Environment Agency

# River Derwent Catchment Flood Management Plan

Summary Report December 2009

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# Introduction

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

The River 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, groundwater, 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 groundwater is however limited due to a lack of available information.

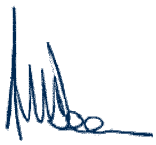
The role of CFMPs is to establish flood risk management policies which will deliver sustainable flood risk management for the long term. This is essential if we are to make the right investment decisions for the future and to help prepare ourselves effectively for the impact of climate change. We will 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.

In the Derwent catchment, over 1000 residential and commercial properties are at a 1% annual risk of flooding from rivers. Over 50% of the properties at risk are concentrated in the towns of Keswick, Cockermouth and Wigton. Keswick, Cockermouth and Workington suffered severe flooding in November 2009. By 2100, we estimate that there will be 1660 properties at risk in a 1% annual fluvial flood event, this is a 66% increase. There is also a tidal risk from estuaries in the CFMP area, including the towns of Workington and Maryport. Although this document is a summary of the main CFMP document which sets out the long term policies for this catchment, we have taken the opportunity to update this document with information from the recent (Nov. 2009) flood.

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. To develop this plan and ensure social, economic and environmental issues were taken into account we worked with, and consulted many organisations. These included United Utilities, Allerdale Borough Council, Cumbria County Council, Natural England, National Trust, Lake District National Park Authority, RSPB, NFU and Defra.

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 **enquiries@environment-agency.gov.uk** or alternatively paper copies can be viewed at any of our offices in North West Region.



**Tony Dean**
**Regional Director**

## Contents



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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.
- Internal Drainage Board, water companies and other utilities to help plan their activities in the wider context of the catchment.
- Transportation planners.
- Landowners, farmers and land managers who 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**


Note: Some plans may not be led by us – we may identify the need and encourage their development.

# Catchment overview

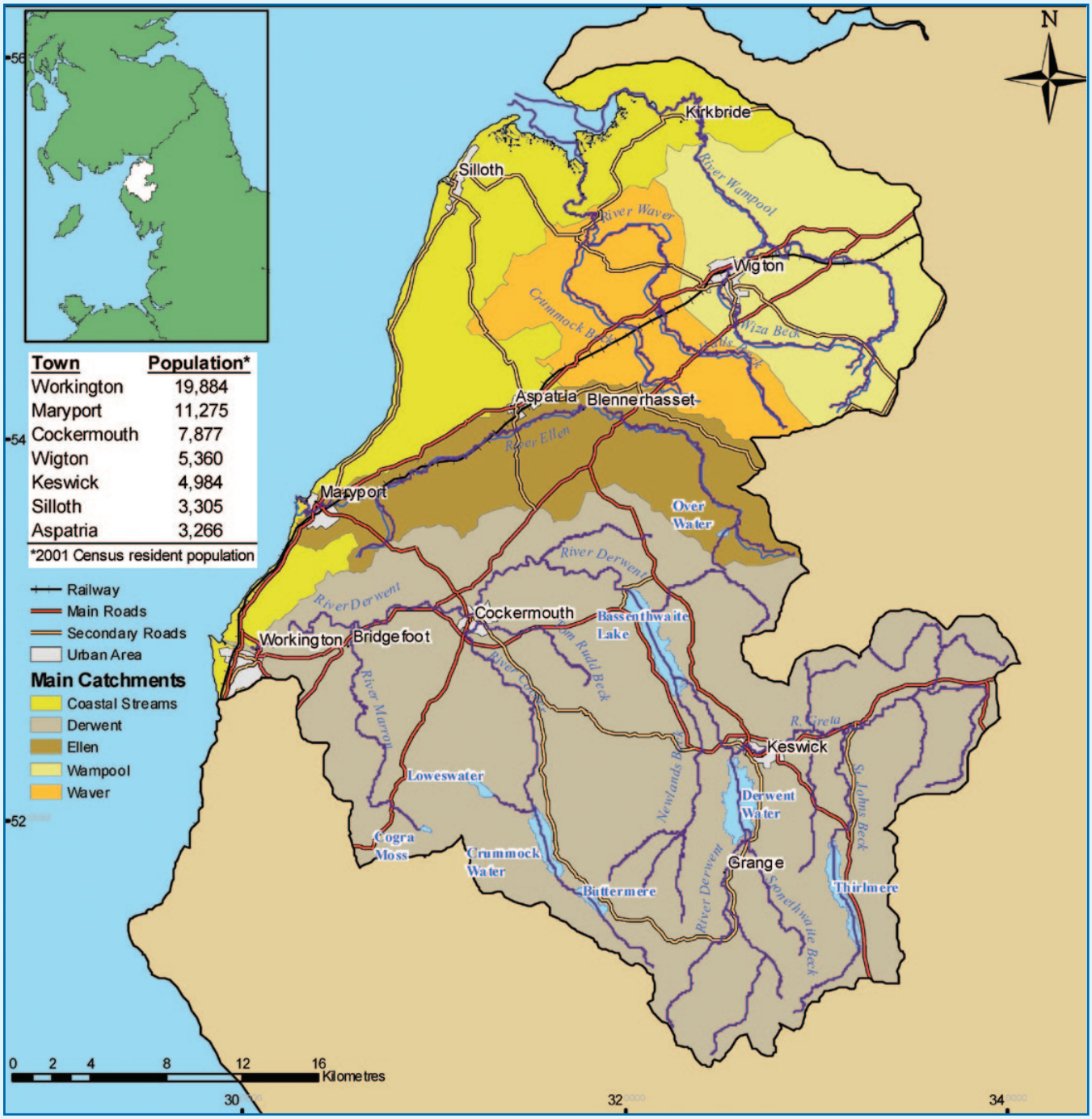
The Derwent CFMP area lies within North West Cumbria. Most of the CFMP area is within the administrative boundary of Allerdale Borough Council, with a significant proportion within the Lake District National Park Authority (LDNPA). It covers a total area of 1,235km$^2$ and has four significant river systems (Derwent, Ellen, Wampool and Waver) which drain the northern fells of the Lake District and the Solway Basin into the Irish Sea. The River Derwent and its major tributaries cover the southern part of the CFMP area and rise in the high peaks of the Lake District draining into the Irish Sea at Workington. There are several lakes which play a key role in the Derwent catchment, including Bassenthwaite Lake, Derwent Water, Thirlmere Reservoir, Buttermere and Crummock Water. The River Ellen covers the central part of the CFMP area and drains into the Irish Sea at Maryport. The Rivers Wampool and Waver cover the upper portion of the CFMP area and drain into the Solway Firth at Moricambe Bay.

