

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

The Kent Leven 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.

The Kent Leven catchment has in its north the Lakeland fells, a steep mountainous environment that receives large amounts of rainfall and generates very high rates of runoff. There are approximately 1,500 properties

across the CFMP area at risk from main river flooding. About 33% of these properties are in Kendal, and a further 39% in the rural villages of Grasmere, Ambleside, Windermere and Coniston. Ulverston has 7% of the properties at risk. In the future, due to climate change it is predicted that the total number of properties at risk will rise to 2100.

We cannot reduce flood risk on our own, we will therefore work closely with all our partners to improve the co-ordination of flood risk activities and agree the most effective way to manage flood risk in the future. To develop this plan and ensure social, economic and environmental issues were taken into account, we worked with and consulted many organisations. These include: United Utilities, South Lakeland DC, Cumbria CC, LDNP, Defra, NFU, Cumbria Wildlife Trust, RSPB, Natural England, South Cumbria Rivers Trust and the National Trust.

However it should be noted that the NFU do not support all aspects of this plan in the Lyth Valley policy unit.

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:

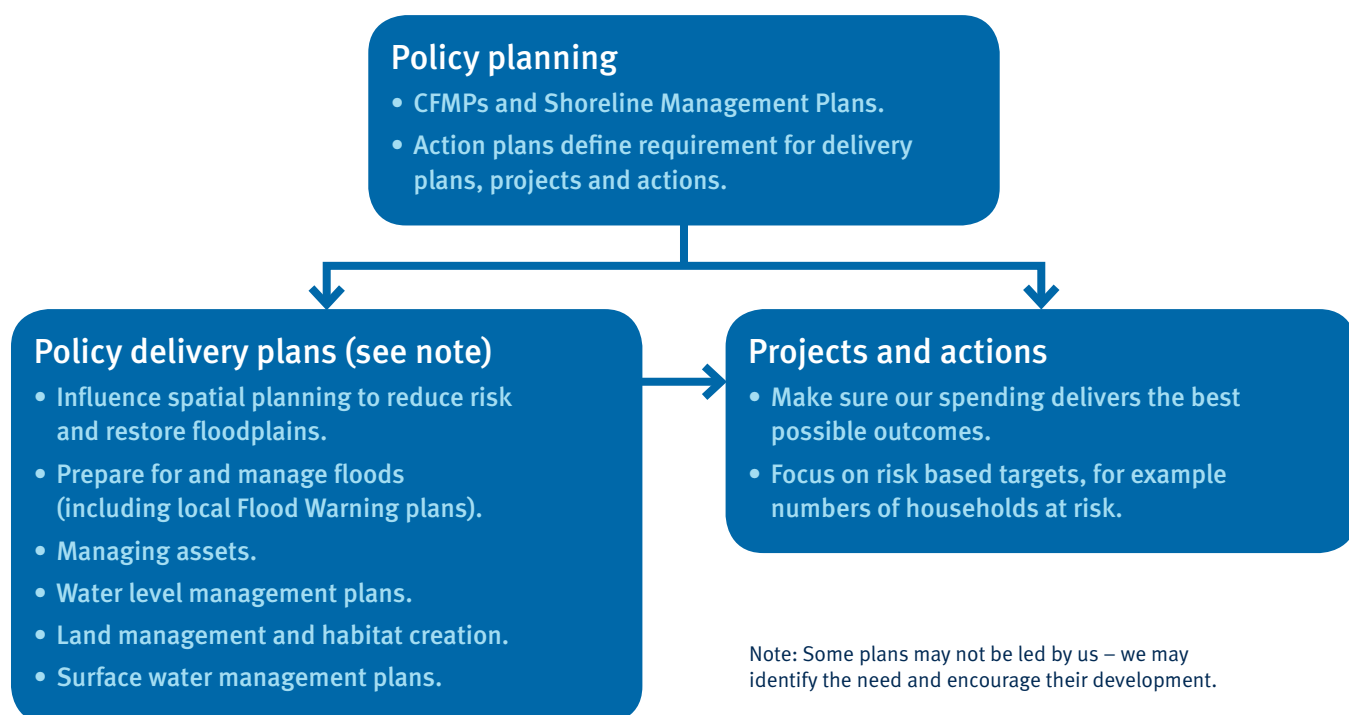
- The Environment Agency, who will use the plan to guide decisions on investment in further plans, projects or actions.
- Regional planning bodies and local authorities who can use the plan to inform spatial planning activities and emergency planning.

- 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. This CFMP area is predominately rural, being only 1.5% urban. The Rivers Kent, Leven and Crake drain the southern fells of the Lake District, and high rainfall, thin soils and impermeable geology combine to produce large amounts of run-off. Four other main rivers drain lower-lying land, and smaller rivers drain the coastal fringe, with a slower rainfall response. Most of the rivers, apart from the coastal streams and some small becks (Eea Beck, Dragley Beck), ultimately drain south into Morecambe Bay via the Kent and Leven estuaries.

The upland rivers have little natural floodplain, being confined to narrow channels in the volcanic rock. In the middle catchments, there is limited floodplain, some occupied by settlements, and in the lowlands there are some wider areas including the Lyth valley. The Lyth valley was artificially drained to support agriculture in the 1960s, with pumping stations and embanked rivers. In Kendal, the Kent has been modified to convey water more efficiently, by deepening, widening and constructing raised defences. Most of the floodplain around Kendal has been developed for industry. We need to improve flood risk management in Kendal, and also in Ulverston, to help mitigate the impacts of climate change.

