

Esk and Coastal Streams 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

www.environment-agency.gov.uk

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Introduction



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

The Esk and Coastal Streams 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 Esk and Coastal Streams CFMP area has a history of flood risk. Limited engineering works have been carried

out in the past which reduce the risk in key areas such as Skinningrove. In total there are 853 properties currently at risk during a 1 per cent event (not taking into account defences). This will increase to 866 properties in the future.

We cannot reduce flood risk on our own, we will therefore work closely with all our partners to improve the co-ordination of flood risk activities and agree the most effective way to management flood risk in the future. We established a local steering group which included Hambleton and Ryedale District Councils, Redcar and Cleveland and Scarborough Borough Council and North Yorkshire County Council and a regional steering group which included Natural England and water companies amongst others.

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 or alternatively paper copies can be viewed at any of our offices in the North East Region.

A handwritten signature in black ink, appearing to read 'D. Dangerfield', written in a cursive style.

David Dangerfield
Yorkshire and North East Regional Director

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The purpose of a CFMP in managing flood risk

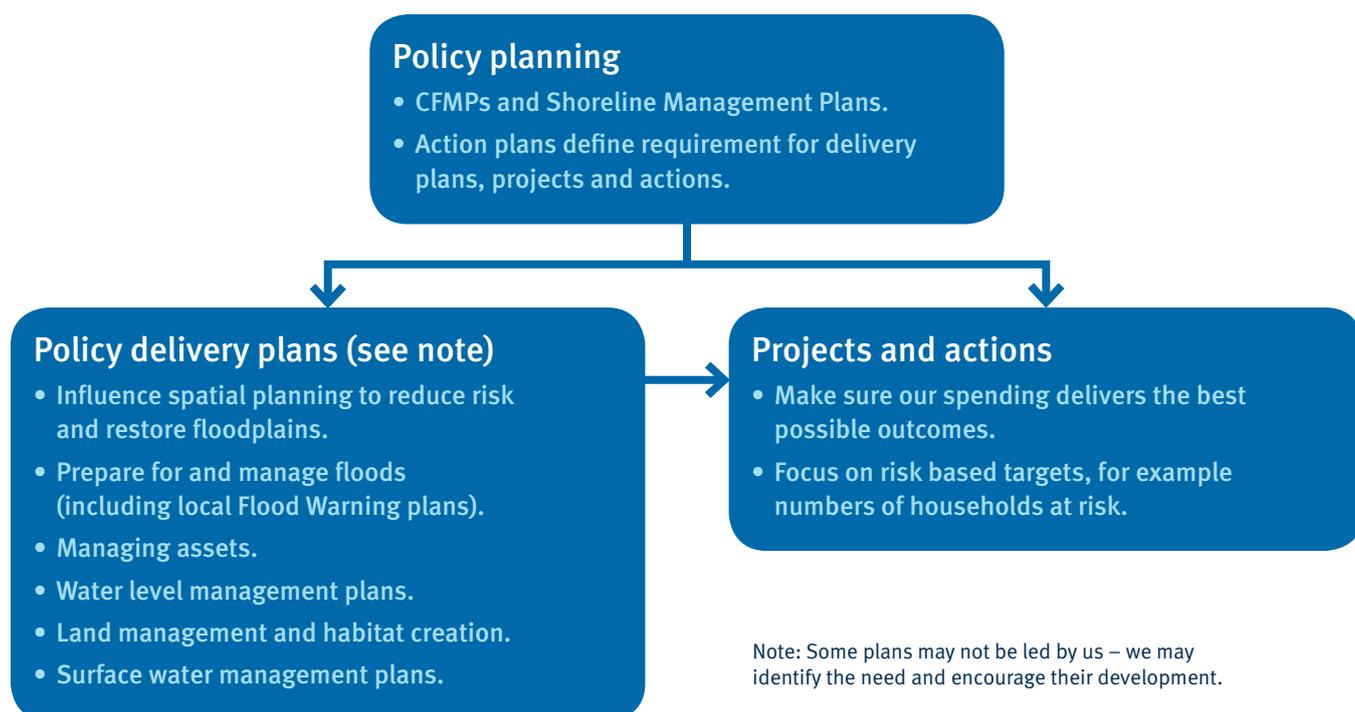
CFMPs help us to understand the scale and extent of flooding now and in the future, and set policies for managing flood risk within the catchment. CFMPs should be used to inform planning and decision making by key stakeholders such as:

- 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;
- 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. 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



