Managing flood and coastal erosion risks in England:

1 April 2012 to 31 March 2013

Report by the Environment Agency

We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people's lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including Government, business, local authorities, other agencies, civil society groups and the communities we serve.

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Executive summary

2012-13 was an extraordinary year. Multiple, widespread and major floods have caused serious damage to over 7,000 homes and businesses across England. However the value of investment in flood risk reduction has been clearly demonstrated as over 200,000 properties were saved from flooding.

Important new flood risk management schemes have been completed this year, reducing risk to some 59,000 properties and supporting economic growth opportunities. The new approach to partnership funding has brought in £8.9 million of additional investment towards projects in 2012-13 from both the public and private sectors. The Government has committed £120 million in extra resources for the coming two years to ensure that new capital schemes are built earlier than previously planned and to provide opportunities for local economic growth.

Most of the provisions of the Flood and Water Management Act 2010 have now been implemented. Partners are fully engaged in building capacity, understanding risks and planning to deal with them. All but four Lead Local Flood Authorities (LLFAs) are now working on their local flood strategies. Five have been completed and many more are at the consultation stage. The Environment Agency also worked closely with Welsh Government, the Countryside Council for Wales and the Forestry Commission Wales in the creation of Natural Resources Wales, which took on lead responsibility for managing flood and coastal erosion risk in Wales from 1 April 2013.

Investment in flood and coastal erosion risk management structures and their maintenance took place with opportunities for environmental improvement in mind. Many new schemes included environment enhancing features. Over £9 million of investment was devoted to environmental gain and creating habitat, including 47 fish and eel passes.

Mapping and modelling risk continues to be an essential part of flood and coastal erosion risk management, as is improving and extending the reach of flood warnings. During the year, Floodline Warnings Direct continued to build and now covers some 1.2 million properties, with 62% of those at high risk. The Environment Agency website was further developed to provide real time information on river levels and increased use of social media enabled partners to share up-to-the-minute information about flood incidents.

This report describes the extensive work undertaken in the past year by all risk management authorities. Significant progress has been made towards achieving the objectives of the National Flood and Coastal Erosion Risk Management Strategy for England[1]. There are numerous examples from around the country that highlight how partners have worked together, with communities, to help deliver the five key aims of the National Strategy.

Dr Paul Leinster CBE

Chief Executive

Contents

1. Introduction

Flood and coastal erosion risk management (FCERM) in England is largely carried out by risk management authorities working in partnership. These authorities are the Environment Agency, Lead Local Flood Authorities (LLFAs), district councils, Internal Drainage Boards (IDBs), water and sewerage companies, and highway authorities. This report provides a summary of flood and coastal erosion risk management in England, as required under section 18 of the Flood and Water Management Act 2010. It covers the period 1 April 2012 to 31 March 2013 and looks across the activities of all risk management authorities and other key partner organisations.

1.1 Scale of flood and coastal erosion risk

The Environment Agency estimates that 2.4 million properties[2] in England are at risk of flooding from rivers or the sea. There are also an estimated 3.8 million properties[3] susceptible to surface water flooding, including around one million that are also at risk of flooding from rivers or the sea. Revised figures, based on the new updated flood map for surface water, will be available later this year.

Coastal erosion and landslides affect less land area than floods but can cause permanent loss of property and infrastructure, with significant impact on local economies outside the area directly affected. Approximately 700 properties in England are vulnerable to coastal erosion over the next 20 years and a further 2,000 may become vulnerable over the next 50 years.

1.2 Progress in implementing legislation

Details about which sections of the Flood and Water Management Act 2010 have been implemented and when, and those which remain outstanding are provided in Defra's implementation progress report[4].

The Environment Agency is working on the second stage of the Flood Risk Regulations 2009, to produce hazard and risk maps for rivers, the sea and large raised reservoirs for England. During this year, updated mapping for surface water flooding was produced and shared with LLFAs and other risk management authorities for review. Maps are expected to be published in December 2013.

Risk management authorities were consulted on an approach to developing Flood Risk Management Plans, required under the Regulations. The consultation covered the scale of plans, plan integration across flood sources, using existing plans (Shoreline Management Plans and Catchment Flood Management Plans) and working together. Responses are being considered and proposals for a way forward developed.

1.3 Flood and coastal erosion risk management in Wales

Work has been carried out during this year to support the creation of Natural Resources Wales (NRW) on 1 April 2013, a new organisation bringing together Environment Agency Wales, the Countryside Council for Wales and the Forestry Commission Wales. NRW is now responsible for all flood and coastal erosion risk management activities previously carried out by the Environment Agency. Legislation has been put in place to ensure that the Environment Agency and NRW are able to work closely together in cross-border areas. The Environment Agency has also supported the separation of IT systems, data and services.

2. Flooding and coastal erosion this year

This year saw some of the driest and wettest conditions on record in England. The challenges for risk management authorities have been considerable. Some places flooded on a number of occasions and the heavy rainfall and saturated ground impeded recovery, put a strain on people, households and businesses, and stretched the resources of all the organisations involved in the response. Flood risk management assets protected over 200,000 properties from flooding including some communities that were flooded in the last major floods in 2007.

