Our approach to River Maintenance

River maintenance in Cumbria

October 2011

River maintenance

Keeping rivers clear from the build up of gravel, plants and debris forms an important part of the Environment Agency's river maintenance plan, in order to maintain the required standards of flood protection in priority flood risk areas, such as Cockermouth, Keswick and Grange. In Cockermouth, the river channels are inspected annually to identify any maintenance work required. Upstream of areas at flood risk we monitor the river capacity and bank condition and we work to remove trees and other debris that could cause blockages downstream. This year we are maintaining 49 kilometres of river in the Derwent and Cocker catchments. Full details of our annual maintenance programme for this year can be viewed on our website.

Removing gravel, plants and debris

We use a risk based approach for the removal of gravel in priority flood risk areas. In these key locations, the river channels are surveyed annually to determine what work is required to maintain the capacity of the river.

The survey information is used in mathematical river modelling to identify where gravel shoals have reached a level that will affect flood risk. We usually survey rivers in the early spring as this enables us to identify where gravel has accumulated as a result of high river flows, mostly experienced during the winter months. This work forms the basis of our annual maintenance programme which is carried out during the summer months when work has the least impact on the river environment. We also carry out additional survey work after high river flows, if there has been a significant movement of gravel, to ensure that the channel capacity has not been reduced at any time of year.

We use this evidence to help form our approach to managing gravel in order to maintain the required standards of flood protection for people and property. In 2011 we have removed gravel from the River Greta at Keswick and the River Derwent at Grange. The gravel shoals within Cockermouth were last surveyed in March 2011 and are not currently affecting flood risk so no gravel removal is planned at the moment. This will be reviewed in March 2012.

Understanding flood risk in Cockermouth

Flood risk in Cockermouth is managed by a combination of maintaining the capacity of the river channel and the construction of additional flood defences in some locations throughout the town. The Cockermouth Flood Defence Scheme completed in 1999 reduced flood risk to a 1% chance of flooding in any one year (a 1 in 100 year standard of protection).

We base our understanding of flood risk on our long-term river flow records. We use this information to assess the scale of flood flows using the latest water industry recognised techniques developed by the UK's leading scientists and researchers.

As we gather more river level data every year, our estimate of the 1 in 100 year flow and therefore the percentage chance of flooding may change. This is especially the case if there has been a significant flood. Cockermouth is no exception to this. When the flood defence scheme was built in 1999, the 1 in 100 year flow estimate was 198 cumecs (the cumec is a measure of flow rate and means cubic metres per second). Following the major flood in 2005, this was recalculated at 263 cumecs and led to us carrying out work to raise the Waterloo Street flood defences in 2008. Following the significant flooding in 2009, caused by unprecedented rainfall, our revised river level data increased the 1 in 100 year flow estimate to 373 cumecs - a considerable 41% increase. As a comparison, this volume of water approximately equates to the volume of four double-decker buses through the river every second.

This significant increase has subsequently changed the way we need to manage flood risk in Cockermouth to ensure homes and businesses are protected to a 1% chance of flooding in any one year (a 1 in 100 year standard of protection). This is why we are currently developing plans for a new flood risk management scheme.

Our best estimate of the 2009 peak flood flow is approximately 580 cumecs. This equates to a flood with a 0.18% chance of happening in any one year (a flood expected to occur once in 550 years).

Reducing flood risk in Cockermouth

We are currently in the process of designing a new £4.4 million flood alleviation scheme for Cockermouth to reduce flood risk to a 1% chance of flooding in any one year. This will be achieved by a combination of raised flood defences in some locations throughout the town as well as gravel removal. We originally estimated this to cost £5.3 million but have now reduced this to £4.4 million by making savings through design and construction.

The required standard of flood protection cannot be achieved solely by the removal of gravel and deepening the river channel. For example, to achieve the additional channel capacity required by dredging alone, river modelling has indicated that the entire width of the river bed over a two kilometre stretch of the River Derwent would need to be dredged to between a one and two metre depth. The River Cocker would also need to be deepened by approximately one metre over a distance of 700 metres up to Cocker Bridge. This equates to the removal of approximately 215,000 tonnes of gravel on the River Derwent and 30,000 tonnes on the River Cocker. Using the same principle, to contain the November 2009 peak flood flow of 580 cumecs, the river bed would have to be dredged to approximately 3.5 metres in depth over a distance of eight kilometres. This equates to the removal of approximately two million tonnes of gravel.

Dredging the rivers to the levels in either of the two scenarios above would require significant work to demonstrate that it was technically feasible to ensure that bridge foundations, river retaining walls and river banks would remain structurally stable and it is highly unlikely that such options would ever be economically or environmentally sustainable.

Recent gravel removal work in Cockermouth

In Cockermouth, gravel is naturally deposited upstream and downstream of Gote Bridge as it is on a bend in the river. In the 1930's, three side arches were added to Gote Bridge on the inside of the river bend. The river either side of the bridge was also widened, to enable high river flows through these arches. For these reasons, there will always be a shoal of gravel located at this point in the river.

Since 2005, the Cockermouth area has been surveyed and managed to provide the required standard of flood protection (a 1% chance of flooding in any one year, or a 1 in 100 year standard of protection). A small increase in the gravel shoal was identified in 2008 after the unusually high summer flows and gravel was removed in January 2009. This meant the required standard of flood protection for the town was maintained prior to the November 2009 floods.

In November 2009, West Cumbria was subject to unprecedented and record rainfall, which fell on already saturated ground. The river levels were so high and the flooding was so significant, that any removal of additional gravel above our routine maintenance programme would not have prevented the flooding.

The flood of November 2009 deposited a large quantity of gravel in the river channel near Gote Bridge. In response, we carried out emergency works to remove 12,000 tonnes of gravel, plants and debris from the river in January 2010. We also took this opportunity to remove more gravel than had been present before the flood and maintain the channel capacity. This additional work was done to help us reduce flood risk following the significant increase in our 100 year flow estimates following the flood.

What are the next steps?

It is really important we continue work with the community on our plans to reduce flood risk to the town to address any issues and concerns before moving forward with our proposals.

We are holding an exhibition during November 2011 in partnership with the Cockermouth Flood Action Group. Here we will be showing plans and designs for each part of the proposed flood risk management scheme to enable the local community to get a real understanding of our plans to reduce flood risk, as well as seeing first hand how our proposed flood defences will look and if any changes are needed. We welcome all feedback and are happy to answer any queries or concerns, so please do get in touch.

We are planning to complete the detailed design and hope to have all the necessary planning permissions in place by April 2012, so that we can start construction if the necessary funding for the scheme is secured.

Contact us

For more information, advice, or to raise any concerns you may have about our work to reduce flood risk in Cockermouth, please contact:
Adrian Bacon, Cumbria Flood Risk Management Engineer on 01768 215811
or, Keith Roddy, Project Manager, on 01925 542782.
Email : floodriskcockermouth@environment-agency.gov.uk
Visit us at www.environment-agency.gov.uk/cockermouth