

South West Lakes Catchment Flood Management Plan

Summary Report December 2009



managing
flood risk

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Introduction



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

The South West Lakes 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 South West Lakes catchment, the main sources of flood risk are from tidal flooding, rivers, surface water and sewer flooding from the drainage system. The risk of flooding from rivers is a significant problem in the

north and south of the catchment, but not in the central sub-catchments. It is estimated that 1,280 properties are at fluvial flood risk from a 1% annual probability event (APE). Due to climate change, we estimate the number of properties at flood risk will increase to approximately 1,500 by the year 2100. Tidal flooding is the main source of flood risk, with approximately 4,000 properties at risk.

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 include Defra, National Farmers' Union, Natural England, Cumbria County Council, United Utilities, Barrow Borough Council, RSPB, Cumbria Wildlife Trust, Lake District National Park Authority, Copeland Borough Council, Allerdale Borough Council, West Lakes Renaissance.

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.

A handwritten signature in black ink, appearing to read 'Tony Dean'.

Tony Dean
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:

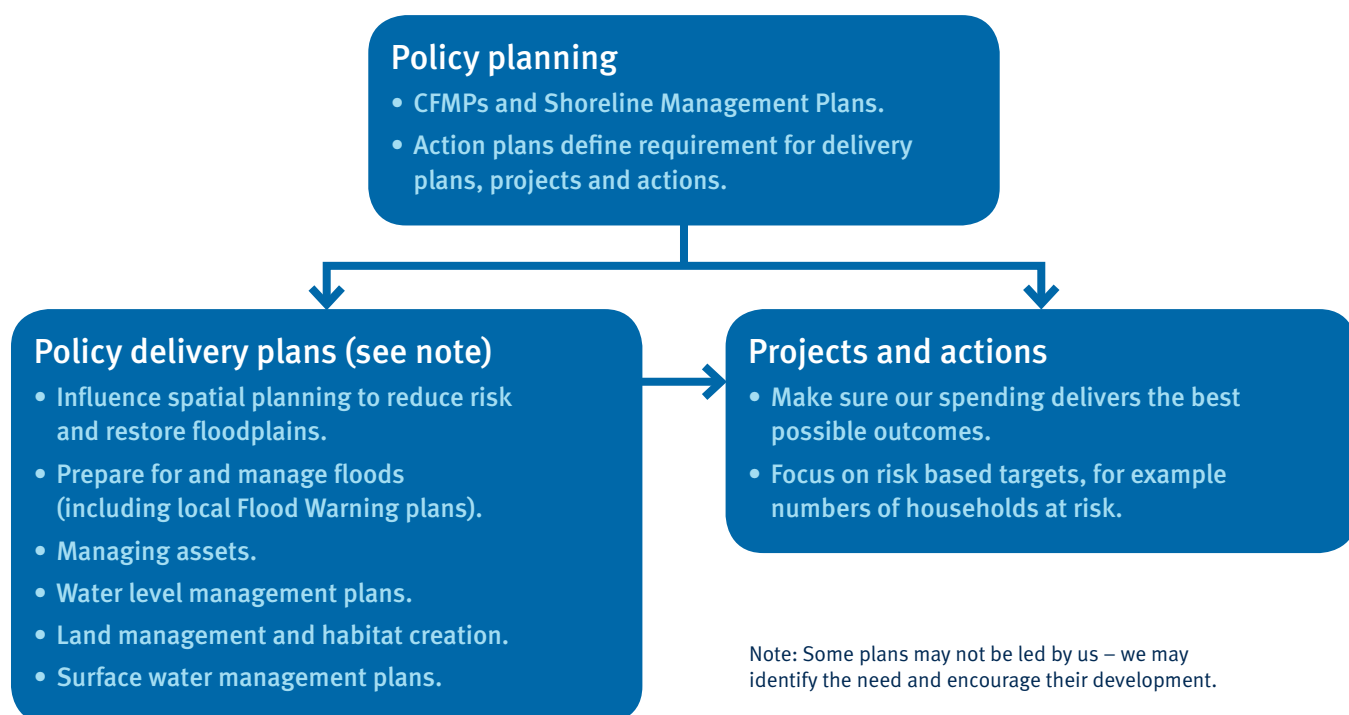
- The Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions.
- Regional planning bodies and local authorities who can use the plan to inform spatial planning activities and emergency planning.

- 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



Catchment overview

It is useful to draw out some general characteristics that are most important in our management of flood risk. The South West Lakes CFMP covers an area of 900km² and contains a number of small, rural, flashy sub-catchments. Approximately 97% of the catchment is rural with larger urban settlements found along the coast, at Barrow and Whitehaven. The catchment is amongst the wettest and steepest in England and Wales. Run-off following rainfall is generally rapid due to the relatively impermeable underlying geology and steep sub-catchments. The watercourses within the CFMP boundary generally rise on the high, rugged and steep sided, western fells of the Lake District. They flow in a westerly or south westerly direction along the coastal plain before discharging into the Irish Sea.