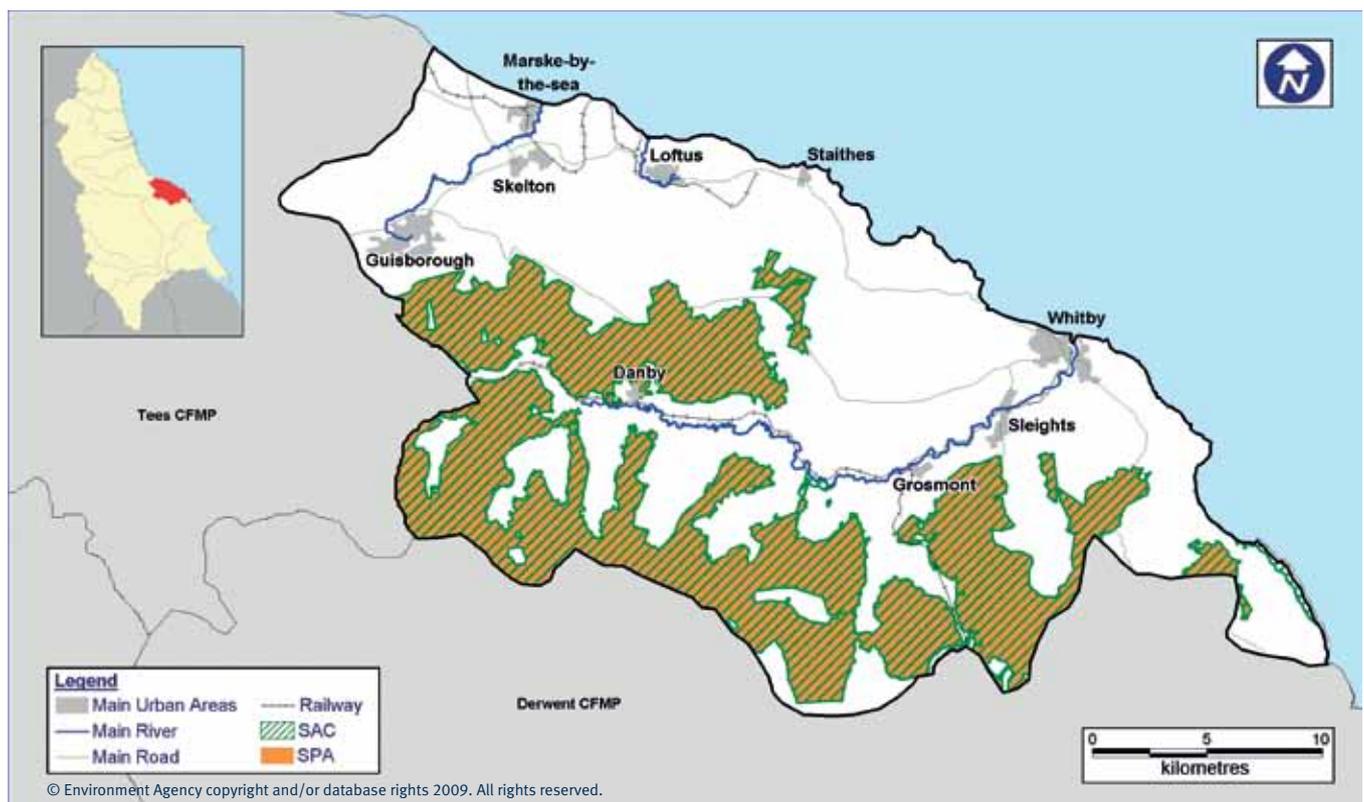
Catchment overview

The River Esk and a number of smaller coastal streams flow through a mostly rural catchment in North Yorkshire. Map 1 shows the location and extent of the Esk and Coastal Streams CFMP area. The North York Moors cover most of the catchment, giving way to lowlands nearer the coast. The population of the catchment is relatively small at around 83,000, and the economy is based largely around agriculture and tourism. Mining was historically a significant part of the economy, but now only one significant potash mine is in operation. Less than 5% of the catchment is urban, with many small villages and towns scattered throughout the area. Whitby, with a population of 13,500, is the largest urban area. Population increases during the summer months, due to tourism.

There is a large amount of open moorland and grassland within the catchment. The North York Moors are the largest areas of heather moorland in England. The catchment is highly valued for nature conservation. Large areas of upland are designated as a Special Area of Conservation (SAC) and Special Protection Area (SPA) for birds. There are also 17 Sites of Special Scientific Interest (SSSI) with a variety of habitats and geological features. The River Esk is the main salmon and sea trout river in Yorkshire, with 237km of river protected under the European Freshwater Fish Directive. Many of the rivers have steep valleys and small floodplains, which can cause floods to rise quickly after heavy or prolonged rainfall.