2.1 Properties affected this year

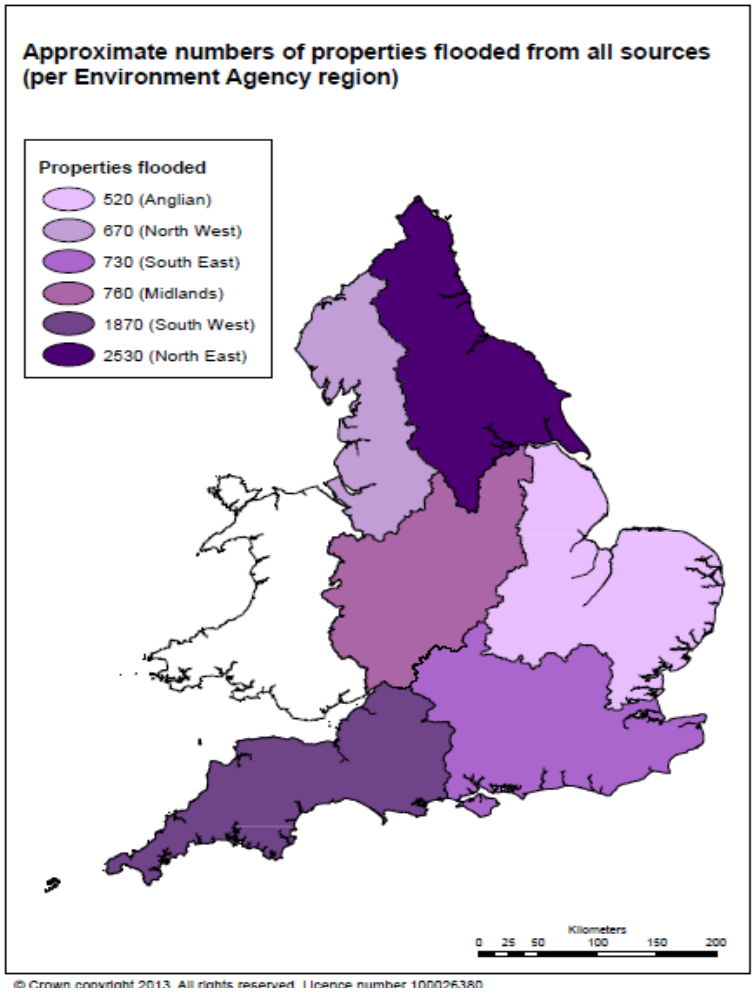


Figure 1 Approximate numbers of properties flooded in 2012-13 from all sources

The Flood Forecasting Centre (FFC) provided information to the emergency responders on all sources of flooding (river, coastal, groundwater and surface water).

The Environment Agency collates the number of properties flooded, and the source of the flooding where possible, based on reports from risk management authorities, Category 1 and 2 responders (as described under the Civil Contingencies Act 2004) and the public during a flood. The figures give a good indication of how widespread the flooding has been across England during the year.

Over 7,000 properties were reported to the Environment Agency as being flooded in England during 2012-13, the majority of them in the North East and South West of the country (see figure 1).

Identifying the sources of flooding can be difficult because sources often combine. Flooding from rivers and the sea is much better understood than flooding from other sources: surface water, groundwater and sewer flooding, and where flooding happens in combination. These are currently recorded by the Environment Agency as 'other'.

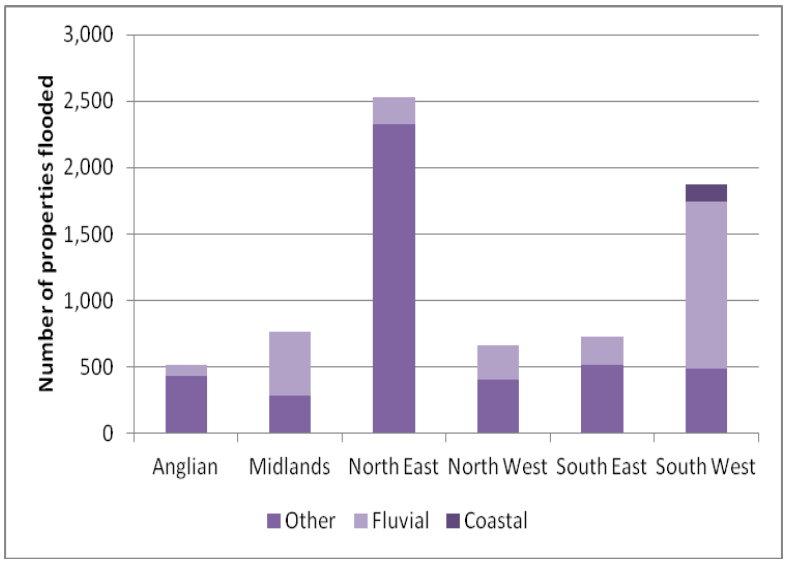


Figure 2 Numbers of properties flooded in 2012-13 by Environment Agency Region and source of flooding

Improvements continue to be made in understanding local flood risk and in recording flooded property numbers.

The numbers of properties flooded during 2012-13, broken down by the source of flooding, are set out in Figure 2.

The particularly wet conditions experienced last year contributed to an increase in coastal landslides. Comprehensive data on the numbers of properties affected by coastal erosion is not collected nationally. However, district authorities, the Environment Agency and the National Oceanography Centre are helping the British Geological Survey collate details of these incidents. In the South West, the British Geological Survey confirmed a fivefold increase in coastal landslips compared to previous years.