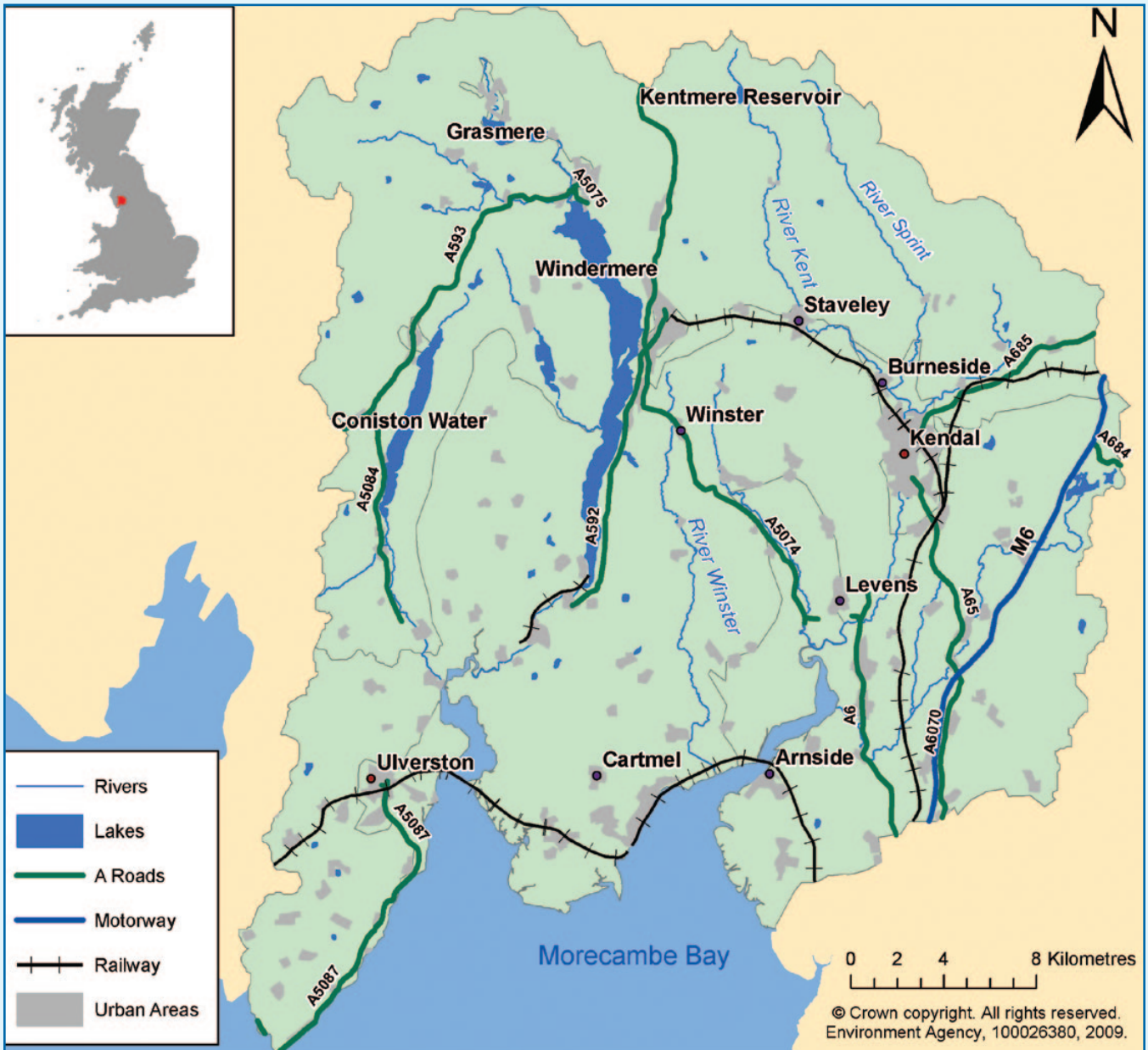
The key urban areas within the catchment are Kendal (26,000 residents) and Ulverston (17,000 residents). Overall, the CFMP area has a resident population of around 94,000 people. Ulverston is located in the south west of the CFMP area on the Barrow peninsula. Kendal is in the east below the confluence of the Sprint and Mint with the Kent. There are approximately 1,500 properties across the CFMP area at risk from fluvial flooding. About 33% of these properties are in Kendal, and a further 39% in the rural villages of Grasmere, Ambleside, Windermere and Coniston. Ulverston has 7% of these properties at risk.

This CFMP area is important for nature conservation and landscape value. Two-thirds of it is within the Lake District National Park, and there are a number of nationally and internationally protected sites including Meathop Moss and Nichols Moss Sites of Special Scientific Interest (SSSI), and the River Kent Special Area of Conservation (SAC). Depending on the location and nature of the designation, flooding and flood risk management could bring both positive and negative impacts. Many rivers in the CFMP area flow into the Morecambe Bay Ramsar wetland site. The policies and actions from this CFMP will not significantly affect the ecological features of the protected sites.



↑ Rural CFMP area

Map 1 Main features



↑ Ulverston Town Centre

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, i.e. we would say that an event has a 1 per cent chance of being equalled or exceeded in any year.

In the Kent Leven catchment the largest flood in the written records was that of 1898, on the Kent, which affected Kendal and Staveley but the most damaging flood occurred in 1954 when nearly 600 houses, shops and industrial premises were flooded in Kendal and nearby Helsington. The largest flows in the gauged record (since 1954) occurred at Kendal in 2005. This caused over 100 properties to flood in Kendal. Ambleside, Grasmere and large areas of the Lyth Valley were also flooded. This event caused less damage than the 1954 flood due to the construction of flood alleviation works in 1978.

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

- River flooding is the main source of flooding in the catchment. Kendal would be seriously affected by a major event, it has high density housing close to the River Kent and two business parks at risk. Staveley is at risk from the rivers Gowan and Kent and flooded 0.6m deep in 2004. Ambleside and Grasmere flood from the River Rothay. Church Beck causes flooding at Coniston. Ulverston is at flood risk from Dragley Beck exacerbated by channel incapacity and tidelocking.
- Tidal flooding occurs in this catchment and the main areas affected are areas around Ulverston (affected seriously in 2002), Flookburgh, Grange-over-Sands, Lindale, Arnside, the Kent Estuary and potentially the Lyth Valley. Potentially there are over 3000 properties at risk from tidal flooding (not taking into account defences). Revised Shoreline Management Plans (SMP2) due for completion in 2010 will address tidal flood risk in this catchment.
- Surface water flooding is known to occur in Kendal, Lindale, Ulverston and Grange-over-Sands, as a result of short intense storms. The water is forced to flow across the ground, when the capacity of the urban drainage system is exceeded. There is little information on surface water flooding in this catchment and further work is being undertaken to assess its true extent.
- Sewer flooding is known to have occurred in Ambleside, Grasmere and Kendal but there is little information available on these incidents. United Utilities have an ongoing programme of work to maintain and improve public sewers.
- Groundwater flooding is thought to be a component of flooding around Grange-over-Sands. Grange-over-Sands has a long history of flooding and is close to the main groundwater source in this CFMP area; irregular springs and rapidly changing groundwater levels in the limestone aquifer are thought to be underlying factors. There are no other major aquifers in this CFMP area.