There are a number of internationally designated environmental sites within the catchment including the Duddon and Esk estuaries. Over half the catchment lies within the Lake District National Park. The majority of the agricultural land found in the catchment is considered to be of poor quality but much of the land has a high environmental and recreational value. The catchment is popular with tourists due to its scenic beauty and rural nature. Tourism plays a major part in the South West Lakes economy.

The main towns have gone through an economic decline in the past and this area still struggles economically due to its remote location and reliance on a few declining industries. In particular VSEL (Vickers Shipbuilding and Engineering Ltd), Sellafield Ltd and the manufacturing sector in general have shown a steady decline. The Barrow and Copeland Local Plans state that as there has been a recent decline in population and Industry. Economic regeneration is important to the catchment as a whole. Future regeneration plans are focused on Barrow-in-Furness and Whitehaven.

Flood risk is confined to the main towns and other dispersed villages across the catchment. The scale of flood risk is low when compared to other catchments in the North West. The highest risks to property, people and infrastructure are in Whitehaven due to flooding from Pow Beck (and other sources), Egremont from the River Ehen, Dalton from Poaka Beck and Barrow from sewer flooding. There is some intermediate flood risk in Cleator Moor, Braystones and East Barrow.

Several national environmental and historical designations are also at risk, but we believe the chance of flooding is low. In the rural locations, flood risk management policies will aim to contribute to the environmentally rich, scenic landscape and rural land use.

The following plan shows the main features of the South West Lakes catchment.

Map 1 Principal features



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 urban flood risks quoted in this report take account of flood defences already in place.

The South West Lakes catchment has a history of flooding, the majority of which is caused by either intense thunderstorms, which leads to flash flooding during the summer months or prolonged periods of heavy rain during the autumn/winter. A particularly significant event was in November 1999 when exceptionally heavy rain fell in the Whitehaven area. Flooding to most properties was caused by non-main rivers or blocked highway culverts/drains. In total, 264 properties were flooded, including 40 in Cleator Moor, 60 in Egremont and 154 in Whitehaven.

The main sources of flooding in the South West Lakes catchment are as follows:

- River flooding is from many sources. Harrington floods from the River Wyre, Egremont and Cleator from the River Ehen (Egremont also floods from

Skirting Beck), Barrow and Dalton from Poaka Beck and Mill Beck, Braystones and Beckermets from the Ehen and Kirk Beck, Cleator Moor floods from the River Nor and Bowthorn Beck and Whitehaven and Mirehouse from Pow Beck. We expect river flooding durations to be low in the South West Lakes catchments. Smaller, steeper catchments bring about rapid rates of rise and therefore, do not last as long but can also lead to high flow velocities being generated and short times to peak. This means it is difficult to warn towns and villages of impending floods.

- Tidal flooding is caused by storm surge and wave action in times of high astronomical tides. The main areas affected by tidal flooding are the Duddon and Drigg estuaries and Barrow and Walney Island. There are approximately 4,000 properties at risk of tidal flooding. Tidal flooding and coastal processes will be assessed in the next SMP 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 type of flooding can occur throughout the catchment but usually only causes a low level of risk. However, during the 1999 flood event, surface water was a major

component of the flooding in Whitehaven.

- Sewer flooding is usually caused by inadequate sewer capacity or blockages within the network. Barrow-in-Furness and to some extent Whitehaven have experienced sewer flooding. In 2004, it was reported that over 150 properties flooded in Barrow when the sewers could not cope with the discharge after an extended period of heavy rain. United Utilities have an ongoing programme of work to maintain and improve public sewers and have work planned in this area.
- Even though the South West Lakes CFMP area contains areas of permeable bedrock at or near the land surface and some underlying aquifers, groundwater flooding is not seen as a major issue in the area. In extreme flood events, groundwater levels could rise to cause localised groundwater flooding, this is probably the case in parts of Whitehaven and other areas.

What is at risk?

The risk of fluvial flooding from rivers is a significant problem in the north and south of the catchment, but not in the central sub-catchments. Using broad-scale models and flood zone maps we estimate that 1,280 properties are at fluvial flood risk from the 1% APE. Inadequate culvert capacity and blockages are

recurring problems in many of the urban watercourses. There are 9 environmentally designated sites (SSSI) and 5 scheduled ancient monuments within the 1% annual probability flood extent, some of which could be adversely affected by a flood.

Where is the risk?

The majority of properties at flood risk are in Egremont, Dalton-in-Furness and Whitehaven with Barrow the main area at risk from sewer flooding. There are fewer properties at risk of flooding in Braystones, Beckermeth, Cleator Moor and Cleator. The rest of the areas at risk of flooding in the catchment are spread out with a low probability of flooding. Major flood events include the November 1999 storm which flooded up to 260 properties in the catchment including many in Whitehaven and some in Egremont and Cleator Moor. In August 2004, over 150 properties were flooded in Barrow due to insufficient sewer capacity. The map overleaf illustrates where properties are at risk from all sources of flooding.