2.2 Agricultural land

The impacts of the 2012-13 flooding on agricultural land are hard to quantify, but are extensive. Satellite pictures show that between the 28th and 30th November 2012, approximately 43,000 hectares of agricultural land - about 0.4% of all agricultural land in England - were under water. In particular, the Somerset Levels and Moors, the Hampshire Avon, the Thames Valley, and areas in Lancashire and the North East of England were badly affected.

Of the total agricultural land in England, approximately 1.3 million hectares (14%) are within flood risk areas. 550,000 hectares (42%) of this is grade 1 or 2 agricultural land. More than 98% of the arable land in England is either protected by flood defences or has no risk of flooding from rivers or the sea.

Farming practices are generally resilient to winter floods. However, flooding in the spring and summer has the biggest impact on farms in the flood plain with loss of grass and arable crops. Some of the direct impacts were:

- heavily saturated soils which prevented drilling winter cereals (land left fallow until the spring)
- milking cows and cattle being housed indoors a month earlier than normal (impact on winter fodder stocks)
- wet soils encouraging slugs resulting in more pesticide usage
- blocked local roads restricting access for farm workers, animal movements, milk collection and feed delivery

A recent project to identify the additional benefits of flood and coastal erosion risk management schemes suggested that schemes completed during 2012-13 provided improved protection to around 76,000 hectares of agricultural land. Although only an indicative figure, this shows the benefit of such work to rural communities.

Somerset Levels

In late April 2012, heavy rain fell over Somerset for prolonged periods. Rivers responded to the rainfall and the River Tone reached its highest level since December 2000. On 29 April 2012, Curry and Hay Moor flood storage reservoir started to fill. At the peak, 11 million cubic metres of floodwater were stored on the moors to help protect properties in Taunton, Bridgwater and the local villages. Flooding of the moors to this extent in May is unusual. As soon as water levels started to fall in the Rivers Tone and Parrett, the Environment Agency started pumping to drain the moors.

In the first seventeen days of pumping, over 10.5 million cubic metres of water were removed. Using twelve permanent pumps and eighteen large mobile, pumps it was possible to remove the water faster than ever before from the Curry, Hay, Salt and North Moor areas.

Despite best efforts to remove the water quickly, the quality of the last 0.5 million cubic metres of floodwater started to deteriorate rapidly. Dissolved oxygen levels fell due to stagnation of the standing flood water, rotting field vegetation, rising temperatures and nutrient-rich field run-off. This meant the remaining flood water had to be treated with hydrogen peroxide as it was pumped, and the rate of pumping had to be reduced and carefully controlled to avoid the risk of major environmental damage (for example, widespread fish kills and damage to the aquatic environment).

Once temperatures fell, the Environment Agency was able to increase pumping and remove the remaining standing waters. However, due to repeat flooding, flood water was not totally evacuated from these Moors until February 2013. This resulted in the loss of spring grass and crops for many farmers, over an area of approximately 7km^2, and delays to crop harvesting and planting.

Curry and Hay Moor are also Sites of Special Scientific Interest (SSSI), part of the Somerset Levels and Moors Special Protection Area, and a Ramsar site. The Environment Agency managed water levels and evacuated flood waters to ensure that the impact on the environment was minimised.

2.3 Impacts on wildlife from the 2012-13 floods

There were clear, direct impacts of the flooding in 2012-13 on a number of nesting wading bird species. For example, there was a total failure of nesting waders on the Ouse Washes and a reduction in numbers of nesting waders on the Nene Washes. Of particular concern was that no Limosa race Black-tailed Godwits bred in 2012 on the Nene Washes, which normally supports the majority of the UK breeding population.

2.4 Reservoirs

The Environment Agency is responsible, under the Reservoirs Act 1975, for regulating the 1,749 third-party-owned large flood risk raised reservoirs in England. It also operates 195 large raised reservoirs in England, mainly for flood risk management purposes. The Reservoirs Act aims to ensure that dams and reservoirs are safely built and maintained to prevent structural failure, and the severe flooding that could result. The biennial report on Environment Agency regulatory and operational activities under the Reservoirs Act for the period 1 April 2011 to 31 March 2013 will be published later this year.

In 2012-13, there were 22 reports of dams and reservoirs at potentially imminent risk of structural failure. This compares to around seven in an average year. The relatively high number of incidents in 2012-13 was a direct result of the high rainfall and fluvial floods. The incidents were effectively managed and appropriate action was taken, so that although some properties were flooded downstream of reservoirs, none were flooded as a result of structural failure of a reservoir.

Flood storage, Leybourne Avenue, Bournemouth

Wessex Water and Bournemouth Borough Council have worked together to reduce surface water flooding in Leybourne Avenue in Bournemouth, protecting 12 properties. A natural valley makes the area susceptible to flooding, and plans were proposed, supported by residents, to develop 450m^3 of above-ground water storage. A 115m earth embankment was constructed in March 2013 by Wessex Water and will be landscaped and maintained by Bournemouth Borough Council

2.5 Response to flooding in 2012-13

The Flood Forecasting Centre's Flood Guidance Statements gave early indications to all risk management authorities of the potential for flooding. Social media was used to help keep the public informed and provide advice on what they should do to protect themselves in the event of imminent flooding.