The Esk and Coastal Streams CFMP looks at the risk of flooding from all sources, but mostly from river flooding. There is also a risk of flooding from the North Sea in this catchment. The future management of tidal and coastal risk is covered in detail by the 'River Tyne to Flamborough Head Shoreline Management Plan'.

Map 1. Location and extent of the Esk and Coastal Streams CFMP area



Current and future flood risk

Overview of the current flood risk

The risk of flooding can be broken down into two parts; the chance (probability) of a particular flood and the impact (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 per cent flood has a 1 per cent chance or 0.01 probability of occurring in any one year.

Within this document the figures for flood risk are shown as the 1 per cent flood assuming no formal flood defences. They are taken from broadscale mathematical modelling, this gives a higher number of properties than will actually flood during events as the presence of defences will reduce the risk of flooding.

This catchment has a long history of flooding, the most significant event in recent years occurred in Skinningrove in 2000 when over 170 properties were flooded from the Skinningrove Beck.

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

- River flooding occurs throughout the CFMP, the main areas include Guisborough and Loftus and Skinningrove.
- Surface water flooding occurs in parts of the catchment. Specific locations include Lealholm, Egton Bridge, Briggswath and Ruswarp, where there is a risk of surface water flooding from moorland runoff. Skinningrove, Sandsend and Hinderwell have also suffered from surface water flooding.
- Tidally influenced flooding is a source of flooding in the lower reaches of the river systems. Specific locations where flooding can be tidal influenced includes Ruswarp, Whitby, Staithes and Skinningrove.

What is at risk?

Within the Esk and Coastal Streams catchment there are 681 residential properties and 111 commercial properties at risk of flooding at the undefended 1 per cent flood. This means that two per cent of the population living in the catchment is currently at risk of flooding.

Flooding has a neutral impact on around 0.8km² of SSSI, 0.54km² of SAC and 0.5km² of SPA. Additionally, there are 4 Scheduled Ancient Monuments and 0.2km² of Registered parks and gardens at risk of flooding, during the 1 per cent flood, the impact of flooding on these assets has not been fully assessed.

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	Guisborough, Loftus and Skinningrove
25 to 50	Lealholm, Ruswarp and Briggswath

Table 2 Critical infrastructure at risk:

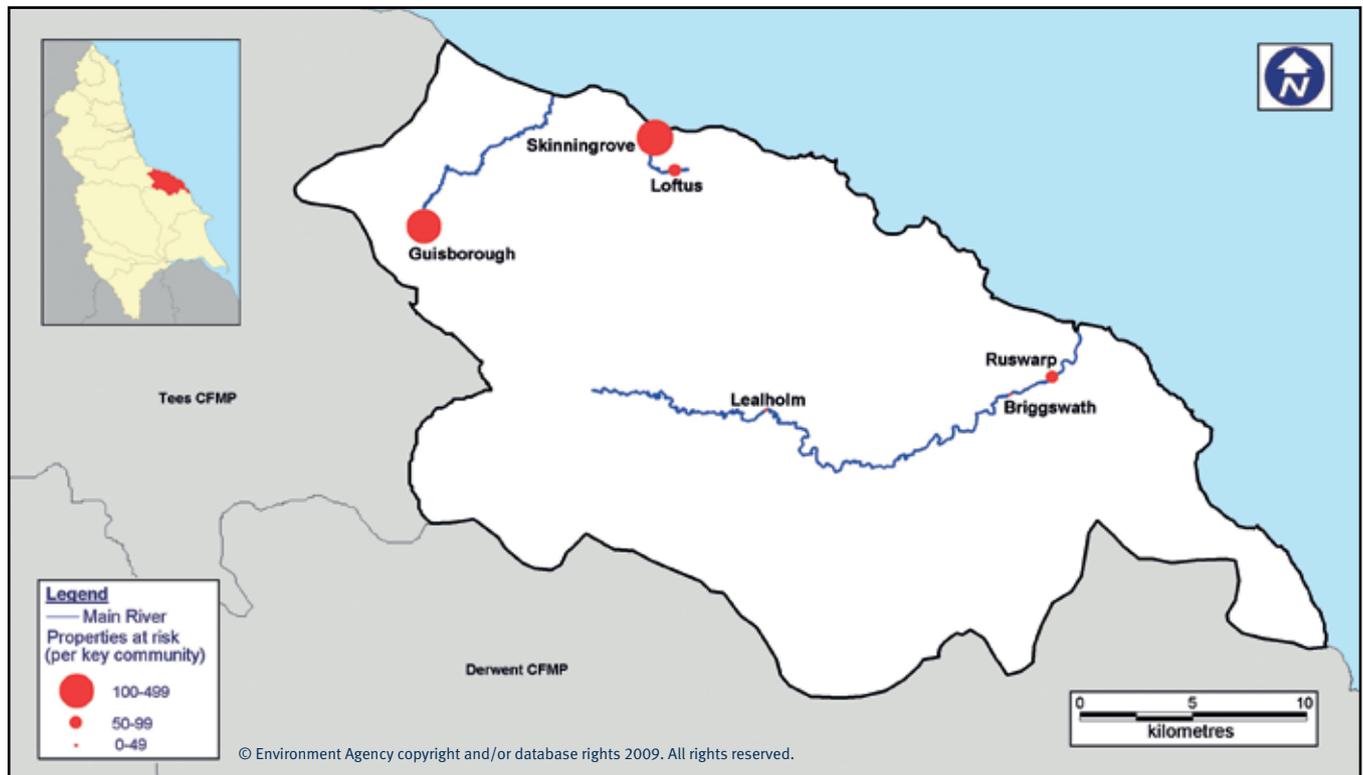
3 electricity and gas assets, 2 wastewater treatment works, 1 healthcare facility and 3 educational facilities
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Where is the risk?