The catchments within the Derwent CFMP receive a great deal of rainfall. Combined with the impermeable underlying geology and waterlogged upland soils, this produces large amounts of run-off. The main risk areas on these rivers are Cockermouth and Keswick (on the Derwent) and Wigton (on Wiza Beck). There are many smaller settlements at risk from localised rapid run-off from the fells which are mainly located within the uplands of the Derwent catchment. In addition, some coastal areas may be subject to tidal flooding including parts of Workington, Maryport, Flimby and Silloth.

This CFMP area has a particularly high environmental and landscape value, reflected in its two main designations. Much of the area is within the Lake District National Park and it contains one Area of Outstanding Natural Beauty (AONB). Many of its sites have international, European and national environmental designations, including over 25 sites of special scientific interest and 11 scheduled ancient monuments.

↑ Coledale Beck at Braithwaite

## Map 1 Main Features of River Derwent CFMP area




| Town | Population* |
|---|---|
| Workington | 19,884 |
| Maryport | 11,275 |
| Cockermouth | 7,877 |
| Wigton | 5,360 |
| Keswick | 4,984 |
| Silloth | 3,305 |
| Aspatria | 3,266 |

*2001 Census resident population

# Current and future flood risk

## Overview of the current flood risk

Flood risk has two components: the chance (probability) of a particular flood and the impact (or consequence) that the flood would have if it happened. The probability of a flood relates to the likelihood of a flood of that size occurring within a one year period, it is expressed as a percentage. For example, a 1% flood has a 1% chance or probability of occurring in any one year, and a 0.5% flood has a 0.5% chance or 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.

Newspaper reports over the last 250 years point to a long history of flooding in the Derwent catchment. The largest in recent times was in November 2009. Keswick Cockermouth and Workington experienced an extreme flood event. Rain gauges at Seathwaite Farm recorded over 400mm of rainfall between the 18th and 20th of November, and it is believed, also recorded the highest 24hr total in the UK of 316 mm during this period. Around 240 properties were flooded by overtopping of flood defences in Keswick. In Cockermouth, 885 properties were flooded and Workington had 90. The floods destroyed six bridges. The peak flow at Camerton gauging station on the Derwent was the largest in over 40 years of recorded data exceeding the previous total by over one metre.

The main sources of flooding in the Derwent catchment are as follows:

- River flooding has its largest effects in Keswick from the Rivers Greta and Derwent, Cockermouth is affected again from the Derwent and the River Cocker, Wigton floods from Wiza Beck and Allonby from Crookhurst Beck. There are many smaller responsive watercourses that can rise and fall very quickly, and give little warning of flooding, for example the Marron, which affects Branthwaite and Bridgefoot.

- Tidal flooding is caused by storm surge and wave action in times of high astronomical tides. The primary areas of tidal flood risk are on the estuaries of the Derwent at Workington, the Ellen at Maryport and the Wampool at Kirkbride. Direct coastal flooding within the CFMP area is significant, with up to 327 properties identified as being at risk in a 0.5% tidal event. About two thirds of these properties are located in a coastal strip between the towns of Workington and Maryport. The remaining third are concentrated around Silloth and Moricambe Bay. Tidal flooding and coastal processes will be assessed in the next Shoreline Management Plan expected in 2010.

- Surface water flooding is caused by water collecting or flowing over the surface before soaking into the ground or entering a watercourse. This is expected in some areas because the ground is steep and impermeable, these areas are generally outside the urban areas. Very little information on surface water flooding in the Derwent CFMP area was available but there are known surface water flooding issues from the Cuddy Beck in Keswick and in Greysouthern, Brigham, Broughton Cross, Broughton, Broughton Moor and Flimby these are generally very localised in nature affecting few, if any properties. Some of the flooding may be exacerbated by inadequate culvert capacity.

- Sewer flooding is usually caused by an inadequate sewer capacity or blockages within the network. Isolated sewer flooding affects various locations across the catchment to some extent. The greatest number of external sewer flooding incidents are recorded in Dearham and Keswick, but we do not have any more detail on these events. Elliot Park in Keswick is known to have sewer flooding problems when the River Greta is high as it prevents effective discharge to the river. United Utilities have an ongoing programme of work to improve the sewer network.

- Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. There is little groundwater in the Derwent CFMP area, and it does not cause any known flooding problems.

## What is at risk?

Using a broad-scale model and flood maps we estimate over 1000 residential and commercial properties are at a 1% annual risk of flooding from rivers within the catchment. Over 50% of the properties at risk are concentrated in the towns of Keswick, Cockermouth and Wigton. There are 6 SACs, 1 SPA, 1 RAMSAR site, 26 SSSIs and 11 scheduled ancient monuments within the 1% annual probability flood extent, some of which could be adversely affected by a flood.

## Where is the risk?

There is a long history of flooding in the CFMP area, most seriously in January 2005 and more recently in October 2008. There are three main towns affected by flooding in the Derwent CFMP area, Keswick, Cockermouth and Wigton. In Keswick our defences are mainly raised defence walls and Cockermouth benefits from flood defences consisting of riverside walls, stop logs, floodgates and minor earthworks. Wigton does not benefit from formal flood defences. Many other villages across the CFMP area have varying degrees of flood risk. In these locations the total number of properties at risk may be small but the impact of flooding on the community may be significant. Parts of both Maryport and Workington are at risk of flooding from the estuaries of the River Ellen and River Derwent respectively. Flooding at areas such as Rosthwaite is characterised by rapid runoff leading to a fast rate of rise of the floodwater, this can produce high velocities, which may in turn cause a risk to life. It is predicted these situations can only worsen with the increases in flow predicted by climate change scenarios. The map overleaf illustrates where the properties are at risk of flooding in a 1% annual probability event.