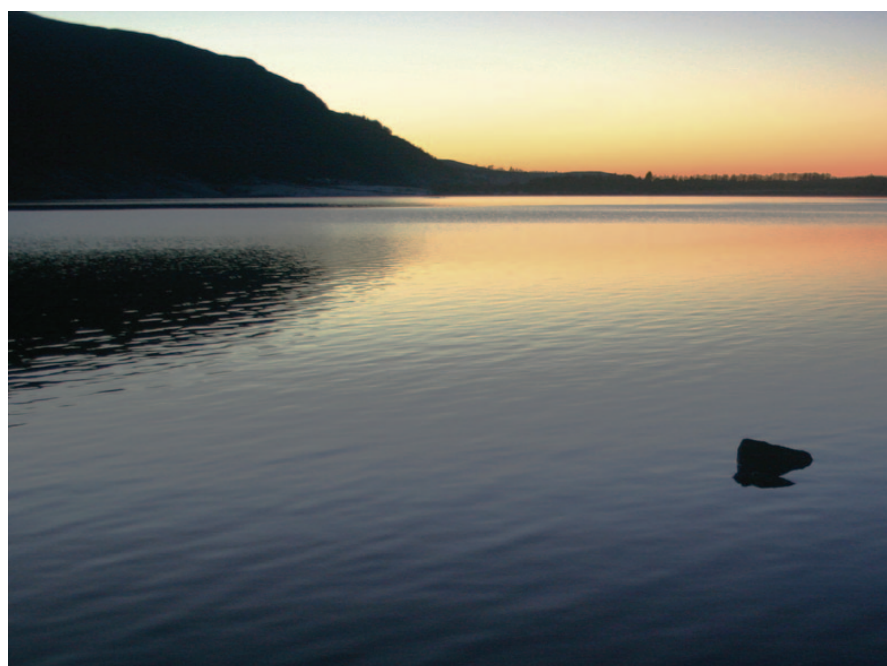
We recognise the potential risk from surface water and sewer flooding. However, further studies, following on from the CFMP, will be undertaken to quantify this potential risk.

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

Number of properties at risk	Locations
100 to 500	Whitehaven, Egremont, Dalton in Furness and Barrow (tidal).
50 to 100	Cleator Moor, Cleator and Braystones.
0 to 50	Barrow (fluvial) and Ennerdale

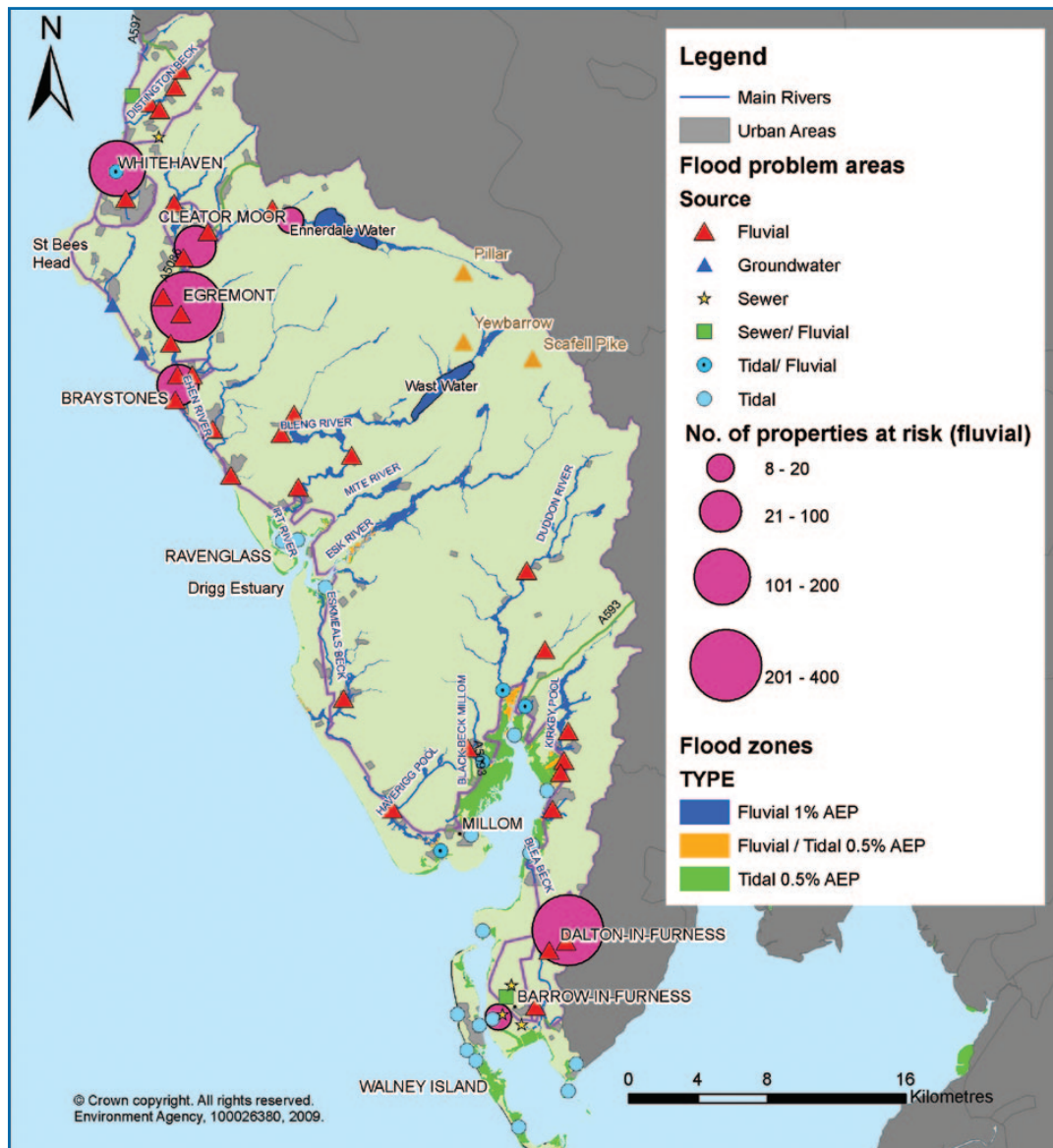
Table 2. Critical infrastructure at risk:

3 Schools, 2 Power/gas Stations, 3 Sewage treatment works



↑ Ennerdale Water

Map 2 Flood zones and flood risk problem areas



How we currently manage the risk in the catchment

There are flood defences in the South West Lakes catchment but many are privately owned and protect agricultural land. Most defences consist of earth embankments and riverside walls. Egremont has defences that protect a number of properties but the standard of protection is low.

In addition to these defences, 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 60km of raised defences; and 90 flood defence structures such as grills, weirs and bridges.

- Identifying and promoting new flood alleviation schemes where appropriate. We plan to make significant investments in the next ten years on several schemes such as the Egremont Strategy and the Poaka Beck scheme in Dalton-in-Furness. This should provide improved protection to 120 residential and 50 commercial properties.

The impact of climate change and future flood risk

- Enforcement and maintenance where riparian owners carry out work detrimental to flood risk.
- 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 warnings service 316 properties in the catchment. It is technically unfeasible to issue flood warnings to most locations in the South West Lakes as the catchment responds so rapidly to rainfall.
- 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.

In the future, flooding will be influenced by climate change, changes in land use (for example urban development) and rural land management. In the South West Lakes 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 South West Lakes CFMP were:

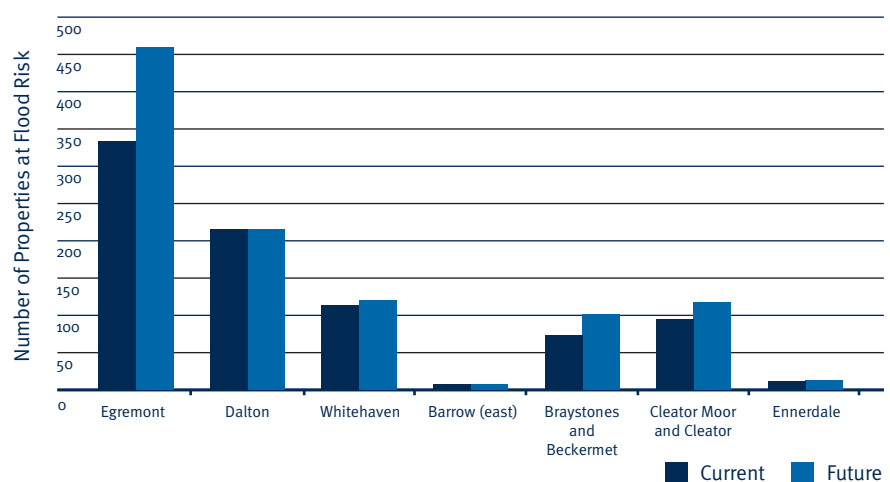
- a 20% increase in peak flow in all watercourses. The predicted increase in flow can affect the frequency, timing, scale of flooding and the flood levels;
- increased urbanisation (between 12% and 40%), change in rural land use reducing time to peak by 2 hours.

We estimate that by 2100 approximately 1,500 properties will be at risk of fluvial flooding in a 1% annual probability event. This is nearly a 20% increase compared to the current number of properties at fluvial flood risk across the catchment. Flood depth could increase by 2m in Egremont but only by a small amount in Whitehaven, Cleator Moor and Dalton. Flood risk may be adversely affected by further urban development, run-off could increase and future development pressure may result in building on the floodplain.

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.