Over one third of the properties that are at risk of flooding within the catchment from a 1 per cent annual probability river flood, (not taking into account defences) are located in the Guisborough area. A further quarter of the properties at risk are located in the Loftus and Skinningrove areas of the catchment.

The distribution of properties at risk from the 1 per cent river flood is illustrated on Map 2. Table 1 summarises where there is flood risk to more than 25 properties. We recognise that there is further risk from surface water flooding. However, further studies following on from the CFMP are needed by us and our partners to quantify this risk.

Map 2. Properties at risk of flooding in the Esk catchment



How we currently manage the risk in the catchment

Our current flood risk management is focused on addressing the risk present in the catchment. In the Esk there are few formal flood defences compared to other more urban catchments.

There are 2 defences in the catchment which reduce risk in the catchment.

- At Skinningrove 0.65km of raised defences with manual flood gates providing protection up to the 1 per cent flood to around 160 properties;
- A small raised defence in the Lower Esk, although the standard

of protection provided by the defence is unknown.

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

- Maintaining the above defences;
- Maintaining river channels;
- Working with local authorities to influence the location and layout of development, ensuring only appropriate development is allowed in the floodplain through the application of Planning Policy Statement 25: Development and Flood Risk (PPS25)

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

- Understanding where flooding is likely by flood risk mapping;
- Providing flood warning to 8 separate areas across the CFMP area;
- 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. Recent studies, have concluded that flood risk will increase throughout the country. Within the Esk Catchment we carried out a catchment sensitivity analysis to a number of future flood risk drivers. From this it has been identified that within the Esk Catchment climate change will be the main driver for future flood risk. The following scenario was used for the future flooding scenario:

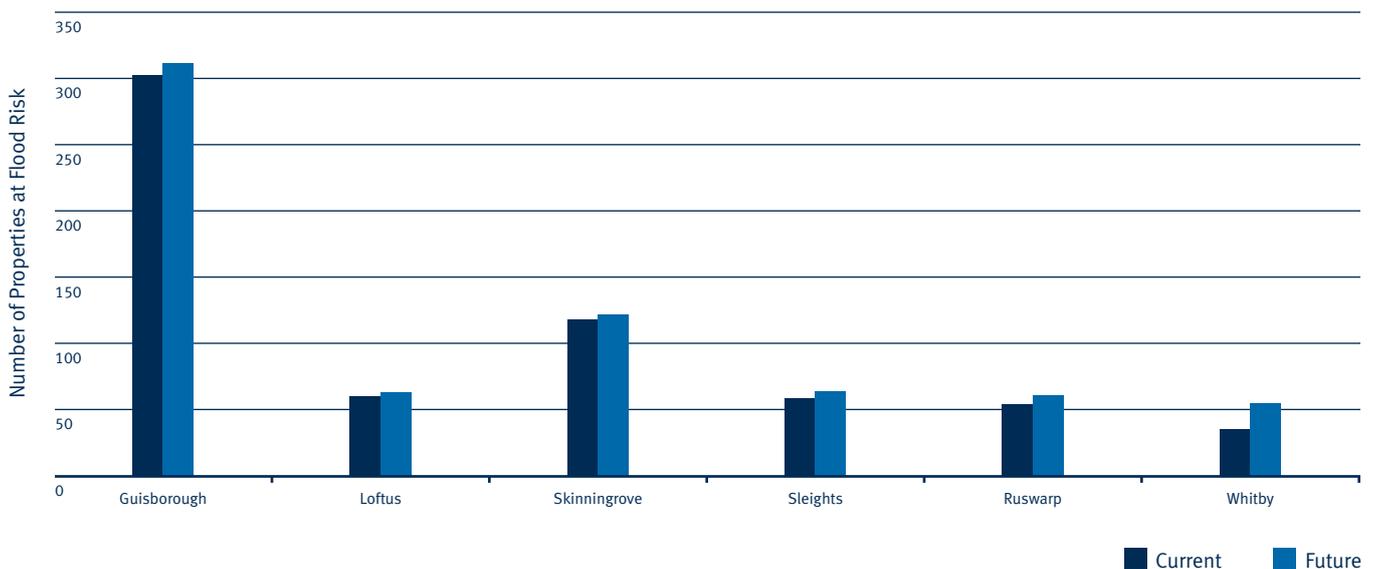
- 20 per cent increase in peak flows in all the watercourses. This will increase the probability of large scale flood events.