What is at risk?

Using broad-scale modelling on the main rivers we estimate 1,500 properties have a 1% annual chance of flooding from rivers. Properties in Ulverston and along the Morecambe Bay coast are at risk of tidal flooding if undefended. There are 18 environmentally designated sites, 14 campsites and 23 scheduled ancient monuments at risk from a 1% flood event.

Where is the risk?

Kendal is the largest single area at risk and despite its defences, was flooded in 2004 and 2005. Kendal would be seriously affected by a major event, with high density housing close to the River Kent and two large business parks, located in the floodplain. Despite a new flood alleviation scheme, the Stock Beck tributary still presents a fluvial flood risk to approximately 30 properties. Burneside is also at risk from the Kent and Sprint; it was flooded in January 2005 at the same time as Kendal. Staveley is at risk from the rivers Gowan and Kent, and flooded to 0.6m deep in February 2004 despite defences. Ambleside has a history of flooding from the River Rothay. There are some flood defences in Ambleside, but few in Grasmere which is also at risk from the Rothay. In Coniston, Church Beck causes flooding at peak flows, and this has worsened recently with new urban development in the village. Coniston has no flood defences. Dragley Beck causes flooding in Ulverston due to channel incapacity, tidelocking and inadequate storage capacity. Town Beck in Ulverston also presents some flood risk but it has not been investigated in detail. There are some minor flood defences in Ulverston. Together, Kendal, Grasmere, Ambleside, Coniston and Ulverston account for more than half of the properties at risk of flooding in the CFMP area. The distribution of flood risk to properties across the catchment is illustrated on the map overleaf.

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
Over 500	In the District of South Lakeland in Kendal and Burneside
151 to 500	In the District of South Lakeland in Ambleside, Grasmere, Ulverston and Coniston
51 to 150	In the District of South Lakeland in Windermere
25 to 50	none

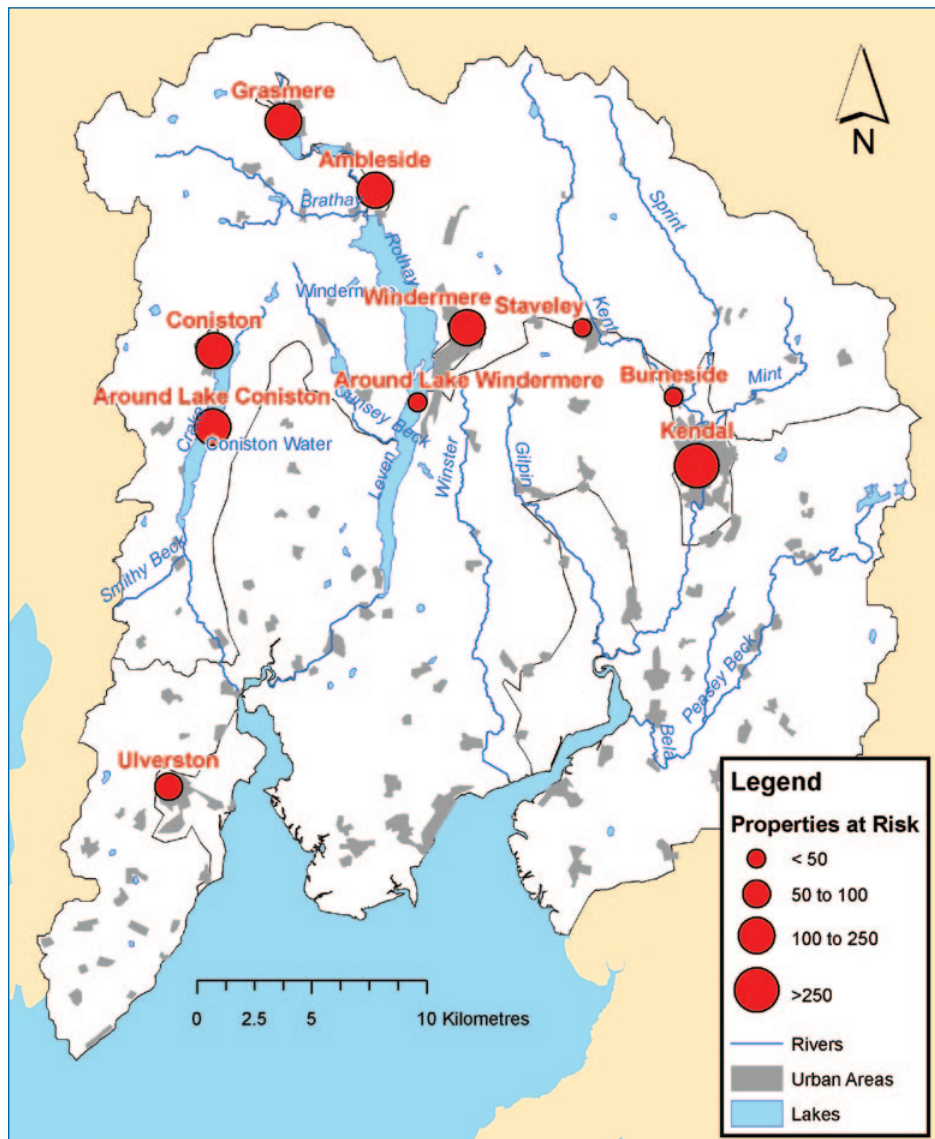
Table 2. Critical infrastructure at risk:

6 medical centres, 6 emergency services buildings, 8 schools and 6 sewage treatment works.