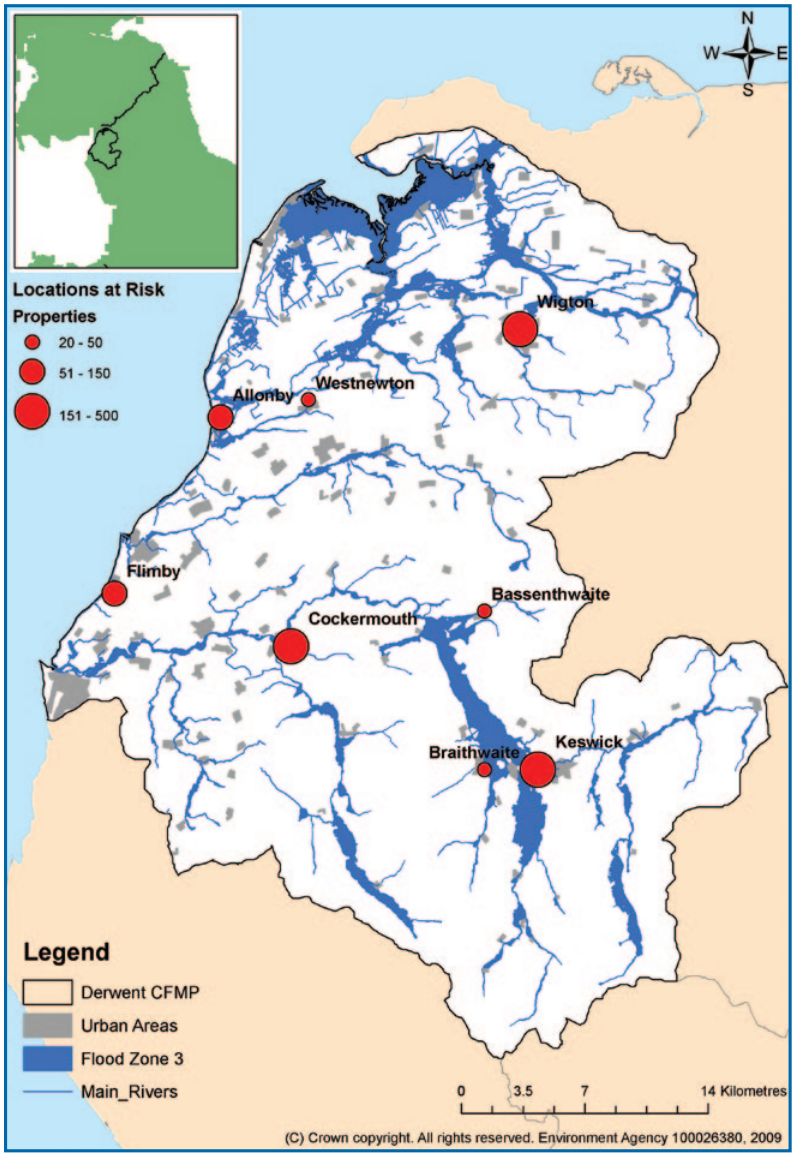
**Table 1. Locations of Towns and Villages with 25 or more properties at risk in a 1% annual probability river flood**

| Number of properties at risk | Locations |
|---|---|
| 101 to 500 | Keswick (in the Allerdale Borough Council area)<br>Cockermouth (in the Allerdale Borough Council area)<br>Wigton (in the Allerdale Borough Council area)<br>Allonby (in the Allerdale Borough Council area) |
| 51 to 100 | Silloth (in the Allerdale Borough Council area) |
| 25 to 50 | Braithwaite (in the Allerdale Borough Council area)<br>Workington (in the Allerdale Borough Council area)<br>Kirkbride (in the Allerdale Borough Council area) |

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

| |
|---|
| 1 School, 1 Care Home, 4 Emergency Response, 3 Utility stations, 1 Telephone Exchange, 5 Sewage Treatment Works and 2 Water Treatment Works. |

Map 2 Flood Risk in the River Derwent CFMP Area for a 1% event




## How we currently manage the risk in the catchment

The Derwent catchment has benefited, from engineering schemes put in place over the last 20 years or more. These include:

- The Keswick Flood Alleviation Scheme was completed in 1989 and provided the town with defences with a design standard of 2%.
- Construction of the Cockermouth Flood Alleviation Scheme in 1999 and subsequent improvements now provides the town centre with protection for a 1% annual flood event.

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, structures and watercourses. The catchment has over 49 km of raised defences, more than 13km of which are maintained by the Environment Agency.
- Enforcement and maintenance where riparian owners and others carry out work detrimental to flood risk or neglect their duties.

- Identifying and promoting new flood alleviation schemes where appropriate, such as the work in progress that is looking at opportunities to reduce flood risk in Keswick and Cockermouth and studies at Bridgefoot, Rosthwaite and Wigton.
- 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).

Activities that reduce the consequences of flooding include:

- Flood risk mapping, understanding where flooding is likely to occur.
- Operation of floodline and flood warning services to over 750 properties in three areas of the Derwent catchment.
- Providing flood incident management.
- 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.

## The impact of climate change and future flood risk

In the future, flooding will be influenced by climate change, changes in land use (for example urban development) and rural land management. In the Derwent catchment, sensitivity testing revealed that climate change has the greatest impact on flood risk, with land management change, and urbanisation having a smaller effect. Whilst we do not know exactly what will happen in the future the key trends are:

- More frequent and intense storms causing more widespread flooding from drainage systems and some rivers.
- Wetter winters increasing the likelihood of large-scale flooding.

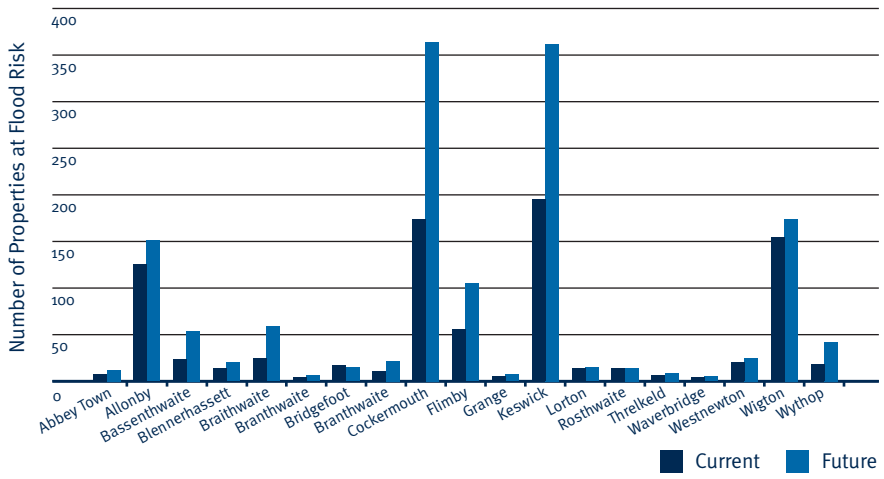
The future scenarios used in the Derwent CFMP were:

- A 20% increase in peak flow in all watercourses. The predicted increase in flow can affect the frequency, timing, scale of flooding and the flood levels.
- A total sea level rise of 841 mm by the year 2100.

In the Derwent CFMP, taking into account climate change, by 2100 the number of properties potentially at risk from flooding increases. In many cases, very significant increases are likely where current defences may be overwhelmed. For example, in Keswick the number of properties at risk in the 1% annual probability event (APE) may increase from 195 to 362 and in Cockermouth from 174 to 364. It is predicted that there will be greater hazard to people due to the future depth and velocity of flooding in many places. Large increases in tidal levels, particularly from 2050 to 2100, suggest the number of properties at risk in the 0.5% APE tidal event in Workington may increase from 35 to 405 and in Maryport from four to 46. No additional environmental or heritage sites are in the future 1% annual probability flood extent but the flood depth and extent of flooding is expected to increase slightly.

