

## 2007 Summer floods

### Investment and funding – a tale of two cities

**The summer floods in June and July 2007 highlighted the high levels of flood risk many people throughout the country face. Oxford and Leeds are just two cities that were affected. Although they face different challenges to provide sustainable flood risk management, they both need significant investment. This case study explains the stories of these two cities and highlights the need for increased investment to address flood risk.**



**Floods in Leeds city centre in 2000**

**FUNDING FOR FLOOD RISK** - The severe flooding that affected much of the country in June and July followed what we now know to be the wettest May to July since records began in 1766. Whilst thousands of homes and businesses were flooded across the country, many communities were protected by our flood defences, some for the first time following recent investments. Across England and Wales, our flood defences include over 17,400 structures and 22,800 kilometres of coast and riverbank defences. Over the last five years our capital investment programme has reduced the risk of coastal and river flooding to a further 155,000 properties. With over two million properties at risk of flooding, considerable challenges remain.

We have permissive powers to provide flood defences in England and Wales. This means that whilst we invest significant amounts of money in managing flood risk each year, by law we do not have to provide protection to a given standard, or at all. Typical standards of protection refer to the chance of a particular flood event being exceeded in any one year. These are expressed as either a ratio (1 in 100) or a percentage (one per cent). Current policy gives indicative standards of protection from river flooding of between 1 in 50 and 1 in 200 for urban areas.

Government funding for flood risk management has increased over the last three spending reviews, doubling since 2000. Need has also grown and with funding limited by annual budgets, we have to prioritise our investment in areas of greatest flood risk. We also have to carefully assess potential schemes on their technical merits, their costs and benefits, and wider impacts on the environment. As highlighted this summer, Leeds and Oxford face significant flood risk, but both compete for limited national funds. Here we tell their stories.

### LEEDS

**A HISTORY OF FLOODING** - On 25 June 2007 heavy rain fell in the Leeds area, with many places receiving an average month's rain in just 24 hours. Wyke Beck in Leeds, along with many other rivers and watercourses across the region, were unable to cope and overtopped their banks, flooding properties in the Halton area. The River Aire overtopped its banks in central Leeds and property in the Calls and Brewery Wharf areas was flooded.

Leeds has flooded in the past. In 2000, isolated parts of Leeds flooded and the city came close to experiencing widespread flooding. Over 250 houses and 50 businesses flooded despite the peak flood levels having a relatively low return period, around a 1 in 25 (or four per cent)

chance of flooding. Leeds has flooded nine times since 1768. The biggest flood 'The Great Flood of Leeds' in 1866 claimed twenty lives.

**FUTURE CHALLENGES** - We have identified that there are around 2,000 houses and over 1,000 businesses at risk of flooding from a 1 in 200 (0.5 per cent) flood event. There are no formal flood defences through Leeds, and we do not know if the existing informal defences would provide adequate protection during less extreme events. In 2000 we introduced temporary measures to reinforce the informal defences. In some places the standard of protection is less than a 1 in 5 (20 per cent) chance of flooding. We do operate a flood warning system for the city, but we are only able to provide a few hours warning due to the speed of flood flows from the upstream catchment.

Leeds is a major economic centre in the North of England and significant flooding in the city centre would be catastrophic. It could affect the economic regeneration of the city. Potential changes in our climate and weather patterns, as a result of climate change, look likely to cause more severe storms and heavier rains. Based on our work to date, this could increase peak flood levels through the city by over half a metre, in the longer term. This could put many homes and businesses in the city at greater risk of flooding. If we do nothing, the financial effects of climate change will be significant. The leader of Leeds City Council, Mark Harris recognises the need for a flood defence scheme. He said in the Yorkshire Post:

**'We understand that the Environment Agency does have enormous pressures from around the country for flood defences, with limited funds, but at the same time we believe the situation in Leeds is very serious and needs immediate attention'.**

**OUR PLANS** - A study of potential schemes to reduce the flood risk in Leeds is currently underway. The floods in 2000 highlighted the scale of the problem facing the city. Since then, we have carried out extensive studies to better understand and find solutions to flooding from the River Aire. We built a computer model of the river system around Leeds and have used this

to assess the different ways of reducing flood risk. In 2004 we started work on a flood risk management strategy for the area, which recommended investment in the city's flood defences. We are currently assessing the different ways of reducing flood risk. This includes reviewing in detail the costs and benefits of the different options, as well as their technical and wider social and environmental merits. We expect to finalise our plans for a flood risk management scheme for Leeds in 2009.