↑ Miller Bridge, Kendal

Map 2 Risk to property across catchment for the 1% annual probability fluvial event



How we currently manage the risk in the catchment

The Kent Leven catchment has benefited from engineering schemes put in place over the last 50 years or more. Including:

- Construction of the comprehensive Kendal Flood Alleviation Scheme in 1978 which has provided protection to the largest settlement in the CFMP area and the area that historically, has suffered the most damaging floods.

- Construction of the Lyth Valley pumped drainage scheme in the early 1960s, to enhance the agricultural potential of the land, which would naturally be wet grassland.

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 Kent Leven catchment has over 75km of raised defences maintained by the Environment Agency and 26km privately maintained.

The impact of climate change and future flood risk

- Enforcement where riparian owners carry out work detrimental to flood risk, or neglect their responsibilities.
- Identifying and promoting new flood alleviation schemes and feasibility studies where appropriate, such as Stock Beck in Kendal that is expected to protect 170 properties in a 1% fluvial event.
- 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 nearly 1400 properties around Kendal.
- Providing flood incident management.
- Promoting awareness of flooding so that organisations, communities and individuals are aware of the risk and are prepared 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 Kent Leven catchment, sensitivity testing revealed that climate change has the greatest impact on flood risk, with land management change, and urbanisation having a much 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 Kent Leven 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 720 mm by the year 2100, this will increase the probability of tidal

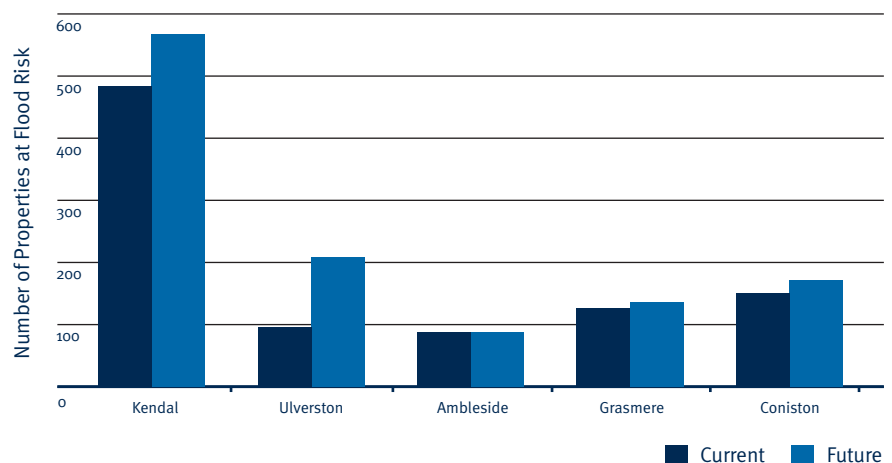
flooding and the frequency of tide locking.

As a result of climate change, we estimate that by 2100 approximately 2,000 properties in this CFMP area will be at risk of fluvial flooding in a 1% annual probability event (APE). This is roughly a 40% increase in the number of properties currently at fluvial risk in the CFMP area. Flood depth is expected to increase by up to 0.4m in Grasmere, 0.2m in Kendal and 0.1m in Ulverston, Ambleside and Coniston, by 2100. The extent of flooding on environmental sites will increase as a result of climate change, but no further sites are at risk in a 1% event. A further three scheduled ancient monuments are at risk in a 1% event.

It is expected that flooding will increase in frequency due to climate change and by 2100, a present day 1% fluvial flood event could occur twice as often.

The graph below shows the difference between current and future flood risks from a 1% event at key locations across 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 Kent Leven CFMP area into eight 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 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