Figure 2 shows the difference between current and future flood risk for a 1% annual probability event at key areas in the catchment.

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



# Future direction for flood risk management

## Approaches in each sub-area

We have divided the Derwent CFMP area into ten distinct sub-areas that have similar physical characteristics, sources of flooding and levels of risk. These sub-areas will allow us and the key stakeholders to promote flood risk management approaches, policies and actions that are most appropriate in that area to deliver the various Government and regional strategies, in particular "Making Space for Water". In the face of increasing risk, it often is not sustainable to keep building and raising defences. This is why we have to look catchment wide at how we direct effort and resources to ensure sustainable solutions. We have assessed what will be the most sustainable approach to managing flood risk in each sub-area. This is presented in the following sections and they outline:

- The key issues in that area.
- The vision and preferred policy.
- The proposed actions to implement the policy.

This document does set out our policies for managing flood risk, recognising the constraints that do exist. Our future direction for managing flood risk is expressed by applying one of our six standard policy options to that sub area. 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. The six policy options are explained on page 11.

**Map 3 Sub-areas**

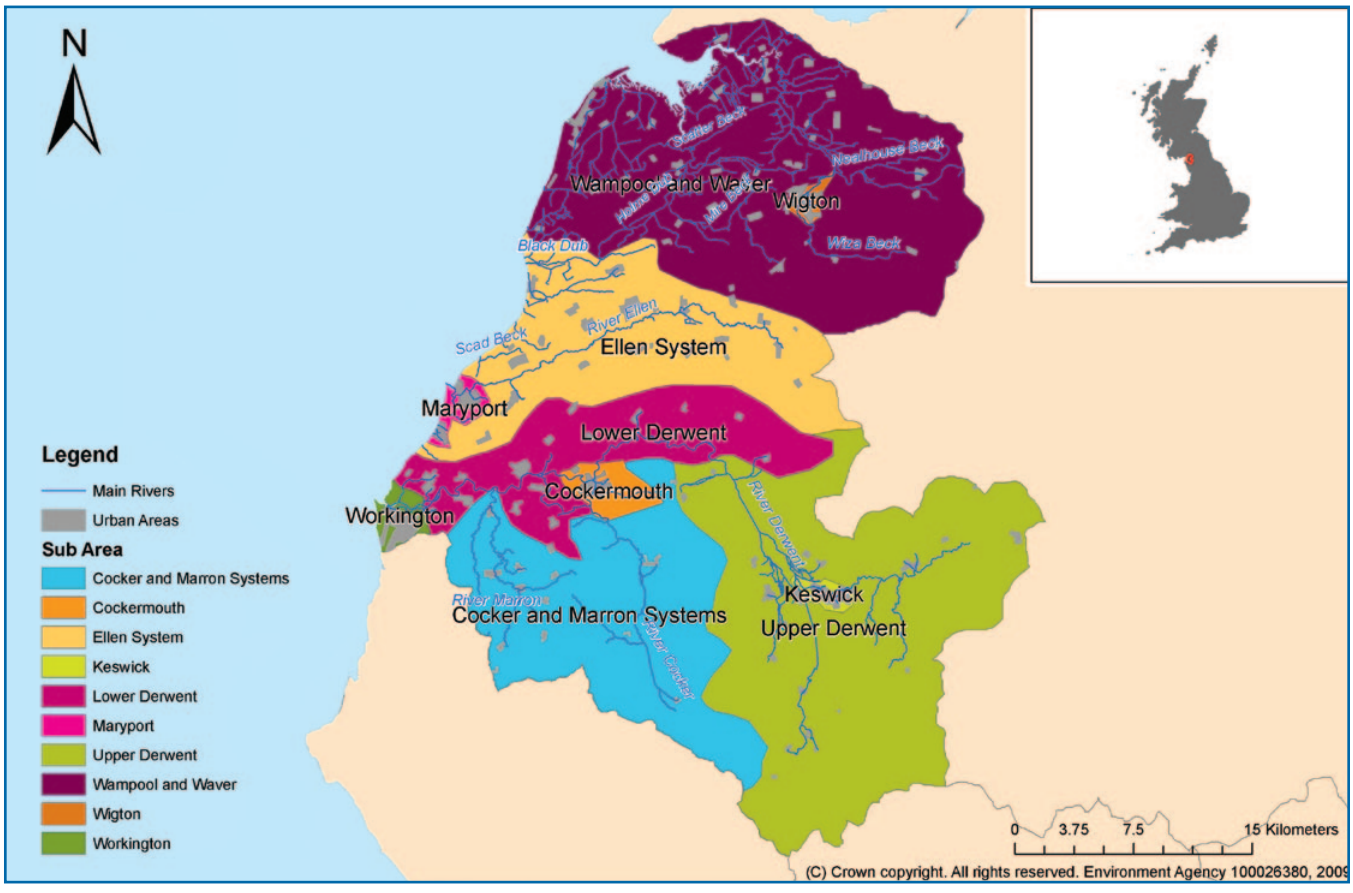


Table 3 Policy options

## ➜ 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 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.

# Keswick

## Our key partners are:

**Lake District National Park Authority**

**Local authorities**

**United Utilities**

**Natural England**

## The issues in this sub-area

This sub-area covers the town of Keswick situated in the Lake District National Park. There is flood risk to approximately 195 properties in a 1% APE. The causes of the flooding are primarily from the River Greta, but risks also come from Cuddy Beck, Derwent Water and surface water. We currently manage the risks to Keswick by maintaining flood defences and the river channels along the River Greta. Following the 2005 floods further river modelling has been used to assess the standard of protection provided by the defences. In places this has been found to be less than the design standard and funding has been allocated to start design work on a flood alleviation scheme. We offer a flood warning service in Keswick. One school, one campsite and one emergency response centre are at risk. The River Greta through Keswick forms part of the River Derwent and Bassenthwaite Lake Special Area of Conservation (SAC) which is in an unfavourable condition. This may be sensitive to changes in run-off and flood risk management measures.