The Environment Agency's response to managing flood and coastal erosion risk follows a 'think big, act early' principle, evolved as a result of experience from previous flood events and exercises and recommendations from the Pitt Review and Exercise Watermark.

Upper Calder Valley multi-agency flood response

Following the rapid, widespread and repeated flooding in the Upper Calder Valley during summer 2012, the Environment Agency, Calderdale Council, Yorkshire Water, the National Flood Forum and the Canal and River Trust have been working together with local communities, during the initial phase of the recovery process.

In September 2012, Calderdale Council established a Flood Recovery and Resilience team, to coordinate and lead the ongoing multi-agency recovery. During October and November, the Environment Agency supported the National Flood Forum and Calderdale Council at a number of public drop-in events, to provide information about the floods, the recovery work and building flood resilience. Around 30 flood wardens were recruited and Flood Action Groups were subsequently started in the three mains towns of Todmorden, Hebden Bridge and Mytholmroyd.

In phase 2, starting in April 2013, activity will be concentrated on ongoing repair and improvement work and further assessment and evidence gathering. One of the key tasks will be the development of a detailed Flood Investment Plan.

Under section 19 of the Flood and Water Management Act 2010, Lead Local Flood Authorities (LLFAs) are required to carry out investigations into flooding in their areas, and these will help improve the understanding of local flood risk. Across 96 of the 152 LLFAs, over 1,700 investigations have been carried out, with many LLFAs undertaking multiple investigations, including 32 LLFAs with more than ten.

Flooding investigations, West Sussex

Environment Agency staff have been working closely with West Sussex County Council on the production of their formal investigation report into the June 2012 floods, supplying much of the data and statistical evidence. They liaised with West Sussex County Council and other key local risk management authorities (Arun, Adur, and Chichester District Councils and Southern Water) to define and agree actions arising from the investigation report, and have since been supporting the delivery of these outcomes. This partnership working is helping to reassure the affected communities, that the relevant authorities are working together and not in isolation.

2.6 Estimating the economic impact of flooding in 2012-13

The economic impact of all the events this year has been estimated using a rapid assessment method, giving an initial indicative forecast of the economic impacts as a range of figures. The uncertainty range will narrow as more data is gathered.

The economic damage from flooding of residential and non-residential properties is estimated to be between about £200 million and £277 million. The other major impacts, such as disruption to transport and infrastructure, and indirect impacts on communities, businesses and the local economy, are much less certain. These can only be given in very broad terms, but could bring the total economic impacts through the year to between about £260 million and £620 million.

Were it not for flood defences, many more properties would have been flooded and the economic impacts would have been much greater. The economic benefit of protecting properties, based on estimates of properties protected during specific flood events, is estimated to have been at least £3 billion, and up to around £7.5 billion if wider and indirect benefits are included.

3. Understanding and managing risk

Understanding climate change and its impacts continues to develop. In its July 2012 progress report, the Committee on Climate Change's Adaptation Sub Committee[5] stated that climate change is likely to increase the chance of flooding and the rate of coastal erosion by the 2080s, although the potential scale of the impact remains uncertain. Current evidence[6] suggests that increases in rainfall intensity and the frequency of high river flows are likely by the 2080s, leading to an increased risk of surface water and river flooding in the UK. There is greater certainty that sea levels will rise, leading to an increased risk of coastal flooding and erosion.

As a result, flood damages and associated costs are expected to increase across the UK, according to the Government's Climate Change Risk Assessment[7]. Today, around 490,000 properties face a significant risk of flooding. If investment is kept at current levels (in 'cash terms'), there will be 350,000 more properties, of which 280,000 will be residential, with a significant chance of flooding by 2035.

3.1 Local flood risk strategies

Under the Flood and Water Management Act 2010, Lead Local Flood Authorities (LLFAs) are required to develop, maintain, apply and monitor strategies for managing local flood risk (from surface water, groundwater and ordinary watercourses) in their areas. Local strategies describe the local flood risk in a particular area and set out the actions that will be taken to manage that risk.