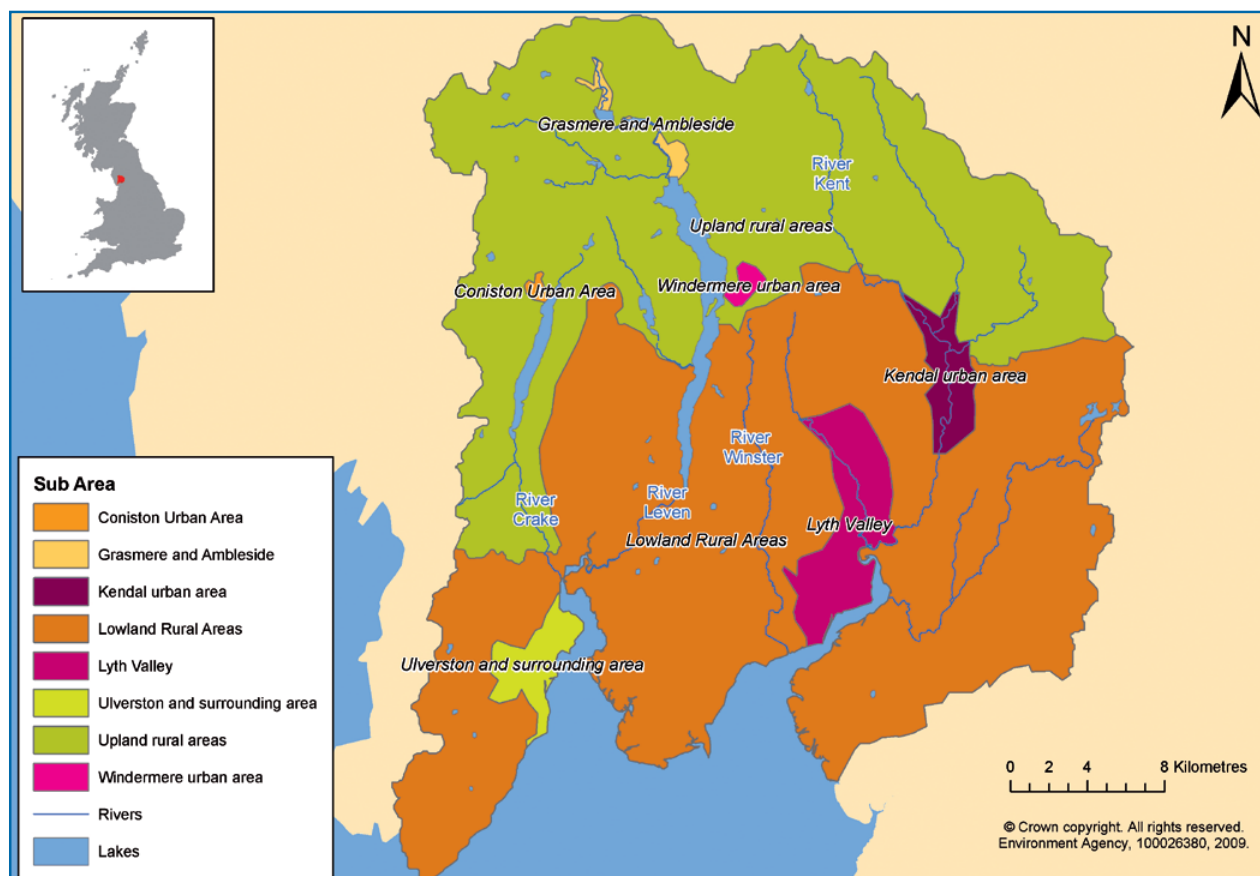


Table 3 Policy options

→ 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.

Ulverston and surrounds

Our key partners are:

Cumbria County Council

South Lakeland District Council

The issues in this sub-area

Ulverston is one of two economically important settlements in the CFMP area. Fluvial and tidal flood risk are present in this sub-area and need to be managed to avoid economic harm. There are raised defences on Town Beck and Dragley Beck which contain flows up to a 4% APE, and coastal defences which protect against a 12.5% annual probability tidal event. Dragley Beck discharges to the estuary via a tidal flap, and tide-locking can worsen fluvial flooding in Ulverston by preventing fresh water drainage. At present approximately 169 properties are at risk during a 1% APE. Climate change is expected to increase the risk of fluvial and tidal flooding and could result in up to 380 properties being at risk in the future. Flooding depths could increase by roughly 10cm.

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.

Fluvial flooding in Ulverston has the potential to affect many people and properties. Dragley Beck causes flooding due to channel incapacity, tidelocking and inadequate storage capacity. Flooding from Town Beck

is caused by inadequate culvert capacity and grid blockages. The town is regionally important, and likely to expand in future, flooding can result in major financial damages, and could impact the economy. We would like to further reduce the existing flood risk to the town from Dragley Beck and Town Beck, so that there will be less frequent and less severe flooding. Investment in flood protection will need to be combined with prudent development and redevelopment.

The key messages

- We need a better understanding of flood mechanisms and risk from Town Beck.
- A flood warning service for the properties most at risk, together with increased flood resilience and flood proofing, would lower risk to life and damage to property.
- The proper application of PPS25 and the recent Strategic Flood Risk Assessment (SFRA) are essential when Local Development Frameworks are compiled.
- Our full involvement in the Market Towns Initiative and Ulverston Canal Masterplan are essential for adequate consideration of concerns relating to flood risk.

Proposed actions to implement the preferred policy

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

- Proactive measures to maintain and improve defences, flood resistance and resilience, including review of the existing assets.
- Investigate the possibility of providing a flood warning service on Town Beck.
- Map the flow routes occupied when Town Beck is out of bank, including flood extent, depth and velocity.
- Work with the planning authority to limit development in the floodplain and major flow routes; use sustainable urban drainage systems (SuDS) or controlled discharges for new developments.



↑ Obsolete lock at Canal Foot

Kendal urban area

Our key partners are:

Cumbria County Council

South Lakeland District Council

Developers

The issues in this sub-area

Kendal is the second of two economically important settlements in the CFMP area. Fluvial flood risk could affect around 540 residential and commercial properties in a 1% APE, and this risk needs to be managed to avoid economic harm. There are raised defences along parts of the Kent which contain flows up to a 2.5% APE, and at the Mint confluence which protect against a 2% APE. On Stock Beck, a scheme provides defence against a 1% APE for 170 properties. These levels of defence will gradually decrease as climate change increases flows in future, and by 2100 we estimate around 620 properties will be at risk. There is a small amount of flood risk from surface water. Flood warning is potentially available to 1,359 properties in Kendal and Burneside. Kendal is likely to experience further development for industry and commerce in future, which could increase the existing flood risk unless planning is precautionary. The River Kent in Kendal is a designated SSSI, and there are important bridges which are Scheduled Ancient Monuments.

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.

Fluvial flooding in Kendal affects many people and properties. Despite defences, the town has been seriously flooded twice in the last five years, affecting high density housing close to the river and two large business parks at Mintsfeet and Lakeland. Kendal lies at the confluence of the Kent, Sprint and Mint, and the combined flow volume of these rivers causes flooding as the floodplain is occupied by development. Flooding in Kendal can result in major financial damages, and could impact the local economy. We would like to reduce the existing flood risk, so there will be less frequent and less severe flooding. Investment in flood protection will need to be combined with prudent development and redevelopment.

The key messages

- Reduce urban flooding in Kendal and Burneside, and retain all the available floodplain.
- The proper application of PPS25 and the recent SFRA are essential when Local Development Frameworks are compiled.
- Recommendations of the recent Kendal pre-feasibility study need to be implemented, subject to economic viability and funding constraints, which will increase protection to many properties.
- Review the level of protection as the effects of climate change become apparent.

Proposed actions to implement the preferred policy

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

- Maintain and improve the flood defence assets where appropriate, and according to recommendations in the Kendal Pre-feasibility study. Investigate options to reduce flood risk in Burneside.
- Encourage take-up of the flood warning service by residents and businesses, including extending this service to Stock Beck if feasible.
- Review the effectiveness of flood risk management works such as gravel extraction to maintain conveyance.
- Planning authorities to limit floodplain development and maximise the use of SuDS or controlled discharges wherever possible. All redevelopment to incorporate flood resilience measures.
- Investigate local schemes for flood relief on minor watercourses.