The figure below shows the difference between current and future flood risk for a 1% annual probability event at key locations 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 South West Lakes CFMP area into nine 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 is often not sustainable to keep building

and raising defences. This is why we have a catchment wide look at how we direct effort and resources to ensure comprehensive 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

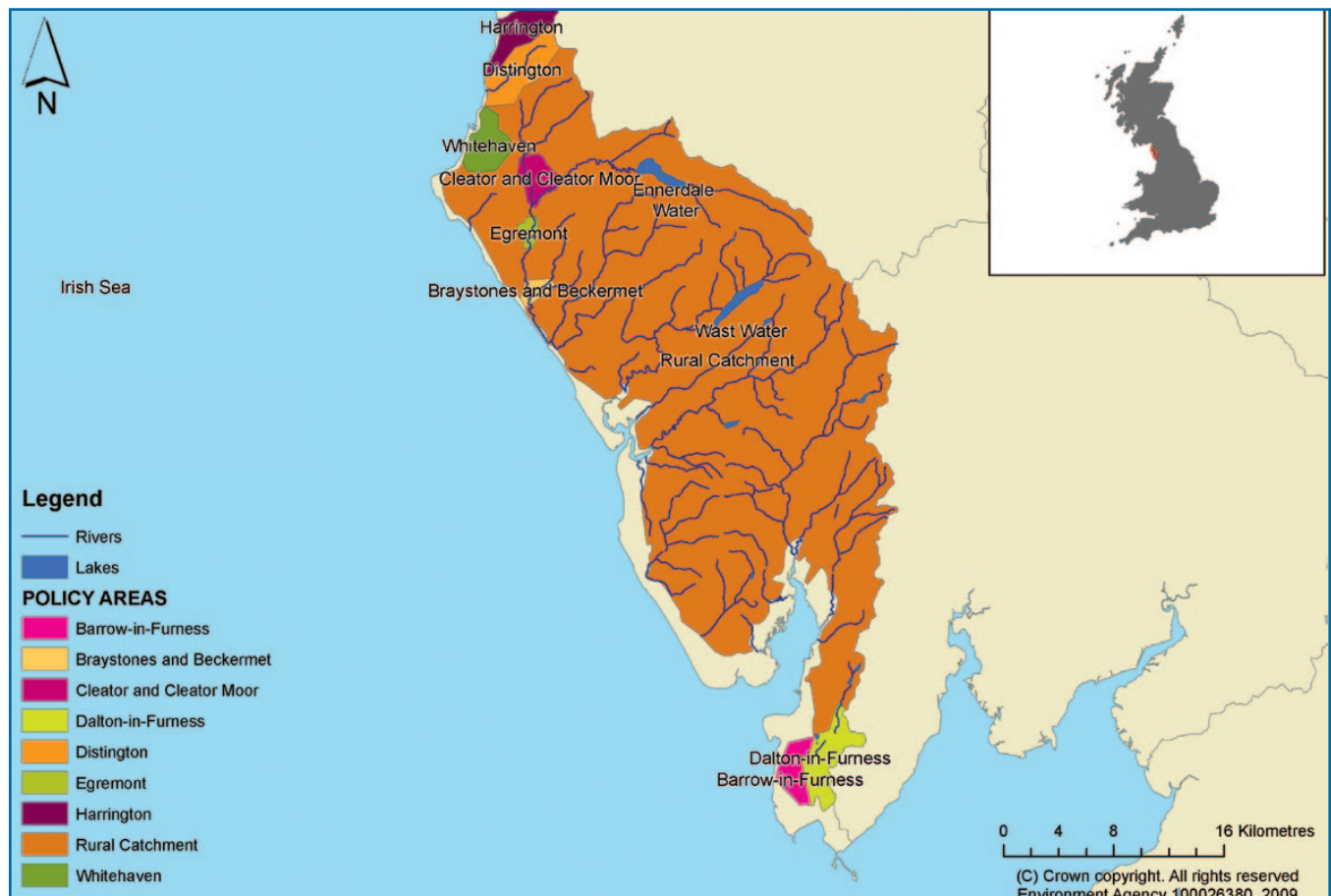


Table 3 Policy options

→ 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.

Harrington

Our key partners are:

Allerdale Borough Council

Copeland Borough Council

Developers

The issues in this sub-area

There is flood risk to approximately 40 houses in Harrington from the 1% APE from two sources of risk; tidal and fluvial (inadequate channel capacity and culvert problems). We manage flood risk through several small stretches of raised flood defences, periodically de-silting Harrington Reservoir and by clearing debris from the river channel and culverted sections. Climate change will put an additional 10 to 20 properties at risk of fluvial flooding.

The vision and preferred policy

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

Our vision for this sub-area is to continue with the existing maintenance regime but look for opportunities to focus this activity for the maximum benefit. In future, climate change will increase the frequency of flooding and the total number of properties at risk. Although, the flood hazard is not expected to be significant, steps should be taken to inform residents of the risks and on how to prepare and respond to flooding. To achieve this, our preferred approach is policy option 3.