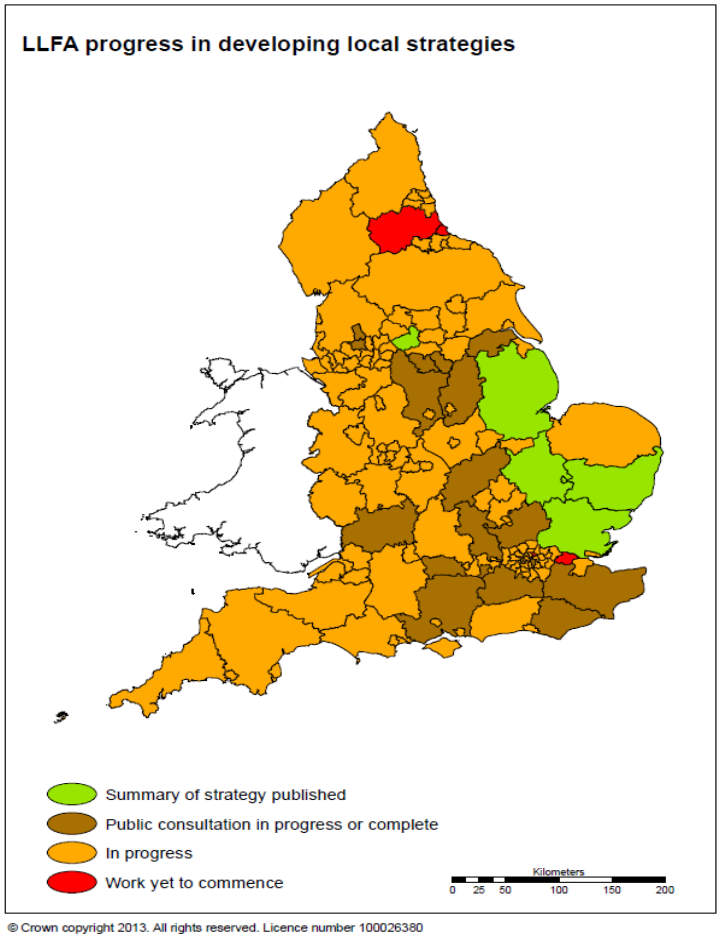


Figure 3 Lead Local Flood Authority progress in developing local strategies

Feedback from all 152 LLFAs in England shows that as of 31 March 2013, five had completed and published strategies; 19 were at the consultation stage; 124 were working on their strategies and four had yet to start work on their strategies. This shows some improvement from last year, when only seven had begun or completed consultation and no LLFAs were at the publishing stage. Progress is summarised in figure 3.

Although the legislation set out no deadline for producing local strategies, the Government's expectation is that they will be completed and published in a 'reasonable period of time' from the commencement of the legislation, which was in October 2010. It is therefore likely that the majority of outstanding strategies will be completed and published during 2013/14.

3.2 Spatial Planning

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied, recognising the importance of considering flood and coastal erosion risk in planning. The Department for Communities and Local Government (CLG) published technical guidance[8] in support of this, which is currently being reviewed. The Environment Agency published a quick guide[9] covering flood and coastal erosion risk which will be reviewed when new technical guidance is issued by Government.

The Environment Agency is a statutory consultee for planning applications (except for minor development) in areas at risk of flooding from rivers and the sea (Flood Zones 2 and 3[10]) and large developments in Flood Zone 1 (where flooding from rivers and the sea is very unlikely). The Environment Agency works in partnership with local planning authorities and advises developers on planning consultations in high risk areas. Details of the number of planning applications on which the Environment Agency was consulted for detailed flood risk advice during this year are shown in Table 1 below:

Number of planning applications the Environment Agency was consulted on for detailed flood risk advice	Number of initial objections on flood risk grounds	Percentage of applications initially objected to	Number of sustained objections (following engagement with local planning authorities and developers)	Percentage of applications to which objections were sustained (following engagement)
8,760	2,638	30%	618	7%

Table 1 Environment Agency responses when providing detailed flood risk advice in 2012-13

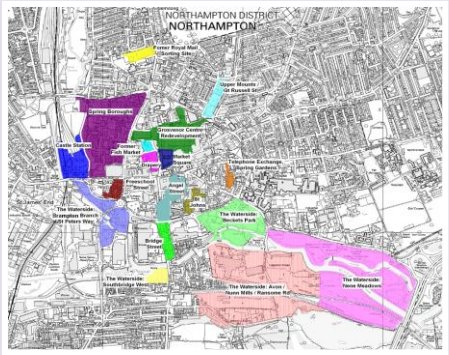
Across all development types, 2012-13 is the seventh year in succession in which over 95% of planning applications (where the outcomes are known) were decided in line with Environment Agency flood risk advice. Of the 68,903 new residential units within planning applications on which the Environment Agency has been notified of the decision, over 99% were decided in line with Environment Agency flood risk advice.

Of the 34 planning appeals where flood risk was an issue, 31 were either dismissed or allowed with conditions which fully addressed the Environment Agency's flood risk concerns. The remaining three were overruled. The Secretary of State for Communities and Local Government has powers to call in major development applications in areas at risk of flooding. These powers were not exercised during this year.

Northampton Drainage Plan

The Northampton Drainage Plan is a partnership project for the regeneration of Northampton, supporting the Waterside Enterprise Zone and promoting efficient use of existing infrastructure. It is led by Northampton Borough Council, in partnership with Anglian Water, the Environment Agency and Northamptonshire County Council.

Northampton has high levels of proposed growth in an area that is already at high risk of river and surface water flooding. The plan will secure, through planning policy, the separation of surface water flows from the combined system in redevelopments. This will help to reduce the volumes of water pumped and treated, operational carbon, sewer flooding risks and pollution incidents. As a result, it will contribute to meeting Water Framework Directive objectives and climate change adaptation in Northampton.



Published in August 2012, the drainage plan recommendations have been incorporated into Northampton Borough Council's Central Area Action Plan (January 2013). The Planning Inspectorate has recognised the work as best practice. Developers are also supportive of the recommendations and these are reflected in planning applications submitted to the Council.

3.3 Improvements in flood forecasting

This year saw the publication of the first Environment Agency/ Met Office Joint Flood Forecasting Plan, which integrates new products and services into the flood forecasting service. This has helped improve the radar rainfall data used within flood forecasting models, extending the rainfall forecast input to five days from the previous 36 hours, helping forecasters describe uncertainty in their forecasts. The coastal forecasting service is taking advantage of improvements in the availability of wind and wave data to provide responders with an earlier forecast of potentially damaging storms.