↑ Kendal from Scout Scar

Coniston urban area

Our key partners are:

Cumbria County Council

South Lakeland District Council

National Park Authority

The issues in this sub-area

Coniston is a picturesque large village on the north west shore of Coniston Water. It is a popular tourist destination. Church Beck and Yewdale Beck drain the steep fells to the north west, and run undefended through the village. Flooding can occur rapidly as both catchments are steep, with thin soil, and respond quickly to rainfall. Approximately 150 properties are at risk from a 1% APE, including a fire station, a school and two health centres. Coniston is a small settlement and the properties at risk are a significant proportion of the properties in the village. There are no raised defences or flood warnings in operation, but the channel is maintained. Climate change is likely to slightly increase the frequency of flooding in Coniston but the total number of properties at risk in the village would only slightly increase to 160.

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.

Although the number of people at risk is small, the effects of flooding on the Coniston community are considerable due to its small size and geographical isolation. The village is historic, and has grown alongside the flood risks, so that development is likely to have accommodated some of the existing problems already. Coniston, lying between two ‘rapid response’ catchments, has been categorised as being at ‘extreme risk’ of rapid inundation. This is supported by the flood history of the village. Our vision is to ensure that flood risk does not increase in future, whilst respecting Coniston’s unique and characteristic appearance and location.

The key messages

- Review the possibility of providing flood warnings as technological improvements allow.
- Maintaining river conveyance, in the village and upstream, is important in minimising flood risk. Activities which would impinge on the channels should be discouraged and prevented.
- If flood alleviation works are required in future to maintain the level of risk, detailed impact studies should be first undertaken.

Proposed actions to implement the preferred policy

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

- Investigate the provision of a flood warning service for Coniston. Ensure residents have an understanding of how to take effective action.
- Provide information on and promote the use of flood resilience and flood proofing measures.
- Review the effectiveness of flood risk management works such as gravel extraction to maintain conveyance.
- Planning authorities to limit floodplain development and maximise the use of sustainable urban drainage systems (SUDS) or controlled discharges wherever possible. All redevelopment to incorporate flood resilience measures.
- Ensure that the Local Development Framework incorporates policies which seek to relocate critical infrastructure at the end of the operational life of the building. This will improve ability to respond to flooding emergencies.
- Ensure the Local Development Framework aims for long term protection and re-creation of river corridors and floodplains, through sustainable land use and management.



↑ Coniston Fells

Grasmere and Ambleside

Our key partners are:

Cumbria County Council

South Lakeland District Council

Lake District National Park Authority

The issues in this sub-area

Grasmere and Ambleside are a village and small town in the north of the CFMP area, linked by the River Rothay and the waterbodies Grasmere and Rydal Water. Downstream of Ambleside, the Rothay flows into Lake Windermere. Flood risk in both settlements is from the Rothay, and also in Ambleside from its tributary Stock Beck (although this risk has not been confirmed by detailed modelling). Approximately 140 properties in this sub-area could be affected by a 1% APE, including eight infrastructure buildings (two sewage treatment works, electricity sub station, one school, three health centres and a fire station). Flood risk is managed with raised defences in Ambleside, of varying standards of protection, and channel and asset maintenance. There is no flood warning service. Although flooding from the Rothay is likely to occur at moderate speed, the Stock Ghyll Beck is a steep, small catchment which could flood rapidly. Climate change is expected

to increase the frequency and depth of flooding in Grasmere and Ambleside and consequently up to 230 properties could be at flood risk.

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.

Two small settlements in the Rothay Valley make up this sub area. The current flood risk management measures are limited, but of clear benefit to the people and properties. Our vision for the sub area is to continue to manage the residual flood risks by making sure that our expenditure on flood risk management is proportional to the risk to the community. If the risk of flooding increases in future, we may need to look at other ways of managing the sub area, such as land management change and flood warning. Appropriate planning is necessary to ensure future development does not bring additional flood risk issues. Compared to other sub-areas, the effects of flooding on these communities are more significant, and any measures to address flood risk must be sensitive to local aesthetics.

The key messages

- Review possibility of flood warnings for this sub-area as technology improves.
- Ensure PPS25 is applied properly, including SUDS measures.
- Regulate works affecting Stock Ghyll Beck, Greenhead Road Beck and Fisher Beck through the Land Drainage Consenting procedure, to protect channel capacity.
- Undertake detailed studies before implementing flood alleviation works, to maintain risk at the current level.

Proposed actions to implement the preferred policy

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

- Investigate feasibility of providing flood warning services to Grasmere and Ambleside, and provide residents with an awareness of how to take effective action.
- Review effectiveness of current flood risk management works, including gravel extraction – produce a System Asset Management Plan, a forward looking plan for the repair and maintenance of flood defence structures.
- Limit development in the Rothay and Stock Ghyll Beck flood plains and reduce new development run-off using SUDS or controlled discharges where possible.
- Encourage flood proofing and flood resilience by providing advice and information about getting funding for these measures.
- Ensure there are policies in the Local Development Framework which over time will seek to remove critical infrastructure from Flood Zones 2 and 3.



↑ River Rothay at Rydal Water

Windermere urban area

Our key partners are:

Cumbria County Council

South Lakeland District Council

National Park Authority

The issues in this sub-area

Windermere lies between the east shore of Lake Windermere and low hills further to the east. Flood risk is from Mill Beck, which is culverted in parts of the town and flows into the lake, and also from high lake water levels. There is some risk from surface runoff. Approximately 140 properties are at risk from a 1% APE, as well as part of a caravan site. There are no formal raised flood defences, and no flood warning service due to short lead times; flood risk management consists of channel and asset maintenance. Climate change is anticipated to increase the number of properties at risk to 210.

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.

Windermere is a popular tourist destination, but is unlikely to see any significant urban development due to its position in the National Park. The current level of risk is manageable, but the risk areas will need further measures to sustain the current level of risk to take

into account climate change. Our vision is to focus on making these areas more resilient to flooding, to minimise the economic and social harm of flooding. We need to review our current flood risk management measures and spend to ensure that we direct our efforts to the most vulnerable parts of the sub area.