Our modelling of the future flooding scenario suggested that the number of properties at risk during an undefended, 1 per cent flood would increase from the current 792 properties to 860. This shows that the catchment is not sensitive to climate change with a small increase in number of properties at risk.

Figure 2 below shows the difference between current and future flood risk from a 1 per cent river flood across the sub-areas in the catchment.

The impact of future flooding on critical infrastructure is not expected to increase significantly across the catchment.

Figure 2. Current and future flood risk to property from a 1 per cent 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 Esk catchment into five 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 in each sub-area
- our policy and vision for future management;
- the key messages for each sub-area;
- the key actions to carry out the policy.

Map 3. Catchment sub-areas

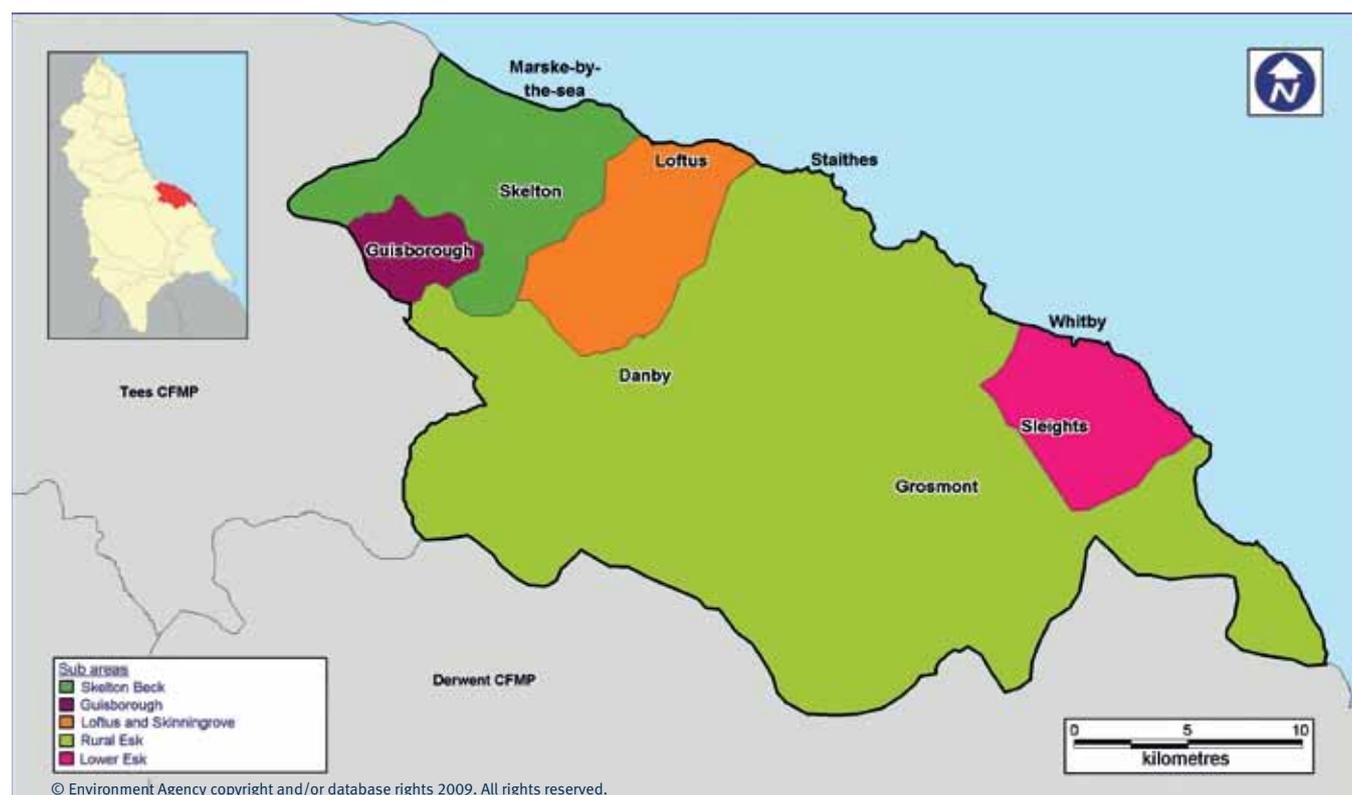


Table 3 Policy options

→ 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.