The key messages

- Although flooding is frequent, it affects a low number of properties. A large flood risk management project is unlikely to be economically justifiable but the existing defences will be maintained.
- Flood risk management should be supplemented by promoting flood resistance, resilience and awareness, in order to reduce the impacts of climate change.

Proposed actions to implement the preferred policy

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

- Develop an Asset Management Plan to review effectiveness of current flood risk management measures and identify areas for improvement.
- Where localised problems exist, promote flood resilience and resistance measures and small-scale works through the Integrated Urban Drainage Group.
- Continue to promote emergency planning and flood awareness.
- Establish risk to critical infrastructure and take appropriate action to reduce and manage this risk.



↑ Harrington

Distington

Our key partner is:

Copeland Borough Council

The issues in this sub-area

There is fluvial flood risk at several locations along Distington Beck, mainly in the village of Distington. These locations are hydraulically linked and are small scale in nature (5 properties are at risk from the 1% annual probability flood). Overall, the flood hazard and impact on people, the economy and environment is minimal due to low flood depths, velocity and frequency of flooding. Very limited flood risk management measures are undertaken in this sub-area. There are some local raised defences and a few short sections of maintained channels.

The vision and preferred policy

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

Our vision for this sub-area is to continue with the existing maintenance regime but look for opportunities to focus this activity for the maximum benefit. In the future, climate change will increase the frequency of flooding and the number of properties at risk of flooding. It is estimated a further property may be at risk by 2100 in a 1% APE. Although the flood hazard

is not expected to be significant, steps should be taken to inform residents of the risk of flooding and how to prepare and respond to a flood event. To achieve this, our preferred approach is policy option 3.

The key messages

- This is a rural catchment with a low frequency of flooding problems and few properties at risk. As a result, new flood defences are unlikely to be justifiable.
- Flood resistance, flood resilience and informing people of flood hazards in Distington would be more feasible.

Proposed actions to implement the preferred policy

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

- Develop an Asset Management Plan to review effectiveness of current flood risk management measures and identify areas for improvement.
- Where localised problems exist, promote flood resilience and resistance measures and local works through the Integrated Urban Drainage Group.
- Increase awareness of flooding risk.



↑ Distington

Whitehaven

Our key partners are:

Copeland Borough Council

Developers

United Utilities

The issues in this sub-area

Over 250 properties are at risk of flooding from the 1% APE, mainly from Pow Beck but also other sources (the sea, drains, sewers and groundwater). The town and quay areas of Whitehaven are vulnerable to flooding from high tides and surges from the Irish Sea.

There are some small stretches of raised embankments along Pow Beck which offers protection up to a 4% APE. The remainder of the beck is a mixture of open and culverted sections; which are cleared of debris and silt when necessary. The outfall of Pow Beck into the harbour is restricted by the tide. However, the ability of the beck to drain freely can be sustained during times of high sea levels by closing the harbour gates at low water. In the future due to climate change we estimate a further 9 properties will be at risk in a 1% APE.

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.

Our vision for this sub-area is to reduce the risk of flooding from all sources to enable Whitehaven to continue to be an important administrative and service centre for the area. This will allow sustainable development and help to attract regeneration. To achieve this, our preferred approach is policy option 5.

The key messages

- Whitehaven is at risk of flooding from a number of sources and it affects a significant number of properties.
- Continued regeneration is important to sustain economic activity for this isolated but important town.
- We need to re-direct this regeneration away from flood risk areas where possible.

Proposed actions to implement the preferred policy

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

- A study should be completed for Whitehaven to help us understand the interaction between the different sources of flooding. Part of this can be achieved through a Surface Water Management Plan which will be completed and agreed between our partners.
- Work with the local planning authority to direct regeneration away from the Pow Beck floodplain.
- Develop an Asset Management Plan to review effectiveness of current flood risk management measures and identify areas for improvement.
- Establish risk to critical infrastructure and take appropriate action to reduce and manage this risk.
- Continue to promote emergency planning and flood awareness.



↑ Whitehaven marketplace

Rural Catchment

Our key partners are:

Allerdale Borough Council

Copeland Borough Council

Lake District National Park Authority

Natural England

National Farmers Union

Landowners

The issues in this sub-area

There are 245 properties at risk of flooding in a 1% APE. These are dispersed throughout the rural areas in approximately 25 locations.

The number of properties at risk is estimated to be 290 by 2100 due to the effects of climate change. Very limited flood risk management is undertaken across this large, rural sub-area. There are some extensive stretches (up to 30km) of rural defences protecting mainly agricultural land. Most of the river maintenance in the scattered villages is in response to flood events.

This sub-area includes large areas of scenic and environmentally sensitive habitat. As a result, there are areas of special scientific interest and scheduled ancient monuments that are considered to be at risk of flooding.

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.