Flooding in small, rapid response catchments was a feature of several of the floods of 2012. Although difficult to predict and warn for, the experience gained has been used to develop a national standard approach to forecasting for these catchments, using the latest radar rainfall forecasts, and warning responders and communities earlier.

Integrated flood risk modelling in Liverpool

Liverpool City Council wanted a better understanding of the local drainage system to develop a long-term management plan for its key flood risk management assets. Interconnectivity between the culverted watercourses and public sewerage system meant there were substantial benefits if an integrated model could be developed.

The Council successfully applied for central Government funding and commissioned United Utilities to develop an integrated model based on their existing sewer model. Potential catchment solutions consist of surface water management improvements, culvert rehabilitation and optimisation of the sewerage and watercourse infrastructure within the Liverpool City Council area. This information will also inform development and regeneration plans for the City as well as multi-agency incident response planning. Data collection began in November 2012 and was completed in February 2013. The project is now in the modelling and mapping phase and is due for completion in July 2013.

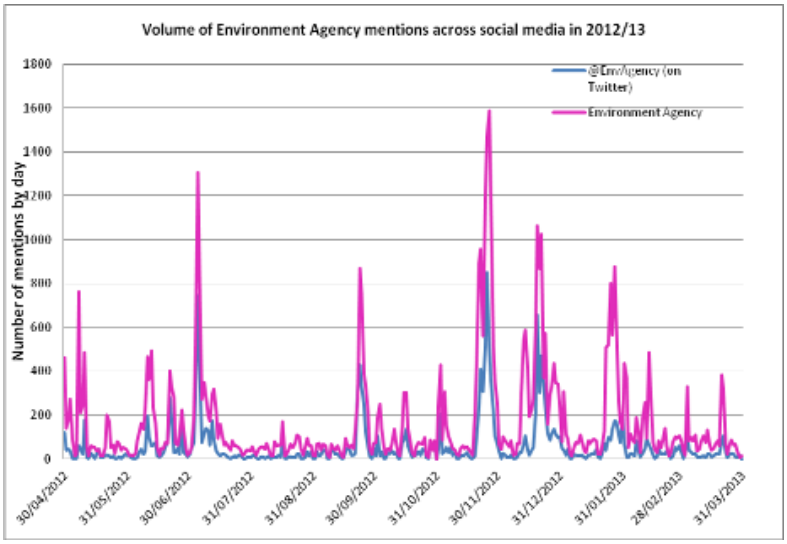
3.4 Warnings and alerts

In 2012-13, nearly 62% of homes and businesses at the highest risk of flooding were able to receive a direct flood warning service from the Environment Agency, an increase of 48% since April 2009. Over 655,000 of these properties have been added through an opt-out approach. The autumn 2012 Flood Awareness Campaign prompted over 2,600 new customers to register voluntarily for flood warning services and over 6,500 existing customers to add an email address.

During 2012-13, a new Live Flood Warning Map[11] became available on the Environment Agency website showing where the latest flood warnings are in force. In addition, customers can now enter their postcode and access all the relevant flood information for their location on one page, including flood warnings, river / sea levels and flood risk maps, enabling people to better prepare for flooding and to help save lives.

The Environment Agency and Met Office developed a Flood Widget[12] for the Met Office website, capturing reports of flooding and photos from the public and using Flickr to archive historic flood photos[13].

3.5 Using social media to warn and inform



The use of social media to engage with the public on flood and coastal erosion risk management is increasing. During flooding incidents, mentions of the Environment Agency increased by over 1,000% and staff monitored networks and responded (see figure 4). 2,000 messages were shared during the November floods resulting in 120,000 visits to the Environment Agency's website in one week alone.

Figure 4 Volume of Environment Agency mentions across social media in 2012-13

Social media supported a campaign to increase sign-up to the Environment Agency's flood warning service. It generated the highest ever recruitment of people to the service in one day - 1,275 on 2 November 2012 - and a 240% increase in social media referrals to the Environment Agency website. In November 2012 alone, there were nearly 18 million hits on the flood pages, out of a total of 60 million hits for the 2012 calendar year. In December 2012, over 300 additional websites were carrying flood warning information, including those for community flood groups, local authorities and national newspapers.

3.6 Preparing for major coastal flooding

The Government's 2012 National Risk Register[14] identifies a major coastal flood as one of the most significant threats facing the UK. On 31 January 2013, events were held to commemorate the 1953 floods, in which 307 people died along the east coast. The south and west coasts are also at risk of significant and widespread flooding. Such events have a low probability of happening, but a very high impact when they do happen.

Whichever coastline is affected by major coastal flooding, local emergency responders would require national assistance to move people to safety, protect key infrastructure and restore communities to normality. A national Coastal Flooding Group was established in October 2012 to review the role and preparedness of the Government. Its work will be incorporated into the National Flood Emergency Framework for England[15] in autumn 2013.

On the east coast, where the risk is highest, local authorities and emergency services have co-operated to share good practice and develop effective emergency response plans. They launched the East Coast Flood Emergency Framework on 31 January 2013. Enhanced flood hazard mapping, a computer model to assess coastal flood impacts up to five days in advance, and arrangements to repair damaged coastal flood defences rapidly are some of the improvements being implemented.