→ Policy 2

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

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

→ Policy 3

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

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

→ Policy 4

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

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

→ Policy 5

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

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

→ Policy 6

Areas of low to moderate flood risk where we will take action with others to store water or manage runoff 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 runoff. 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.

Guisborough

Our key partners are:

Redcar and Cleveland Borough Council

Northumbria Water Ltd

The issues in this sub-area

The town of Guisborough sits within a lowland floodplain. The risk of flooding comes from Chapel Beck and can occur rapidly. Chapel Beck has a number of culverts, bridges and other structures which can cause flooding if debris gets trapped during high flows. Currently 302 properties are at risk

of flooding from the river during the 1.3 per cent flood. This is nearly 40 per cent of the whole community. Additionally, there are also some surface water and sewer drainage flooding problems.

In the future the number of properties at risk of flooding is expected to increase to 312 for the 1.3 per cent flood.



The vision and policy

Policy option 5 has been chosen for this sub-area. The community of Guisborough is currently at risk and there is a limited amount of flood risk management being carried out. We will therefore take more action to reduce the risk of flooding. This policy will help to protect a vulnerable population from the effects of flooding now and into the future taking account of future development. We need to understand more about how we can best reduce the risk of flooding. This could include increasing river maintenance, providing flood warnings and new flood defences. A study into the flood risk will be required to develop a clear action plan for the future.

The key messages

- Much of the community in Guisborough is at risk of flooding. This would result in disruption during a major flood event.
- In addition to flooding from Chapel Beck, there are also risks from surface water and sewer flooding.

Actions to implement the policy

- Develop a System Asset Management Plan to determine the most sustainable approach to managing existing flood risk management activities, to ensure that the risk of flooding is still reduced.
- Work in partnership with the Lead Local Flood Authority to reduce the risk of flooding from surface water.
- Ensure that emergency response plans are reviewed. Vulnerable communities should be identified to ensure that emergency response is risk based.
- Establish and maintain a register of structures or features which are likely to have a significant effect on flood risk in their area.
- Identify locations where culverts can be removed or improved through redevelopment.
- Carry out a flood warning feasibility study to address the potential to improve our flood warning service.

Loftus and Skinningrove

Our key partners are:

Redcar and Cleveland Borough Council

Scarborough Borough Council

Natural England

North York Moors National Park

The issues in this sub-area

Both Loftus and Skinningrove are at risk of flooding. A total of 183 properties are at risk of flooding in this sub-area during a 1 per cent flood, assuming no defences. The main area at risk of flooding is located in Skinningrove where Skinningrove Beck meets the North Sea.

Floods rise rapidly and as a result the village can be cut off. Flooding can be made worse if Skinningrove Beck is blocked by debris.

Skinningrove has also suffered from surface water flooding.

Defences in Skinningrove protect 160 properties to the 1 per cent flood. However, they are dependent on the closing of manual floodgates in the village.

Flood risk in the future is expected to rise slightly to 188 properties during a 1 per cent flood, although flooding will occur more frequently in the sub-area.

Due to the rapid onset of flooding in the area flood warning is provided by sirens in order to alert large numbers of people quickly.



The vision and policy

Policy Option 3 has been selected for this sub-area. The main flood risk is in Skinningrove and the current defences currently provide an effective standard of protection to the community. Flood risk does not increase significantly in the future flooding scenarios and so by continuing with existing flood risk management activities we will be able to continue to provide flood risk reduction in the future. We will continue to maintain the existing defences and the river channel as this assists in reducing risk. We will continue to offer a flood warning service within the sub-area to make residents more aware of potential flooding and enable them to prepare for a flood.

The key messages

- Flood defences need to be maintained in the area in the future. They are essential to managing the risk of flooding.
- The flood warning service is available to residents in some locations but uptake is low.
- There are links to coastal flooding and the River Tyne to Flamborough Head Shoreline Management Plan will suggest actions to manage coastal erosion or the risk of flooding.

