above Malton.
- Flood flows in the lower area overtop into the Lower Derwent Valley SPA and SAC.
- Actions to manage flooding must comply with the requirements of the Habitats Directive and SSSI requirements.
- Our flood risk management actions are necessary here to prevent widespread flooding in the area.
- We will continue to manage the flood defences in the area.

## The issues in this sub-area

This large sub area covers the area from just upstream of Kexby down to the confluence of the Derwent with the Ouse and includes the Barmby Barrage which prevents the lower section of the river being tidally influenced. When the River Derwent is in flood, high volumes of water pass through this low lying mainly rural area. There are villages at risk that are found along the length of the river but lengths of flood bank provide protection to properties and agricultural land. Currently there are 685 properties at risk during the one per cent flood, assuming no defences which may rise to 769 in the future. However the extensive defences in the area reduces this risk significantly with only 80 properties being at risk during the 1.3 per cent flood as a result of the current defences.

## Actions to implement the policy

- Produce a system asset management plan to determine the most sustainable approach to managing assets to ensure that the current standard of protection is maintained.
- Work in partnership to provide information and advice to property owners and businesses on improving flood resilience and flood proofing of properties.
- Continue to maintain Barmby Barrage to ensure that flood risk does not increase.
- Improve modelling and understanding of flood risk in the Lower Derwent to determine a sustainable long term approach to managing flood banks and assets in the area. As part of this work evaluate the benefit of defences within the sub area as well as the role of Barmby Barrage in reducing flood risk to Selby from the tidal influence of the Humber Estuary.
- Following the improved understanding of defences within the sub area, ensure that the most sustainable approach to managing flood risk has been adopted. This analysis should include the potential for managed realignment, wetland creation, defence removal and if required a long term appropriate standard of protection.
- Implement the River Derwent Restoration Plan to recover the SSSI section of the river to an unfavourable recovering or favourable condition in partnership with Natural England and others.



↑ Barmby Barrage

# Filey

## Our key partners are:

Scarborough Borough Council

Yorkshire Water

## The issues in this sub-area

Filey is not at risk from flooding caused by rivers. There is a flood risk from surface water which has affected the town frequently in recent years. Very localised intense rainfall caused widespread flooding most recently during 2007 as a result of drainage systems being overwhelmed by the extreme rainfall amounts. The geography of the policy unit channels water down steep gradient hillsides into the town using roads and paths as preferential flow routes towards the coast.

Over 100 residential properties were affected in July 2007 as well as businesses and public buildings. Flood depths of three feet or more occurred in low spots of the town where flood waters ponded. As we have not carried out surface water modelling as part of the CFMP we are unable to outline future flood risk although it is expected to increase.

## The vision and policy

**Policy Option 5** has been chosen for the sub area. Due to the widespread surface water flooding which has occurred in the sub area, action to investigate and reduce this risk should be undertaken. Surface water maps have recently been developed, which form a basis from which an action plan can be started. Once there is a greater understanding of the risk from surface runoff, we will support Scarborough Borough Council and other organisations in developing plans to manage these risks. Further analysis through the development of surface water management plan will highlight the potential risk of flooding from surface water to the community of Filey.

## Actions to implement the policy

- Work in partnership with Scarborough BC to reduce the risk of flooding from surface water.
- Yorkshire Water to improve sewer infrastructure and storage, as recommended in the Filey Flood Investigation Report.

## The key messages

- Filey is at risk of tidal flooding and from surface water flooding, due to the steep gradient hillsides into the town centre.
- Through working in partnership, over time we will increase our knowledge of surface water flooding.

# Pocklington

### Our key partners are:

Yorkshire Water

Highways Agency / or local highways authorities

East Riding of Yorkshire Council

Natural England

landowners

Working with others, activity will be increased in the sub area to reduce the risk of flooding from Pocklington Beck and from surface water. There are no flood defences in the area and our current activity is limited. Increasing our activity may not necessarily lead to flood defences but will ensure a reduction in the level of risk.

of flooding from both river and surface water sources.

- Continue to manage localised sedimentation build up where it poses a risk of flooding. Investigate the source of this sediment and the potential for land management actions to reduce its input into the beck.
- Determine in detail the risk of flooding to the transport and the consequences of road closures during flooding. Where possible ensure that key routes remain operational during flood events. Following the identification of flood risk to these facilities, ensure alternative routes and emergency plans are developed and reviewed periodically.
- Work in partnership with East Riding of Yorkshire Council to reduce the risk of flooding from surface water. This should include areas of known problems in the policy unit and lead to works that improve the standard of protection from small watercourses and land drainage and overland flow.

### The key messages

- The risk of flooding is predicted to increase in the area in the future from both river and surface water flooding.
- The risk of flooding is from more than one source which will require organisations to work together to coordinate plans to manage the risk.
- The long term sustainability of the local economy will be aided through our work to reduce the risk of flooding.

### Actions to implement the policy

- Produce a system asset management plan for the sub area to determine the most sustainable approach to managing assets to reduce the risk of flooding.
- Develop a feasibility study for Pocklington. This study should aim to reduce the risk

### The vision and policy

Under **Policy Option 5** our vision for the Pocklington area is to make the town of Pocklington a safer place to live. The current and expected future levels of flood risk in the area mean that we will take further action in this area.

# Malton, Norton and Stamford Bridge

## Our key partners are:

Network Rail

Ryedale District Council

Highways Agency and or local highways authority

## The issues in this sub-area

The sub area contains the urban areas of Malton, Norton and Stamford Bridge. The towns are situated downstream of the confluence of the Rivers Derwent and Rye and are the larger urban conurbations they are also one of the major flood risk areas in the catchment. Large numbers of properties have been flooded in the recent past in both 1999 and 2000. Since then flood defences were constructed through parts of the sub area to reduce the risk of flooding.