3.7 Property-level flood protection and community resilience

Defra and the Environment Agency have worked to encourage risk management authorities, homeowners and businesses to invest in property-level flood protection measures. To help them develop the knowledge and skills to use them effectively, training workshops have been held for local authorities and an e-learning module has been developed. Open days at the flood product test centre and an online discussion forum hosted by the Local Government Association have also taken place.

The Environment Agency's protect your property from flooding[16] website pages have been updated to include a new interactive flood house to show how and where flood products can help. A new post-installation 'Flood Risk Report' can help insurers take property-level flood protection measures into account. Early learning and recommendations on the performance of property-level protection during this year have been shared with local authorities and within the Environment Agency.

A review of the grant scheme showed that some communities had taken additional measures to increase their resilience to flooding. To explore this further, Defra developed a £4 million 'pathfinder' scheme to help local authorities and Blackburn, Buckinghamshire, Calderdale, Cornwall, Devon, Liverpool, Northamptonshire, Rochdale, Slough, Southampton, Swindon, Warwickshire and West Sussex submitted successful bids for funding.

Bin Brook property-level protection

Property-level protection measures installed in 2011 had their first real test during the significant flooding of 2012, and passed with flying colours.

The Bin Brook is located in the city of Cambridge and has a history of flooding. A bypass channel was constructed in 1978 but some properties, particularly those on Gough Way, continued to be affected. In 2001, 38 properties were flooded.

In 2011, 26 homes received property-level protection products, following an Environment Agency-led project. These products were used on a number of occasions during 2012 and successfully protected properties. When a flood warning was issued for the area, Environment Agency staff helped with the installation of products, supporting work by the active local residents association, who have developed a flood plan.

3.8 Insurance

Defra, the Environment Agency, the insurance industry and the National Flood Forum have worked together to help people living in flood risk areas understand the benefits of home insurance and access affordable insurance cover. A new guide, obtaining flood insurance in high risk areas[17] was published in July 2012.

Environment Agency flood risk data is available to the public, risk management authorities, insurers and others, and work continues to raise awareness of the data and understand the needs of users.

4. Increasing investment, supporting growth

4.1 Investment

During 2012-13, the Environment Agency invested a total of £585 million on flood and coastal erosion risk management in England. Of this, £296.5 million was spent on capital investment, including £29.5 million distributed to local authorities and Internal Drainage Boards (IDBs). Defra provided a total of £540.5 million in flood and coastal erosion risk management grant-in-aid, including £26 million in one-off funds.

Other sources of investment included £30.4 million in local levy provided by local authorities to the twelve Regional Flood and Coastal Committees, £8.9 million in external contributions towards capital projects and £17.1 million of other flood and coastal erosion risk management income.

In the Autumn Statement, the Government allocated an extra £120 million for flood defences in England during the current spending review period to March 2015. As well as accelerating the construction of around 50 schemes, protecting around 60,000 homes, the extra funds will also help bring forward schemes specifically designed to facilitate local economic growth, providing up to £1 billion in economic growth benefits.

There was 100% take-up of the available £60,000 funding for Coastal Erosion Assistance Grants to local authorities, administered by the Environment Agency. The grants were issued to assist with demolition costs where properties are at imminent risk from coastal erosion.

During 2012-13 the Environment Agency saved £17.1 million through efficiencies in delivering schemes through improved design, engineering and procurement.

Nottingham Flood Alleviation Scheme

In September 2012 the Nottingham Flood Alleviation Scheme was officially opened by Owen Paterson MP, Secretary of State for Environment, Food and Rural Affairs and Lord Chris Smith, Environment Agency Chairman.

The scheme stretches along a 27km length of the River Trent from Sawley to Colwick and protects 16,000 homes, businesses, public buildings, local infrastructure and 235 hectares of major industrial land. It is one of the biggest individual inland flood risk management schemes ever built in terms of properties protected.

Major environmental improvements were undertaken as part of the scheme, including the creation of nearly seven hectares of new, high quality habitat in and around the Attenborough Nature Reserve. Facilities have also been provided to help the public better enjoy the natural environment.

The scheme was funded by FCRM grant and led by the Environment Agency, working closely with the local community, Nottingham City Council, Natural England and other local partners.

Large capital projects completed during 2012-13 have whole life benefits of £7.1 billion against whole life costs of £736 million, a ratio of 9.7 to 1. Taking into account other capital expenditure over the spending review, the overall programme benefit to cost ratio is 8.1 to 1.

4.2 Asset condition and maintenance

Flood and coastal erosion risk management is achieved through the building of new defences and through the maintenance and management of existing structures.

The Environment Agency maintains 7,000 km of defences on rivers, including walls, embankments, bridge abutments, demountable defences, quays and flood gates; 1,000 km of coastal defences including cliffs, dunes and beaches; 22,600 structures including bridges, instrumentation for measuring flow, weirs, screens, fish and eel passes and outfalls and 39,000 km of channels including culverts. Third parties, including local authorities, IDBs and private riparian owners, are responsible for over 9,600 structures and 1,700km of raised defences.