Actions to implement the policy

- Develop a System Asset Management Plan to effectively manage the defences and channels in this sub-area. This will improve their condition and reduce the potential for blockages.
- Work in partnership with the Lead Local Flood Authority to reduce the risk of flooding from surface water.
- Investigate the risk of mine water flooding and establish a management plan to control both the risk of flooding and water quality issues.
- Form a partnership to look at opportunities to change land use and reduce runoff from the North York Moors.

Rural Esk

Our key partners are:

Yorkshire Water

Natural England

Local Authorities

Caravan/ landowners

add the following bullet points

North York Moors National Park

RSPB

Yorkshire Wildlife Trust

Yorkshire Peat Partnership

The issues in this sub-area

The risk of flooding comes mainly from the River Esk. This large sub-area has steep valley sides and tributaries of the River Esk in the uplands. There is a relatively wide floodplain along the river between Danby and Glaisdale. The location of properties at risk of flooding in this sub-area is spread along the River Esk. The areas at highest risk are Lealholm and Danby. In total 149 properties are currently at risk, and two campsites, during a 1 percent flood, assuming no

defences. Over 7 kilometres of railway is also at risk as it follows the course of the river. In the future there are 157 properties at risk and while the area of railway flooding increases slightly this will not result in additional disruption.



The vision and policy

Under **Policy option 3**, we will continue to manage the risk at its current level, although we may do so in alternative ways. This is the most suitable way of managing the level of risk.

The key messages

- The upper Esk is a natural river system with steep sided valleys. There are villages within the floodplain at risk of flooding.
- There are opportunities to change land management and provide environmental benefits by storing more water in the floodplain. Managing runoff from upland areas in the longer term.
- Rural Esk coastal areas may have links to coastal flooding. This will be highlighted in the Shoreline Management Plan for River Tyne to Flamborough Head.

Actions to implement the policy

- Develop a System Asset Management Plan to determine the most sustainable approach to managing flood risk management activities.
- Work with caravan park and campsite owners to ensure the risks of flooding are fully understood.
- Work with landowners and other organisations to change the way land is managed to slow the rate at which floods are generated. Reducing run-off and soil erosion could reduce flood risk locally and downstream.
- Form a partnership to look at opportunities to change land use and reduce runoff from the North York Moors.
- Determine the risk of flooding to sewage treatment works and the possible impact on the area.
- Ensure the potential for habitat creation and environmental improvement is fully investigated.

Lower Esk

Our key partners are:

Scarborough Borough Council

Natural England

RSPB

Yorkshire Wildlife Trust

Yorkshire Water

The issues in this sub-area

The risk of flooding comes mostly from the River Esk. There are low bridges at Ruswarp that can trap debris which increases the risk. The location of the properties at risk is spread along the River Esk. The areas at highest risk are Briggswath, Ruswarp and Whitby, with a total of 130 properties at risk assuming a 20 per cent standard of protection. Tidal flooding from the North Sea is

known to affect properties in Whitby harbour and is covered within the Shoreline Management Plan (River Tyne to Flamborough Head). There is also a risk of surface water flooding. In the future flooding scenarios the number of properties does not increase. However the frequency of flooding may increase in the sub-area.



The vision and policy

Under **Policy option 4** we will take action to ensure the risk of flooding does not increase in the future in this sub-area. We will respond to the future impacts of climate change and sea level rise. We need to develop a better understanding of ways in which we can sustain the current risk of flooding from river, surface water and coastal flooding. We will improve our current actions and seek to improve flood warning to reduce the consequences of flooding in the sub-area.

The key messages

- The lower Esk is mostly a natural river system, with a number of villages at risk of flooding.
- The risk of flooding comes from the River Esk, the North Sea and surface water sources. The impact of sea level rise in the lower reaches of this sub-area require further investigation.
- Parts of the area are next to the coast and may have links to coastal flooding. This will be highlighted in the Shoreline Management Plan for River Tyne to Flamborough Head.

Actions to implement the policy

- Develop a System Asset Management Plan to determine the best approach to managing existing assets within the sub-area.
- Ensure that emergency response plans are reviewed. Vulnerable communities should be identified to ensure that emergency response is risk based.
- Work in partnership with the Lead Local Flood Authority to reduce the risk of flooding from surface water.
- Identify the potential causes of blockage and remove hazards where possible.
- Ensure the potential for habitat creation and environmental improvement is fully investigated.
- Increase the uptake and extend our existing flood warning service.

Skelton Beck

Our key partners are:

Redcar and Cleveland
Borough Council

The issues in this sub-area

Skelton Beck is the main source of river flooding in this sub-area. The land is low lying but there is only a narrow floodplain. The area is at risk of flooding during short, heavy rainfall events, because rivers and floodwaters can rise

within two to three hours. There are 21 properties at risk from river flooding in Marske-by-the-Sea, Charlton, and Saltburn-on-the-Sea during the 1.3 per cent flood. In the future this is expected to increase to 23 properties. There are some further tidal flooding issues in the area which are addressed in the Shoreline Management Plan (River Tyne to Flamborough Head).