Budget constraints have slowed progress on the Leeds scheme in the past. Investment decisions are currently based on a 'priority score' process that ranks schemes around the country by a range of factors, to target spending where it is needed most. For the last few years, the priority score for Leeds has been below the national threshold for major investment. Looking forward, we are likely to conclude that raised defences are needed though the city centre together with upstream storage to cope with the effects of climate change. Managing flood risk in Leeds is vital for social, environmental and economic sustainability. We anticipate this will cost £80 million and, if funding is approved, construction could start by 2011.

**FUNDING OUR PLANS** - Given the risk to Leeds and the economy of Yorkshire as a whole, we will need to seek funding from a number of sources. We will seek much of the cost from Government, and we will need to spread construction out over several years. Funding also depends on Leeds achieving the threshold priority score for investment. We will need to work closely with Leeds City Council, the Regional Development Agency Yorkshire Forward and developers to secure other funding, since the defences will protect much of the commercial heart of the city. However, defences in the city centre alone may cost £50 million, which will mean everyone involved will need to make a major commitment. Further investment to increase upstream flood storage will be needed to secure the city against future climate change. A scheme of this size places heavy pressure on the overall flood risk management budget.

## **OXFORD**

**A HISTORY OF FLOODING** - On Thursday 19 July heavy rain fell over large areas of central and southern England, becoming even heavier the following day over Oxfordshire. The rain swelled smaller rivers and streams in the catchment above Oxford, and water levels in

the rivers Thames and Cherwell rose as a result, overtopping their banks. A total of 168 properties were flooded in Oxford, Osney, Binsey, Botley Road and Wolvercote. Other properties were affected, and people living in the Osney Island area were evacuated. Major roads and the London to Oxford railway were closed for more than five days. This had a significant effect on many local businesses.



**Flooding in Oxford in 2007**

Paul Smith of our waterways team helped coordinate events and saw first hand how our lock keepers and staff worked closely with the emergency services, to keep people safe and informed during the floods. In one example our staff helped local pharmacist Pupinder Ghatora deliver essential medicines to vulnerable members of the community. He said:

**‘By coming to our aid, the Environment Agency helped to save lives, and it helped us keep the business going. The floods really hit us hard - we are only just getting back on our feet now.’**

Oxford flooded in December 2000, when 160 properties were affected, and again in January 2003, when 123 properties flooded. Both of these floods resulted from relatively low return period events, with around a 1 in 15 (seven per cent) chance of flooding in any one year. The worst flooding in recent history was in March 1947, when more than 3,000 properties were flooded. At present, areas in Oxford suffer from a high level of flood risk. The current minimum standard of protection provided in Oxford is around a 1 in 5 (20 per cent) chance of flooding.

**FUTURE CHALLENGES** - Oxford city centre is situated on relatively high ground between the major rivers, but there are several urban areas that encroach into the floodplain. This puts over 3,000 properties at risk. Flooding is caused by groundwater, run off from urban areas and man made restrictions in the floodplain. The large number of minor watercourses to the west of the city also causes flooding during high flows. The potential for climate change to cause more severe storms and heavier rains could raise flood levels and put homes and businesses in the city at a greater risk of flooding.

Developing a flood risk management solution for Oxford will not be easy. The area is very environmentally sensitive in terms of its ecological, archaeological, heritage and landscape value. The floodplain is criss-crossed by numerous secondary watercourses, both natural and man-made, which provide an environment rich in wildlife. There are several locally, nationally and internationally designated environmental sites. Developing a flood risk management approach that preserves and enhances these features is a major challenge.

**OUR PLANS** - To understand the causes of flood risk in the Upper Thames area and to recommend the best ways of managing this risk in the longer term, we have developed a Catchment Flood Management Plan (CFMP). This identifies Oxford as a major flood risk area and recommends that we should look at ways of better managing flood risk in the city. Since 2002 we have been working on a flood risk management strategy for the city, and have carried out extensive studies and assessments. These studies are costly and time-consuming but are vital in getting the right, sustainable solution for managing flood risk in Oxford.