Our vision for this sub-area is to create a system with few artificial

influences and a natural river regime. Maintenance work will be undertaken where it protects villages, but we will continue to review other flood risk management work that is detrimental to the environment. At villages and any campsites, emergency procedures will be monitored into the future to manage the risk from any rapid onset flooding. To achieve this, our preferred approach is policy option 6.

The key messages

- A large proportion of this rural section of the catchment is in the Lake District National Park and therefore environmentally sensitive.
- Flood management measures should be sensitive to environmental drivers and limited; given the low flood risk to people and property. Significant flood management measures are unlikely to be justified in this sub-area.
- There are opportunities to enhance the environment through changes in flood risk management but this should be balanced with the need for a sustainable farming sector.

Proposed actions to implement the preferred policy

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

- Complete an Asset Management Plan to review effectiveness of current flood risk management measures and identify areas for improvement.
- Investigate the removal of embankments and naturalising watercourses to increase floodplain capacity, reduce flood risk and enhance the environment.
- Encourage take up of higher level stewardship schemes for more sustainable land management practices.
- Establish risk to critical infrastructure and take appropriate action to reduce and manage this risk.



↑ Ennerdale

Cleator and Cleator Moor

Our key partners are:

Natural England

National Farmers Union

Landowners

Copeland Borough Council

The issues in this sub-area

There is flood risk to nearly 100 properties for the 1% APE in this sub-area mainly at Cleator Moor. Due to climate change, by 2100 it is expected 120 properties will be at risk of fluvial flooding in a 1% APE. Existing defences along the River Ehen offer a limited benefit to properties at Cleator. Bowthorn Beck and Nor Beck are two linked watercourses that pass through Cleator Moor (north of Cleator). In places, these watercourses are culverted and insufficient capacity has caused flooding to occur. The main flood risk is to Cleator Moor from Nor Beck. It is technically difficult to provide flood warning to properties at risk on these watercourses.

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.

Our vision for this sub-area is to take appropriate action to reduce the risk of flooding so that Cleator and Cleator Moor is a safe environment in which people can live and work. We will need to identify measures that are appropriate for this small urban area which will help us mitigate and reduce the impact of climate change. To achieve this, our preferred approach is policy option 5.

The key messages

- Flood defences protect Cleator from flooding, however there is frequent flooding in nearby Cleator Moor.
- A low cost flood risk management scheme in Cleator Moor could mitigate flood risk through small scale works.

Proposed actions to implement the preferred policy

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

- Complete a scheme to reduce flooding to Cleator Moor. Any flood risk management actions should ensure that the River Ehen Site of Special Scientific Interest/Special Area of Conservation is not adversely affected.
- Increase awareness of flood risk and where localised problems exist promote flood resilience and resistance measures and local works through the Integrated Urban Drainage Group.
- Carry out a study to assess the effectiveness and feasibility of increasing upstream floodplain through possible wetland creation and land management change.



↑ Cleator

Egremont

Our key partner is:

Copeland Borough Council

The issues in this sub-area

The centre of Egremont is on the floodplain of the River Ehen. Around 350 properties are at risk from the 1% annual probability flood. Due to climate change we estimate 470 properties will be at risk of flooding in a 1% event by 2100. Existing raised defences offer a limited level of protection to some of the properties at risk. Skirting Beck is culverted through the urban area and has inadequate capacity in high flow conditions. Both watercourses undergo regular channel maintenance but this does not always reduce the risk of problems on Skirting Beck during floods.

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.

The risk of flooding will increase with climate change. Our vision for this sub-area, therefore is to take appropriate action to reduce the risk of flooding in Egremont. We will need to improve the existing assets and continue to make improvements to the flood warning service. To achieve this, our preferred approach is policy option 5.

The key messages

- Egremont is a high flood risk location and flooding is expected to increase in the future due to climate change.
- We need to investigate options to reduce the flood risk including consideration of new or upgraded defences, improving culvert capacity, maintenance and flood attenuation upstream. Increased take-up of the flood warning service should also be sought.

Proposed actions to implement the preferred policy

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

- Investigate options to reduce the flood risk including consideration of defences, improving the culvert and attenuating upstream.
- Improve flood warning by focussing on increasing lead times and take up of the flood warning service.
- Where localised problems exist, promote flood resilience and resistance measures and local works through the Integrated Urban Drainage Group.
- Establish risk to critical infrastructure and take appropriate action to reduce and manage this risk.



↑ Egremont

Braystones and Beckermert

Our key partner is:

Copeland Borough Council

The issues in this sub-area

Braystones is located on the floodplain of the River Ehen. There is also flood risk to Beckermert from Kirk Beck, a tributary of the River Ehen due to inadequate channel capacity. Approximately 70 properties are at risk of flooding from a 1% APE. By 2100 climate change is not expected to put any further properties at risk in a 1% event. Flood hazard is low in Beckermert but this is not the case in Braystones where flood depths of 2m can occur. Extensive raised defences exist on parts of the River Ehen through Braystones protecting properties and extend north and south of the village to protect agricultural land from flooding.