## The vision and preferred policy

**Policy option 5:** Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

This sub-area covers the town of Keswick. There are around 195 properties at risk in a 1% flood event. There are significant raised flood defence walls on the River Greta through Keswick, without which an additional 141 properties may be at risk of flooding. Flood risk is likely to increase in future as flood flows may increase meaning that defences are more likely to be overtopped. The number of properties at risk in the 1% APE could increase to around 362. In future to keep pace with climate change we anticipate the need to maintain and possibly upgrade the flood defences where appropriate and also maintain the river channels and associated assets. We also will improve the flood warning service where required. Actions in the catchment upstream may be able to reduce flood flows reaching Keswick and help mitigate the risk. United Utilities have been trialing some flood risk reduction to Keswick by making available some flood storage capacity in Thirlmere Reservoir over the winter months.

## The key messages

- We are currently undertaking a detailed study to assess whether further development of flood defences in Keswick is feasible.
- Properties that are prone to flooding should be made more resistant and resilient to manage the residual risks.
- Continue with flood warning programme and provide residents with information and advice.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- In March 2007, as part of our National Capital Programme, our consulting engineers completed a high level viability study. A business case, supported by the findings of the viability study, has now been approved, and our consultants will shortly be starting work on a more detailed investigation Project Appraisal Report which is likely to take 12-18 months to complete. Only when this investigation is complete, will we know if there are fully technically feasible, financially justifiable, and environmentally acceptable engineering solutions that can be implemented.
- Improve flood warning and flood forecasting services including the provision of information and advice for people to take effective action. This needs to include visitors to campsites.
- River Derwent and Bassenthwaite Lake SACs are very sensitive environments that may be adversely impacted by flood risk management (FRM) work. We will continue to monitor and assess channel maintenance works, including gravel extraction in the River Greta at Keswick.
- Ensure that inappropriate development is guided away from flood risk areas and that where development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.

The River Greta at Keswick

Sub-area 2

# Cockermouth

## Our key partners are:

- Allerdale Borough Council
- Cumbria County Council
- Lake District National Park Authority
- Developers

## The issues in this sub-area

This sub-area covers the town of Cockermouth situated just outside the Lake District National Park. There is flood risk to approximately 174 properties in a 1% APE. The causes of the flooding are from the River Derwent and the River Cocker. We currently manage the risks to Cockermouth by maintaining flood defences and river channels along the River Derwent and River Cocker. This offers a standard of protection up to a 1% APE in the town centre. We offer a flood warning service in Cockermouth. Two utility installations, one sewage treatment works and two emergency response centres are at risk. The River Derwent and River Cocker through Cockermouth form part of the River Derwent and Bassenthwaite Lake SAC which is in an unfavourable condition. This may be sensitive to changes in run-off and flood risk management measures.

## 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.

There are around 174 properties at risk in a 1% flood event. There are significant raised flood defence walls on the River Derwent and Cocker through Cockermouth, without which an additional 119 properties may be at risk of flooding. Flood risk is likely to increase in future as flood flows may increase meaning that defences are more likely to be overtopped. The number of properties at risk in the 1% APE could increase to around 364. In future to keep pace with climate change we anticipate the need to maintain and possibly upgrade the flood defences where appropriate and also maintain the river channels and associated assets. We also will improve the flood warning service where required. Actions in the catchment upstream may be able to reduce flood flows reaching Cockermouth and help mitigate the risk.

## The key messages

- Continue to maintain, and consider improving, existing defences but recognise that major works will have to compete with other areas for national funding.
- Properties that are prone to flooding should be made more resistant and resilient to manage the residual risks.
- Continue with flood warning programme and provide residents with information and advice.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Undertake a study to investigate the options for further reducing flood risk in Cockermouth, accepting that major works will have to compete with other areas for funding.
- Improve flood warning and flood forecasting services including the provision of information and advice for people to take effective action.
- River Derwent SAC is a very sensitive environment that may be adversely impacted by FRM work. Continue to monitor and assess channel maintenance works including gravel extraction in the River Derwent at Cockermouth.
- Work with the local planning authorities to ensure that inappropriate development is guided away from flood risk areas and that where development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.

↑ Floodgate on a footbridge over the River Cocker

# Wigton

## Our key partners are:

**Allerdale District Council**

**Cumbria County Council**

**Developers**

## The issues in this sub-area

This sub-area covers the town of Wigton situated in the north of Cumbria. There is flood risk to approximately 155 properties in a 1% APE, and 72 properties in a 10% APE. The causes of the flooding are from the Wiza Beck, Speet Gill and Black Beck. We currently manage the risks to Wigton by maintaining the river channels. There are no formal flood defences in Wigton. Currently there is no flood warning service. An emergency response centre and one COMAH site are at risk. There are no designated sites at risk in this sub-area.

## 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.

There are around 155 properties at risk in a 1% flood event. There are no formal flood defences in Wigton and no specific flood warning service. Flood risk is likely to increase in future as flood flows increase due to the effects of climate change. The number of properties at risk in a 1% APE could increase to around 174. A major industrial site in Wigton is at flood risk. In future, we would aim to reduce flood risk in Wigton. A more detailed investigation of options to manage flood risk should be carried out, including consideration of defences, maintenance of the river channels and structures and introducing a flood warning service. Actions to reduce run-off in the catchment upstream may be able to reduce flood flows reaching Wigton and help mitigate the risk.

## The key messages

- Local works may help reduce flood risks but major works may not be a priority for funding.
- Properties that are prone to flooding should be made more resistant and resilient to manage the risks.
- Consider introducing a flood warning service for Wigton.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Carry out a study to consider the justification for reducing flood risk further in Wigton and appropriate ways of doing this, accepting that major works will have to compete with other areas for funding.
- Encourage the use of flood resilience and flood-proofing to existing properties in Wigton through the provision of information and advice and seek appropriate opportunities for funding these measures.
- There is no flood warning service in Wigton. The rate of rise of the flood waters here suggests it may be technically feasible to implement a flood warning system. We would need to assess the likely flood warning areas, mechanisms of flooding and determine the most appropriate methods of forecasting flooding and disseminating that information.
- Work with local planning authorities to ensure that inappropriate development does not take place in flood risk areas and that where development is exceptionally permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk elsewhere.

Sub-area 4

# Cocker and Marron

## Our key partners are:

**Allerdale Borough Council**

**Copeland Borough Council**

**Lake District National Park Authority**

**Developers**

## The issues in this sub-area

This sub-area is predominantly rural, covering the catchments of the River Cocker and River Marron. In total, there are approximately 70 properties at risk in a 1% APE in these two catchments. No individual village has many properties at risk but there are localised issues, for example at Bridgefoot, where deep flooding can occur at the confluence of the River Marron and Lostrigg Beck. We currently manage the risks in this area by maintaining some of the river channels. There is a flood warning service to three properties at Southwaite Bridge on the River Cocker. A sewage treatment works and a campsite are at risk. The River Cocker and River Marron both form part of the River Derwent and Bassenthwaite Lake Special Area of Conservation (SAC) which is in an unfavourable condition. This may be sensitive to changes in run-off and flood risk management measures.