Without defences there would be 681 properties at risk during the one per cent flood which would rise to 745 in the future. However the new defences provide a high standard of protection through the area, but this will reduce over time

as a result of climate change.

## The vision and policy

Our **Policy Option 3** approach to managing the risk of flooding in this area will ensure that there is a long term benefit from defences. We will continue with the long term maintenance of the flood defences through the area in order to continue to provide high standard of protection to people at risk. Although the standard of protection offered by the flood defences will reduce over time we will not undertake additional activities in this area. However, upstream improvements to the way that the system of flood banks and washlands work will counter the effects of climate change here, as will actions to reduce runoff in the upstream sub areas.

## The key messages

- A strategic catchment wide approach to flood risk management, such as reducing runoff and increasing flood storage upstream, will mean that additional actions to counter the effects of climate will not require additional localised actions in this area.
- For flood risk to remain low any future development should take place outside of the floodplain.
- The flood defences constructed in Malton and Norton following the autumn 2000 floods has reduced the risk of flooding in the area. Although flood defences can never remove the risk of flooding completely.

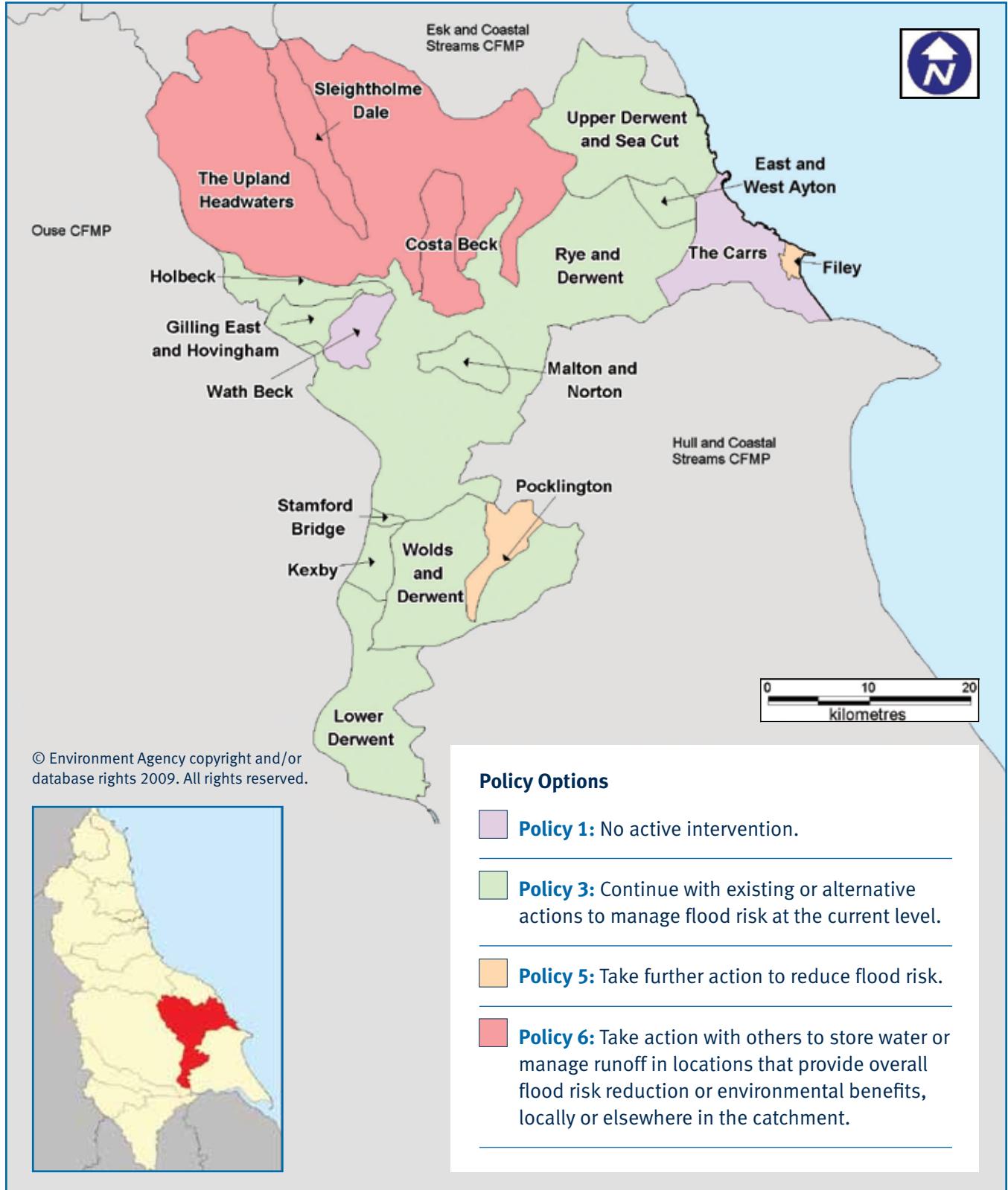
## Actions to implement the policy

- Produce and implement a system asset management plan to determine the most sustainable approach to managing assets to ensure that the current standard of protection is maintained.
- Determine in detail the risk of flooding to transport and the consequences of rail closures during flooding. Where possible ensure that key routes remain operational during flood events. Following the identification of flood risk to these facilities, ensure alternative routes and emergency plans are developed and reviewed periodically.



↑ Defences built since previous floods

# Map of CFMP policies





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