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.

Our vision for this sub-area is to focus flood risk management on the two villages but to create a system with fewer artificial influences and a more natural flooding regime in the surrounding area. We will have to accept that there will be an increase in flood risk in future due to climate change. We envisage

an overall reduction in flood risk management actions, however, we recognise that for those properties at risk we will investigate alternative options to manage flood risk to people and property in the villages. For example, a new flood warning service for Braystones should reduce some of the risk. To achieve this vision, our preferred approach is policy option 2.

The key messages

- There are two small villages in this rural location, the risk to people is low at Beckermert but more significant and difficult to manage at Braystones. Future changes are not expected to significantly increase the number of people or property at risk, but flood frequency is likely to increase.
- Flood risk management measures should be non structural such as a flood warning service, influencing and informing and flood resilience rather than relying on the raised defences and a maintenance programme.

Proposed actions to implement the preferred policy

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

- Complete an Asset Management Plan to review effectiveness of current flood risk management measures and consider a more risk based approach.
- Where localised problems exist, promote flood resilience and resistance measures and local works by the Integrated Urban Drainage Group.
- Promote flood awareness, resilience and resistance measures.



↑ Braystones

Dalton-in-Furness

Our key partners are:

Barrow Borough Council

Developers

The issues in this sub-area

There is a fluvial flood risk to over 200 properties in Dalton from the 1% annual probability flood. In the future, by 2100, we estimate no increase in the number of properties at risk (1% APE), however, it is expected the frequency of flooding will increase. The cause of flooding is from Poaka Beck overtopping its banks and culvert blockages through the town. This is made worse as Hagg Gill joins Poaka Beck in Dalton. Flooding is less frequent and the consequences of fluvial flooding are much lower in the south of the sub-area on the east side of Barrow.

There are some local defences in Dalton that offer limited protection in the main flood risk areas. The current maintenance programme involves clearing debris, vegetation clearance and regular inspections of culverts. In addition, a cricket pitch and playing fields are used as natural storage areas.

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.

Our vision for this sub-area is to take further action to ensure that Dalton is a safe environment for people. We need to balance the use of raised defences, in combination with flood storage, to sustain the landscape value of the area. To achieve this, our preferred approach is policy option 5.

The key messages

- A new flood alleviation scheme to reduce flood risk in Dalton is likely to be feasible.
- A gradual change in the character of the urban area would be beneficial. This could be achieved through re-development so that the consequences of flooding are reduced by better layout and a greater resilience to flooding.

Proposed actions to implement the preferred policy

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

- Carry out a scheme to reduce risk of flooding in Dalton. This could be achieved by additional flood storage, new or improved defences.
- Complete an Asset Management Plan to review effectiveness of current flood risk management measures and consider a more risk based approach.
- Where localised problems exist, promote flood resilience and resistance measures and local works through the Integrated Urban Drainage Group.
- Avoid inappropriate development and re-development in the areas that are prone to flooding through the application of PPS25.
- Establish risk to critical infrastructure and take appropriate action to reduce and manage this risk.



↑ Dalton

Barrow-in-Furness

Our key partners are:

Barrow Borough Council

United Utilities

The issues in this sub-area

The main source of flood risk in this part of Barrow is from sewers. Approximately 140 properties are estimated to be at risk (1% APE), mainly in the south of the town. By 2100 due to climate change we estimate that no additional properties will be at risk of flooding in a 1% APE. The ageing sewer infrastructure and increased development means the sewer capacity is exceeded in times of high rainfall. Current flood risk management measures include sewer network maintenance and urban storage. The risk of sewer flooding is expected to increase due to continued development and climate change.

The town is relatively low-lying and tidal flood risk is also present but the areas affected are studied in the shoreline management plan process.

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.

Our vision for this sub-area is to take further action to ensure that sewer flooding is not an ongoing hazard causing community disruption. The current sewer and water infrastructure will be improved so that Barrow can continue to meet the demands of development and regeneration. Similarly, approaches will be required in other areas of the town that are considered in the Shoreline Management Plan process rather than this CFMP. To achieve this, our preferred approach is policy option 5.

The key messages

- Flood risk from the sewers is a serious issue in the important civic centre of Barrow.
- Development pressure is expected to increase the strain on the sewer network along with an increase in high rainfall events due to future changes.
- The main body responsible for reducing flood risk in Barrow will be United Utilities.

Proposed actions to implement the preferred policy

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

- Complete ongoing sewer infrastructure improvement works across Barrow. This will mainly be an action for United Utilities and will involve a scheme to improve the sewer capacity for South Barrow.
- Apply the Barrow Strategic Flood Risk Assessment to limit new development in the floodplain, encourage flood resilience and ensure that run-off rates are equivalent to green field rates by using appropriate methods, for example, Sustainable Urban Drainage Systems.



↑ Barrow port - Courtesy of the North West England and North Wales Coastal Group

Map of CFMP policies



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