## 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.

This sub-area covers the catchments of the River Cocker and River Marron. This includes the villages of Bridgefoot, Branthwaite, Lorton and Buttermere. There are around 70 properties at risk in a 1% flood event. There are few Environment Agency maintained flood defences in these catchments and there is a flood warning service to properties at Southwaite Bridge. Flood risk is likely to increase in future as flood flows may increase. Ideally, we would aim to create a system with fewer artificial influences and a more natural flooding regime. We will have to accept that there will be an increase in flood risk in future due to climate change. By 2100 due to this we estimate there will be 80 properties at risk in a 1% APE.

## The key messages

- Predominantly rural area with localised flooding issues. Focus our involvement on known problem areas.
- Aim to work towards a more natural catchment and flooding regime. Avoid inappropriate development in the floodplain.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Look to reduce maintenance expenditure in this sub-area in future. Review effectiveness of current maintenance works, including the few maintained flood defences. Focus future maintenance on known problem areas and managing gravel accumulation.
- Work with local planning authorities to ensure that inappropriate development is guided away from flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.
- Encourage take-up of Environmental Stewardship grants for more sustainable land management practices.
- Where localised problems exist or occur at villages within this largely rural sub-area, they should be addressed with an appropriate response. This could be achieved through promoting flood resilience measures and/or small-scale local works.

Sub-area 5

# Upper Derwent

## Our key partners are:

Lake District National Park Authority

Local authorities

Developers

Natural England

## The issues in this sub-area

This sub-area is predominantly rural and covers the catchments draining into Bassenthwaite Lake. This includes the River Derwent, the River Greta, River Glenderamackin, Newlands Beck, St John's Beck and many other small watercourses. Bassenthwaite Lake, Derwent Water and Thirlmere Reservoir are also included. There are numerous villages within this area such as Grange, Rosthwaite, Threlkeld, Braithwaite and Bassenthwaite. In total there are approximately 191 properties at risk of flooding in a 1% APE in this area, which are spread over many villages and caused by local issues. We currently manage the risks in this area by maintaining some of the river channels. There are also many privately maintained defences, some of which do protect property. There is no formal flood warning service in this area. One sewage treatment works, one school, one utility installation and three campsites are at risk in a 1% APE. Some of the watercourses in this area form part of the River Derwent and Bassenthwaite Lake SAC which is in an unfavourable condition. This may be sensitive to changes in run-off and flood risk management measures.

## The vision and preferred policy

**Policy option 6:** Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

This sub-area covers the catchments draining into Bassenthwaite Lake, including River Derwent, River Greta, St John's Beck and River Glenderamackin (excludes the town of Keswick). These include the villages of Grange, Rosthwaite, Threlkeld, Braithwaite and Bassenthwaite. There are around 191 properties at risk in a 1% APE. There are few Environment Agency maintained flood defences in these catchments and there is no specific flood warning service. Flood risk is likely to increase slightly in future as flood flows are predicted to increase. By 2100 due to climate change we estimate 260 properties will be at risk of flooding in a 1% APE. Several villages in this sub-area are at risk of flooding, including Braithwaite, Rosthwaite, and Bassenthwaite. We hope to create a system with fewer artificial influences and a more natural flooding regime. Some works may be carried out to protect villages, if justified, and agricultural defences may be removed to restore floodplains and enhance habitats. Critically, all water from this area flows into Bassenthwaite Lake which is an extremely sensitive habitat. Naturalising the flooding regime should contribute to reducing pollutants and sediments reaching the lake.

## The key messages

- Work towards catchment management to deliver multiple benefits for flood risk and the environment, particularly contributing to the rehabilitation of Bassenthwaite Lake.
- The floodplain is our most important asset in managing flood risk. We want to work towards restoring the natural floodplains and avoid inappropriate development.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Review effectiveness of current defences and maintenance works, including gravel extraction. Investigate reconnection of floodplains to watercourses to reduce flows reaching Keswick and reduce sediment load.
- Work with local planning authorities to ensure that inappropriate development is guided away from flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.
- Where localised problems exist or occur in villages within this largely rural sub-area, they should be addressed with an appropriate response. This could be achieved by promoting flood resilience measures and/or small scale local works.
- Encourage take-up of Environmental Stewardship grants for more sustainable land management practices.

↑ Bassenthwaite Lake and Skiddaw

Sub-area 6

# Lower Derwent

## Our key partners are:

Lake District National Park Authority

Cumbria County Council

Allerdale Borough Council

Natural England

## The issues in this sub-area

This sub-area is predominantly rural, covering the catchments of the River Derwent downstream of Bassenthwaite Lake. There are approximately 18 properties at risk in a 1% APE in this area. No individual village has many properties at risk but there are localised issues, particularly on tributaries. We currently manage the risks in this area by maintaining some of the river channels. There are also some privately maintained embankments along the River Derwent, predominantly defending agricultural land. There is no flood warning service in this area. One water treatment works, one sewage treatment works and one campsite are at risk. The River Derwent in this area forms part of the River Derwent and Bassenthwaite Lake Special Area of Conservation which at present is in an unfavourable condition. This may be sensitive to changes in run-off and flood risk management measures.

## 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.

This sub-area covers the catchments of the River Derwent downstream of Bassenthwaite Lake (excluding the town of Cockermouth). This includes numerous villages, including Great Broughton, Seaton, Great Clifton and Stainburn but none are at significant flood risk. There are around 18 properties at risk in a 1% flood event. By 2100 due to climate change we estimate over 90 properties may be at risk in a 1% APE. There are few Environment Agency maintained flood defences in this area and there is no specific flood warning service. Flood risk is likely to increase in future as flood flows may increase but will remain relatively localised. Ideally we would aim to create a system with fewer artificial influences and a more natural flooding regime.

## The key messages

- Predominantly rural area with localised flooding issues. Focus our involvement on known problem areas.
- Aim to work towards a more natural catchment and flooding regime. Avoid inappropriate development in the floodplain.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Look to reduce maintenance expenditure in this Sub-area in future. Review effectiveness of current maintenance works. Focus future maintenance on known problem areas, particularly on small watercourses.
- Work with local planning authorities to ensure that inappropriate development does not take place in flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.