The vision and preferred policy

Policy 1 has been chosen for this sub-area, as the risk of flooding is low. There is currently no flood risk management carried out. However, we will continue to monitor the risk of flooding.

We will not carry out any specific flood risk management activities in the catchment although we will continue to use the planning process to ensure flood risk does not increase in the future. We will also provide advice to the people at risk of flooding to help them understand what they can do to manage the risks and effects of flooding to themselves and their properties.

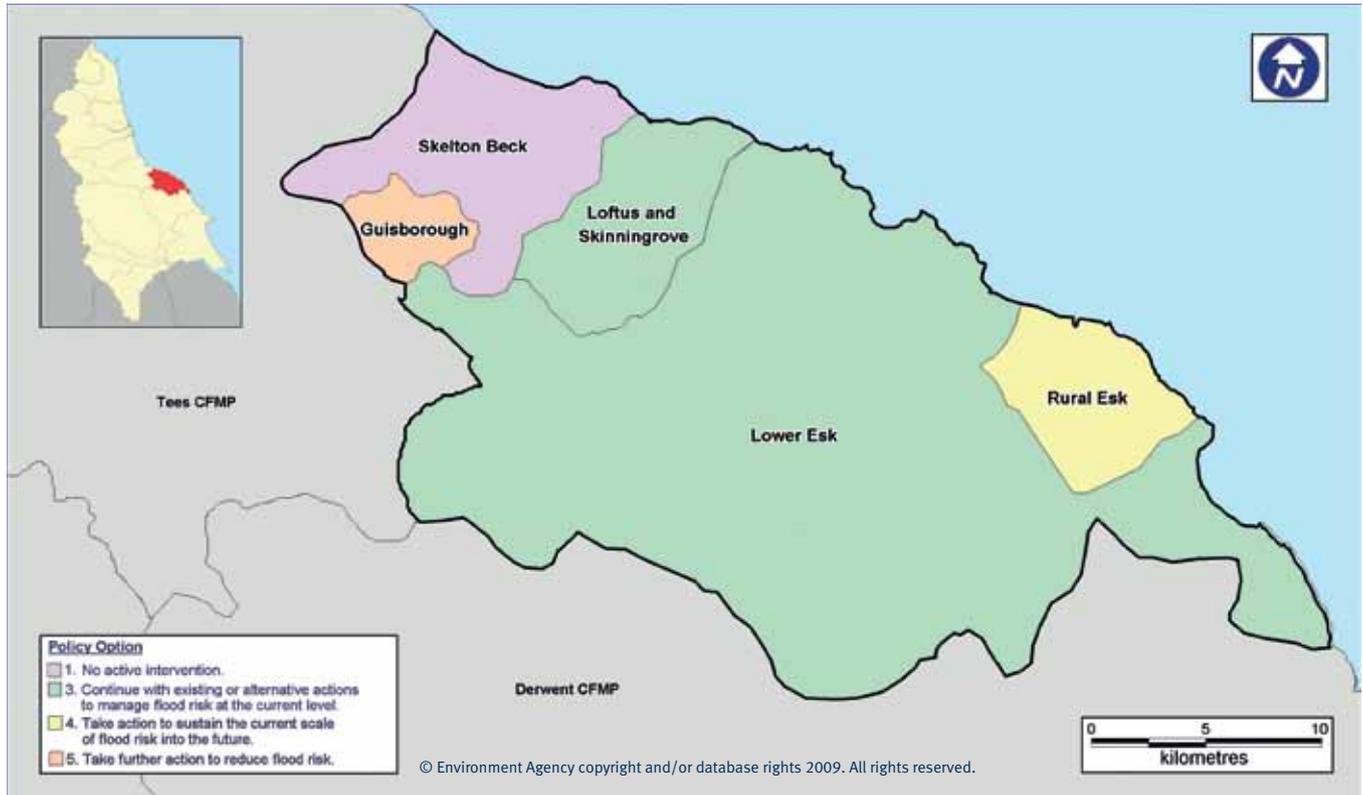
The key messages

- The risk of flooding from Skelton Beck is low and is not likely to increase much in the future.
- Saltburn-on-the-Sea is an area at risk of coastal flooding. The River Tyne to Flamborough Head Shoreline Management Plan will suggest actions to manage coastal erosion or the risk of flooding.

Actions to implement the policy

- Continue to monitor flood risk and identify any changes.

Map of CFMP policies



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