Our studies show that there is a sound business case for reducing flood risk, based on increasing the conveyance capacity of the floodplain to the west of Oxford. We are testing this option on technical merit, economic and environmental grounds. We are now also assessing a wide range of other flood risk management measures, including upstream storage, land use management change and flood resilience. These measures are likely to be aimed at reducing the impacts of climate change. We expect to finalise our plans for a strategic flood risk management scheme by 2009. However, we recognise that we will need a public inquiry because of the potential constraints, sensitivities and high cost of the scheme. On this basis, construction may not start until 2015.

**FUNDING OUR PLANS** - The potential cost of a strategic scheme for Oxford could be as much as £150 million. Oxford currently falls short of the priority score threshold for major capital investment in the near future. The scale of investment needed would represent a major proportion of the flood risk management capital budget and commitments from partners in Oxford would also be required.

## NATIONAL FUNDING ISSUES

**GROWING DEMANDS** - In England and Wales, around 11 per cent of land, some 1.7 million hectares and over two million properties could flood from rivers or the sea. Of these, up to half a million households face a significant risk of flooding. Leeds and Oxford are just two places that are competing for funding. Availability of funding is a major factor in taking these schemes forward. Studies for both cities have identified high cost solutions that could be feasible within the next ten years. However, under existing funding scenarios, there will be considerable competition for funding.

We face many other challenging investment decisions. As well as competing flood risk management schemes, there are a number of other funding pressures. We spend £150 million each year on maintaining the main rivers we are responsible for. We are currently assessing the level of investment needed to bring our assets up to a fit for purpose standard.

**FUTURE CHALLENGES** - As well as tackling current levels of flood risk, we must also consider how climate change will affect us in the longer term. These questions were tackled in the Government's Foresight Future Flooding report. The report predicts that climate change will be an important factor in increasing flood risk, and that both the number of people at risk from flooding and the costs of flood damage will rise significantly. It concludes that we must spend more on flood and coastal defence to protect against the impacts of climate change. We must also continue to invest in and provide flood defences for properties in areas at high risk of flooding as part of the Government's agreement with the insurance industry.

**THE WAY FORWARD** - With greater pressure on flood risk management funds, we need to consider new approaches. Building new flood defences is not the only answer. We are also considering alternatives that tackle flood risk for individual properties and businesses at a more local level. Measures such as improved flood

resilience may provide a cost effective way of reducing flood risk, but they are currently more difficult to appraise and implement.

We need to improve the way that flood risk management funding is prioritised. We are working with Defra to introduce new outcome measures, which have a broader set of measures than the current priority scoring system. These should make it clearer what benefits Government would like to see from investment in the flood and coastal erosion risk management programme. They will provide a more consistent and fair approach between different types of risk, locations and operating authorities. Outcome measures will therefore, help determine investment decisions.

We also need to plan our flood risk management investments more strategically. With a limited supply of money to fund flood risk management activities in any one year, we need a fair system to agree how and where money should be allocated. We have a number of tools to do this. We use the National Flood Risk Assessment on a strategic level to determine where flood risk is greatest and where we need to intervene most.

We carry out more detailed assessments of flood risk for rivers under Catchment Flood Management Plans and for the sea under Shoreline Management Plans. These plans help define where and when investment will be most effective. To implement these plans we need to be sure that future funding will be available .

**BRIGHT FUTURE** - In July, Environment Secretary Hilary Benn announced budgets that would reach at least £650 million in 2008, increasing to £700 million in 2009 and eventually reaching £800 million by 2010. We warmly welcome these increases. We recommend that such increases should continue through the next spending review, reaching over £1 billion a year. We are currently assessing our longer term investment needs. With typical returns on capital investments on flood risk management projects at a ratio of 6:1, there is strong incentive for this level of public spending.

**SUMMARY** - The severe flooding our country experienced during June and July this year is a stark reminder of the high level of flood risk that many people face. Climate change looks set to increase this risk, affecting more people and damaging more property.

Cities such as Leeds and Oxford, amongst many others, face increasing flood risk. Major investment is needed to reduce flood risk to make these places sustainable in economic, social and environmental terms.

Flood risk management investment has grown consistently since 2000 and recent Government commitments go further. Increases in funding need to be maintained to effectively tackle rising flood risk in the future.

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For more information go to:

[www.environment-agency.gov.uk/2007summerfloods/](http://www.environment-agency.gov.uk/2007summerfloods/)