Sub-area 7

# Ellen

## Our key partners are:

**Allerdale Borough Council**

**Cumbria County Council**

**Lake District National Park Authority**

**Natural England**

## The issues in this sub-area

This sub-area is predominantly rural covering the catchments of the River Ellen and several small watercourses such as Westnewton Beck and Allonby Beck. In total, there are approximately 189 properties at risk in a 1% APE in this area. The majority of these are at Allonby, although a more detailed investigation of flood risk at Allonby would help confirm this level of risk. Other locations at risk include Westnewton, Blennerhasset, Baggrow and Bullgill. We currently manage the risks in this area by maintaining some of the river channels. There is no flood warning service in this area. The railway from Carlisle to Workington follows the River Ellen closely in places and has previously been affected by flooding. In addition, a sewage treatment works and a campsite are potentially at risk.

## 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.

This sub-area covers the catchments of the River Ellen catchment and some neighbouring coastal streams including Westnewton Beck and Allonby Beck. This includes the villages of Blennerhasset, Baggrow, Bullgill, Westnewton and Allonby. There are around 189 properties at risk in a 1% flood event. There are few Environment Agency maintained flood defences in these catchments. Allonby has the highest number of properties at risk (over 100). Flood risk is likely to increase slightly in future as flood flows may increase, we estimate by 2100, 240 properties may be at risk in a 1% event. Ideally we would aim to create a system with fewer artificial influences and a more natural flooding regime. We will have to accept that there will be an increase in flood risk in future due to climate change but the increase in risk will be manageable.

## The key messages

- Predominantly rural area with localised flooding issues. Focus our involvement on known problem areas.
- Aim to work towards a more natural catchment and flooding regime. Avoid inappropriate development in the floodplain.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Look to reduce maintenance expenditure in this sub-area in future. Review effectiveness of current maintenance works, including the few maintained flood defences. Focus future maintenance on known problem areas and managing gravel accumulation.
- Work with local planning authorities to ensure that inappropriate development does not take place in flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.
- Encourage take up of Environmental Stewardship grants for more sustainable land management practices.

# Workington

## Our key partners are:

- Allerdale Borough Council
- Cumbria County Council
- United Utilities
- Natural England
- Developers

## The issues in this sub-area

This sub-area covers the town of Workington situated on the Derwent estuary on the west coast of Cumbria. There is flood risk to approximately 35 properties in a 0.5% annual probability tidal event. Recent figures from our flood maps show there are 20 properties at risk in a 1% APE from the River Derwent in Workington and 30 properties from Scale Beck. There are few records of properties flooding from rivers in this sub-area. In 2005, some properties flooded in Church Street, but this is thought to be from surface water exceeding the capacity of the drainage system. We currently manage the risks to Workington by maintaining the river channels. There are no formal flood defences in Workington and no flood warning service. There are also risks from the drainage system and surface water. The River Derwent upstream of Workington Bridge forms part of the River Derwent and Bassenthwaite Lake Special Area of Conservation which is in an unfavourable condition. This may be sensitive to changes in run-off and flood risk management measures.

## The vision and preferred policy

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

This sub-area covers the town of Workington. There are around 35 properties at risk in a 0.5% tidal flood event. There are no formal flood defences in Workington and no specific fluvial flood warning service. Flooding is primarily tidal from the River Derwent Estuary. Flood risk is likely to increase in future as sea levels are predicted to increase significantly by 2100. By this time, it is anticipated that around 400 properties may be at risk in the 0.5% event. The CFMP must work closely with the Shoreline Management Plan (SMP) and determine a long-term strategy for managing the increase in risk. This work indicates that the increase in the number of properties that may be at risk is likely to take place between 2050 and 2100. Actions are therefore most appropriate in the longer term and consideration must be given to a full range of methods of managing the risk in Workington rather than simply building defences.

## The key messages

- Flood risk in Workington is likely to increase significantly in future due to climate change and the predicted rise in sea level.
- Investigate future management of tidal flood risks in Workington, both from the Derwent estuary, and from the coast in conjunction with the SMP.
- Avoid inappropriate development in areas of Workington that may be at flood risk in future.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Develop a long term strategy for managing sea level rise for communities affected by tidal flooding. CFMP policy for the estuaries must ensure they tie in with SMP policies for the coastline. Consider the feasibility of options for reducing risk in the long term – post 2050. This should include changes in land use through the planning system and flood resilience.
- Where localised fluvial or surface water problems exist or occur within this sub-area, they should be addressed with an appropriate response by promoting flood resilience measures and/or small scale local works.
- Work with local planning authorities to ensure that inappropriate development does not take place in flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.

Sub-area 9

# Maryport

## Our key partners are:

**Allerdale Borough Council**

**Cumbria County Council**

**Developers**

## The issues in this sub-area

This sub-area covers the town of Maryport situated on the River Ellen estuary on the west coast of Cumbria. There is flood risk to approximately four properties in a 0.5% annual probability tidal event, but this is projected to increase to over 40 properties at risk by 2100. We currently manage the risks to Maryport by maintaining some of the river channels. There are formal flood defences at Maryport Harbour maintained by Allerdale Borough Council. This offers a SoP up to a 1.3% APE. There is currently no flood warning service in Maryport. There are also risks from small tributary watercourses, drainage systems and surface water. One emergency response centre is at risk. There is one scheduled ancient monument at risk.

## The vision and preferred policy

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

This sub-area covers the town of Maryport. There are around four properties at risk in a 0.5% APE. The harbour area of Maryport is defended to a 1.3% standard. There is no specific flood warning service. Flooding is primarily tidal from the River Ellen estuary. Flood risk is likely to increase in future as sea levels are predicted to rise significantly by 2100. By this time, it is anticipated that the defence standard will have reduced significantly and around 46 properties may be at risk in a 0.5% event. The CFMP must work closely with the SMP and determine a long term strategy for managing the increase in risk. This work indicates that the increase in property numbers that may be at risk is limited. As such, it is difficult to recommend building higher defence walls. Consideration must be given to alternative methods of managing the risk around Maryport Harbour. Over the next 50-100 years, low-lying areas of Maryport should be adapted for lower risk land use and remaining buildings made more resilient to flooding.

## The key messages

- Current flood risks are fairly low as flood defences have recently been constructed around Maryport Harbour, but flood risk is likely to increase in future due to climate change.
- Investigate future management of tidal flood risks in Maryport, both from the Ellen estuary, and from the coast in conjunction with the SMP.
- Avoid inappropriate development in areas of Maryport that may be at flood risk in future.

## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Develop a long-term plan for managing sea level rise in conjunction with the findings of the shoreline management plans (Summer 2010) for the communities affected by tidal flooding.
- Maintain existing flood defences in Maryport (primarily maintained by Allerdale BC).
- Where localised fluvial or surface water problems exist or occur at villages within this sub-area, they should be addressed with an appropriate response by promoting flood resilience measures and/or small scale local works.
- Work with local planning authorities to ensure that inappropriate development does not take place in flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.