The key messages

- Review possibility of flood warnings for this sub-area as technology improves.
- Ensure PPS25 is applied properly, including SuDS measures.
- Regulate works affecting Mill Beck through the Land Drainage Consenting procedure, to protect channel capacity.

Proposed actions to implement the preferred policy

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

- Investigate the feasibility of providing flood warning services to Windermere, and provide residents with an awareness of how to take effective action.
- Review the effectiveness of current flood risk management works, including gravel extraction – produce a System Asset Management Plan (SAMP).
- Limit development in the flood risk area and reduce new development runoff using SUDS or controlled discharges where possible.
- Encourage flood proofing and flood resilience by providing advice and information about getting funding for these measures.



↑ Windermere

Upland rural area

Our key partners are:

Cumbria County Council

South Lakeland District Council

Natural England

Lake District National Park

The issues in this sub-area

This policy unit is essentially rural, with little flood risk. It includes the headwaters of the Crake, Leven and Kent in the northern part of the CFMP area, and is predominantly within the Lake District National Park. Impermeable geology, thin soils and steep, narrow valleys result in rapid run-off, which creates flood risk in isolated properties and villages during extreme events. Surface water run-off may also create flood risk for some properties. There are 58 properties and seven camping and caravan sites at risk from a 1% APE. Throughout the sub-area there are over 20 km of flood defences, mainly protecting agricultural land at low return periods. There is no flood warning service, but an extensive programme of maintenance is carried out.

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.

Flood risk in this sub-area is manageable; the defences protect few properties and are overtopped at low return periods so that the floodplain is already active. The

current maintenance spend is therefore disproportionate to the risk to life. Our vision is to further reduce our involvement in the defences in this sub-area over time, via an Asset Management Plan, in order to gain economic benefits and redirect spending to other sub-areas where risk to life is greater. As this sub-area forms the flood-generating area for Kendal and other urban areas, increasing floodplain connectivity may have benefits downstream. There is also likely to be some benefit to the River Kent SSSI through reduced maintenance. Liaison with landowners and the campsites will be essential in implementing this policy.

The key messages

- Further reduce our maintenance of channels and embankments.
- A gradual reduction in maintenance is essential to prevent flood banks becoming a source of gravel and sediment to downstream areas. This would affect designated environmental sites and flood risk.
- Encourage take up of Entry and Higher Level Stewardship schemes to optimise land management for flood risk reduction.

Proposed actions to implement the preferred policy

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

- Investigate the feasibility of providing a flood warning service to the remote locations in this sub-area, provide residents with awareness of how to take effective action.
- Provide information on and promote the use of flood resilience and flood proofing measures.
- Review the effectiveness of the current flood risk management works, including gravel extraction, and prepare a SAMP for reduced activities.
- Investigate potential environmental enhancements resulting from reduced defences and naturalising watercourses.
- Influence the planning system to ensure that inappropriate development is guided away from flood risk areas and, where permitted, the risks are adequately mitigated.
- Investigate the potential flood risk management benefits of managed wetland and Higher Level Stewardship schemes at Langdale and the Kent, Sprint and Mint valleys.



↑ Longsleddale

Lowland rural area

Our key partners are:

Cumbria County Council

South Lakeland District Council

Lancaster City Council

Lake District National Park Authority

Natural England

The issues in this sub-area

This sub-area is mainly rural, with scattered small towns and settlements in the south of the CFMP area. It includes the lower catchments of the Crake, Leven and Kent, the coastal streams, and the catchments of the Bela, Winstar and Rusland Pool. Settlements include Flookburgh, Cartmel, Newby Bridge, Levens, Beetham, Silverdale, Milnthorpe, Storth, Grange-over-Sands, Arnside, Oxenholme and Staveley. Most fluvial flood risk is from small streams and minor watercourses, and there is some tidal risk. About 260 properties are at risk from the 1% annual probability fluvial event, and 110 from a 0.5% annual probability tidal event. The total number of properties at risk from river flooding alone, having considered the impact of climate change, would be in the region of 370. In some places, such as Grange-over-Sands, tide-locking can increase the risk of fluvial flooding. There may also be unidentified risk from surface water or sewer flooding. At present, there are over 20km of rural, agricultural defences, and no flood warning service.

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 is largely rural, with scattered small areas at risk of flooding. Our vision is to ensure as much of the natural floodplain as possible is restored in order to provide storage, and to direct spending to the areas where life is most at risk. In most of the settlements, the measures which are in place to manage flood risk are adequate, and most of the maintenance is already directed at channels and assets in these rather than in the uninhabited areas. This policy formalises our existing approach to flood risk management in this sub-area. The anticipated effects of climate change warrant continued action in these settlements.

The key messages

- Review the possibility of providing flood warnings in high risk parts of the sub-area, as technology improves.
- Maintenance efforts and spending need to be focussed on the main towns and villages, with reduced activity in the uninhabited areas.
- PPS25 has an important role in managing flood risk in the lowland area through appropriate surface water management, housing layouts, etc.

Proposed actions to implement the preferred policy

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

- Investigate the feasibility of providing a flood warning service to the risk areas, particularly Staveley, Ings, Newby Bridge, Holme and the campsites, as technology improves. Also encourage the use of flood resilience and flood-proofing.
- Review current flood risk management works, including gravel extraction. The level of works should maintain the current protection in urban areas, but maybe reduced in rural areas. Consider small scale schemes to relieve localised flooding due to poor conveyance in urban areas.
- Ensure that the Local Development Framework includes policies which work towards the long-term protection and re-creation of river corridors through sustainable land use and management. Also work with the planning authorities to limit development in flood plains and reduce runoff using SuDS or controlled discharges where possible.
- Work in partnership with Natural England and Defra to link flood risk benefit to agricultural subsidies by catchment sensitive farming practices and Environmental Stewardship Schemes.