Sub-area 10

# Wampool and Waver

## Our key partners are:

Allerdale Borough Council

Cumbria County Council

Carlisle City Council

Natural England

Developers

## The issues in this sub-area

This sub-area is predominantly rural, covering the catchments of the River Wampool and River Waver. In total, there are approximately 222 properties at risk in a 1% APE in this area. The majority of these are at Silloth although a more detailed investigation of flood risk at Silloth would help confirm this level of risk. Other locations at risk include Abbeytown, Kirkbride and Waverbridge. We currently manage the risks in this area by maintaining some of the river channels. There are few Environment Agency maintained raised flood defences in these catchments although there are four land drainage pumping stations at a significant annual maintenance cost. There is no flood warning service in this area. The railway from Carlisle to Workington is at risk in some locations. In addition a campsite is at risk. There are a variety of designated sites within this area, including the South Solway Mosses SAC, Solway Firth SAC, Upper Solway Flats and Marshes Ramsar site and Special Protection Area (SPA), as well as parts of the Solway Coast AONB, the Lake District National Park and Hadrian's Wall World Heritage Site.

## 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.

This sub-area covers the catchments of the River Wampool and River Waver (excluding Wigton). This includes the villages of Abbeytown, Kirkbride, Silloth and Waverbridge. There are around 222 properties at risk in a 1% flood event. Most of the properties at risk of flooding are in the lowland area to the east of Silloth from small watercourses such as Causewayhead Beck. Ideally we would aim to create a system with fewer artificial influences and a more natural flooding regime. We will have to accept that there will be an increase in flood risk in future due to climate change, we estimate by 2100 350 properties will be at risk in a 1% event. The internationally designated wetland sites may benefit from these changes.

## The key messages

- The historic expenditure on the maintenance of rural watercourses should continue to be reviewed as it may be disproportionate to the flood risks.
- Need to balance the requirements of flood risk management, agriculture and the environment.
- Aim to work towards a more natural catchment and flooding regime. Avoid inappropriate development in the floodplain.

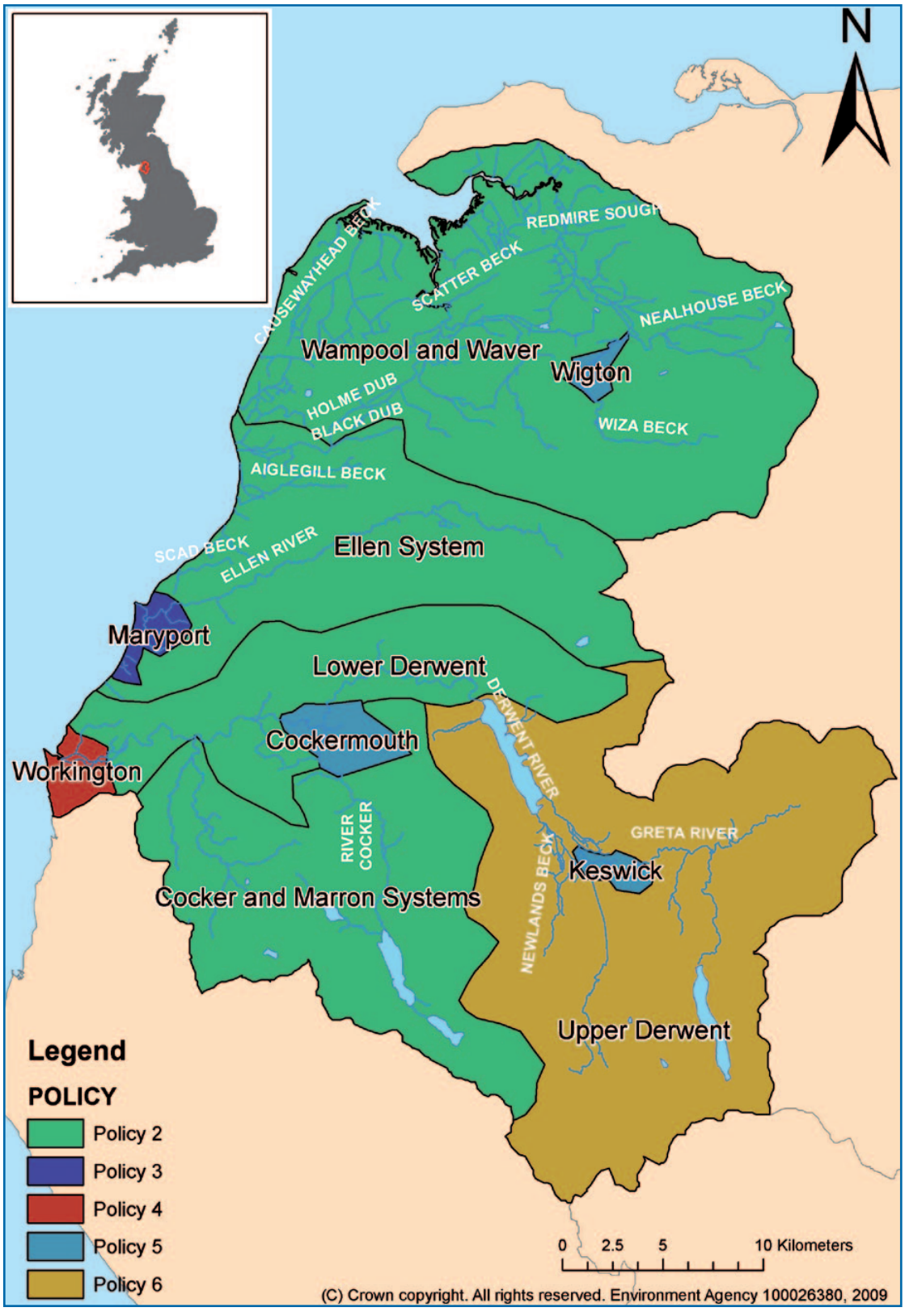
## Proposed actions to implement the preferred policy

The essential actions to achieve our policy aim are listed below:

- Look to reduce maintenance expenditure in this sub-area in future. Review effectiveness of current maintenance works, including the few maintained flood defences and pumping stations. Work with environmental groups and the farming community to investigate future water management in this area.
- Work with local planning authorities to ensure that inappropriate development does not take place in flood risk areas and that where exceptionally, development is permitted, risks are adequately mitigated. Run-off from new development should be managed to minimise flood risk.
- Encourage take-up of Environmental Stewardship grants for more sustainable land management practices. Upstream of Wigton there may be opportunity to reduce run-off to limit flooding in Wigton. In downstream areas this may help reduce expenditure and provide environmental benefits.

↑ Whitrigg Bridge over the River Wampool - Courtesy of the North West England and North Wales Coastal Group

# Map of CFMP policies



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