↑ The Kent Viaduct from Arnside

Lyth valley

Our key partners are:

Cumbria County Council

South Lakeland District Council

NFU

RSPB

Cumbria Wildlife Trust

Natural England

The issues in this sub-area

This sub-area covers the lower part of the River Gilpin and its tributaries. This low-lying land has a complex drainage network including pumps and embanked watercourses to maintain suitable conditions for agriculture. Maintenance is costly, and limits the available area of natural wetland habitat such as reed beds, saltmarsh and fen. There are many raised river defences, and also coastal defences. There is no flood warning service. There is no significant fluvial risk to people here, but without the defences large areas of agricultural land would be inundated by a 1% APE. We estimate 2 properties are at risk of flooding in a 1% fluvial event, a further property is at risk by the year 2100, taking into account climate change. A further 50 properties are at risk of tidal flooding in a 0.5% annual probability tidal event.

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 is largely rural with a very limited number of properties at risk of flooding in a 1% APE. The spending on artificial drainage and maintenance is disproportionate to the benefits arising from carrying out these works. Our vision is to implement an economically and environmentally sustainable flood risk management regime that provides, wherever possible, opportunities for the restoration of the floodplain. This will provide environmental and amenity benefits, whilst taking into account the needs of the agricultural community.

The key messages

- Expenditure needs to be proportional to risk. Reducing spending in this sub-area will allow resources to be focused on other areas where risk to life is greater.
- Altering the maintenance regime in the Lyth Valley will provide opportunities for habitat creation, particularly if Entry and Higher Level Stewardship schemes offer sufficient incentives.
- We anticipate that agriculture would become less intensive and less reliant on the work of the Environment Agency to maintain artificially low water levels.

Proposed actions to implement the preferred policy

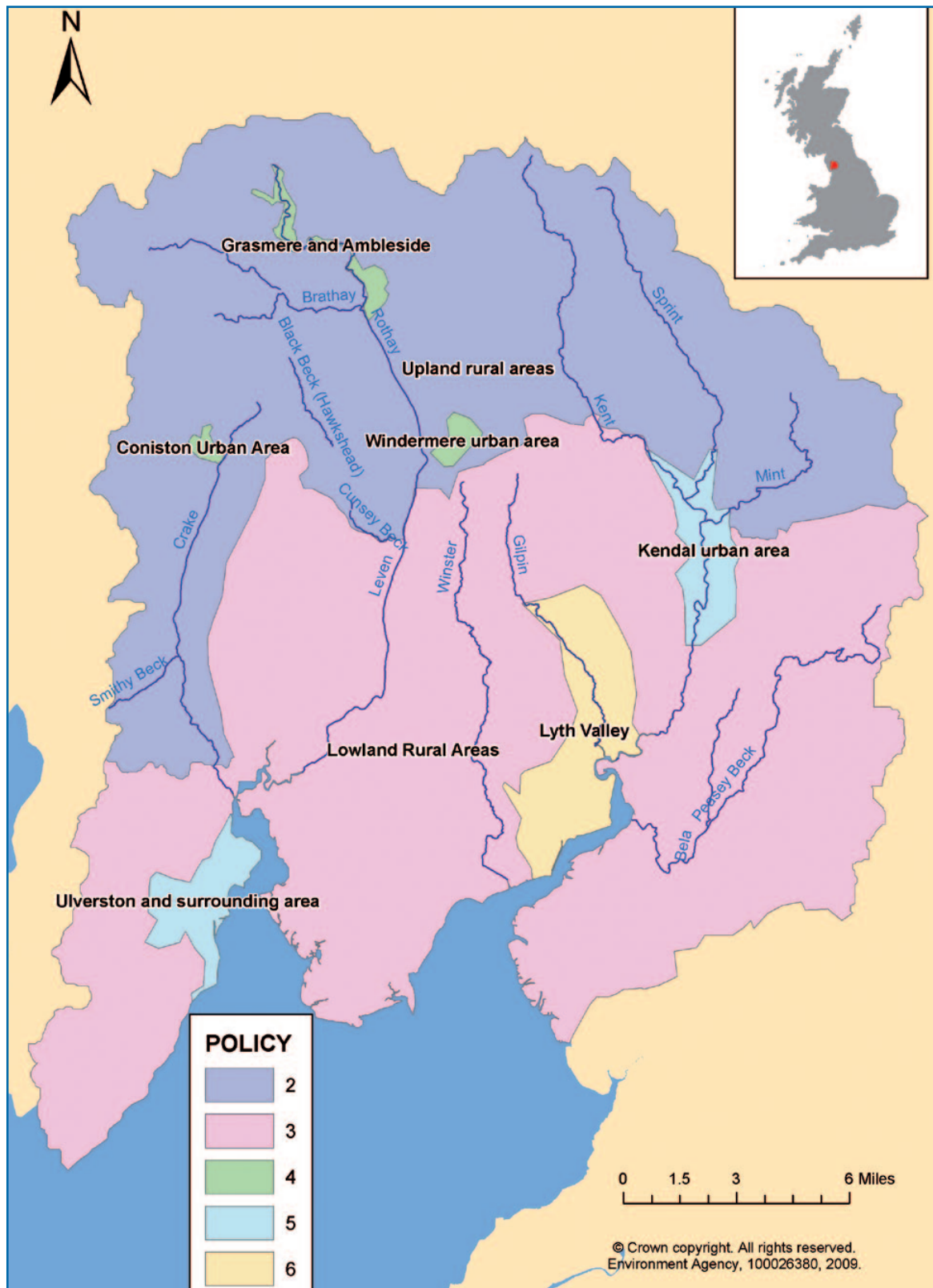
The essential actions to achieve our policy aim are listed below:

- Work in partnership with others to link flood risk benefit to agricultural subsidies by catchment sensitive farming practices and Environmental Stewardship Schemes.
- Review the effectiveness of current flood risk management works and investigate the effect on water levels by a decrease in maintenance in the Lyth valley.
- Ensure the Local Development Framework includes policies which work towards the long-term protection and restoration of river corridors through sustainable land use and management.
- Assess the feasibility of creating UK BAP habitats, floodplain grazing marsh, wet woodland and reedbeds if pumping and associated maintenance were reduced.



↑ The Lyth Valley from Scout Scar

Map of CFMP policies



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