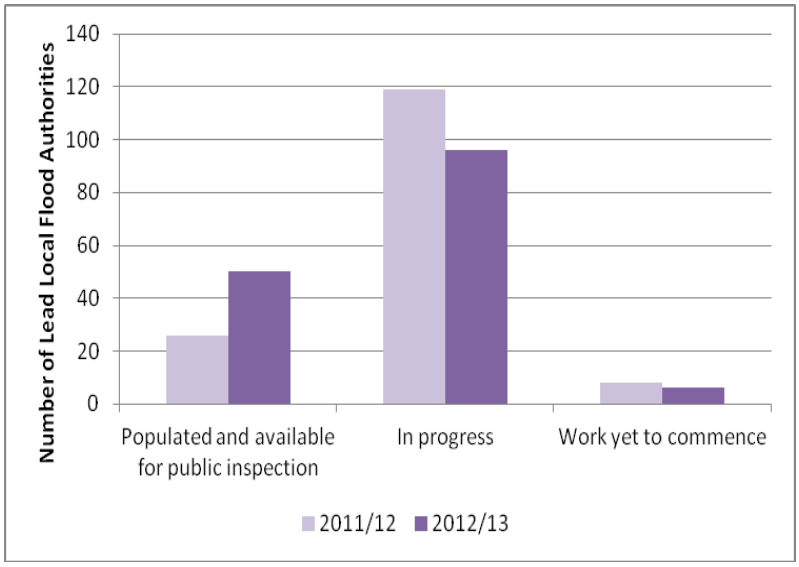


Figure 5 Lead Local Flood Authority progress in developing asset registers

Of 152 LLFAs, 50 (33%) now report that they have a register of structures and features which are likely to have a significant effect on flood risk in their areas. Ninety-six have begun working on a register and only six have yet to start work. Progress against last year is summarised in Figure 5.

The condition of flood risk structures is managed through a programme of inspections, maintenance and capital investment programmes. As a result, 97.9% of structures in high-consequence systems are at or above target condition, the equivalent figure for third party structures is 96.5%.

The Environment Agency's asset maintenance protocol, revised during this year, sets out the approach to maintaining flood and coastal erosion risk management structures in England. It is an important part of the National Flood and Coastal Erosion Risk Management Strategy and will help ensure a consistent approach in working to support land owners when identifying which assets are no longer economic to maintain.

4.3 Implementing partnership funding principles

In May 2012, the Environment Agency published principles for allocating funding, as part of the implementation of Defra's new partnership funding policy. The national capital programme is now founded on partnership funding principles, whereby beneficiaries of schemes increasingly contribute towards their costs. The process for allocating grants and approaches to project appraisal have been published, and a legal and financial framework established for managing contributions to Environment Agency-led projects.

Emerging investment data indicates that local communities, risk management authorities and their partners are embracing the new ways of working. Contributions to Environment Agency-led projects from sources other than local levy totalled £8.9 million in 2012-13, an increase of £3.5 million from the previous year. As the new systems become established, these figures are expected to increase.

Partnership funding is broadening the investment to protect communities from flood and coastal erosion risks, enabling more schemes to go ahead. Local funding innovations include the use of community infrastructure levy, private sector investment and European funding, complementing in-kind and financial contributions by local authorities. Establishing networks of professional expertise and sharing good practice will be a focus for 2013 and beyond.

Lower Dove flood risk management scheme

The start of construction on the multi-million pound Lower Dove flood risk management scheme was celebrated in December 2012 when around 30 partner organisations attended a tree planting ceremony at the Dove Valley Nature Reserve. The £5.1 million flood risk management scheme is being developed with significant financial support from local landowners, industry and community partners, including Nestlé UK, which has made a £1.65 million contribution to the scheme.

The Environment Agency has worked closely with local communities throughout the development of the scheme, which will provide around 5km of new and improved flood defences. Once complete, the Lower Dove scheme will reduce the risk of flooding to more than 1,600 properties in Scropton, Hatton and Egginton in South Derbyshire.

4.4 Performance against targets

In 2012-13, the risk from flooding from all sources and from coastal erosion was reduced for over 59,200 households as a result of work carried out by the Environment Agency, local authorities and Internal Drainage Boards (IDBs).Of the households benefitting, over 27,700 were in the highest risk category and over 4,100 were in areas of significant economic deprivation. Forecasts show that the Environment Agency is on track to complete schemes which will reduce flood and coastal erosion risk to 165,000 households by 2014-15, against their Corporate Plan target of 145,000.

5. FCERM and the environment

5.1 Habitat creation

Under the EU Habitats and Birds Directives, where habitat is lost or damaged as a result of flood and coastal erosion risk management, or coastal squeeze resulting from climate change, new habitat must be created to compensate for or replace it. Building and improving flood and coastal risk management schemes provides the opportunity to protect and improve important natural features and habitats. Schemes currently in progress, such as Steart in the South West and Medmerry in the South East, will ultimately provide large areas of habitat. Further habitat creation schemes will be developed.

River Basin Management Plans set out a wide range of actions for flood risk management authorities. During 2012-13, 807 investigations were completed to assess the impacts of physical modifications by flood risk management on the water environment and what needs to be done about them. In addition, over £3 million was spent completing more than 50 EU Water Framework Directive[18] (WFD) related projects, such as creating channel meanders to reduce flood risk whilst improving water vole habitat, thereby improving the ecological condition of water bodies. A number of these were in collaboration with others, including the RSPB, Wildlife Trusts and Natural England.

RSPB Beckingham Marshes

Beckingham Marshes is an Environment Agency owned flood storage area in the Trent valley which helps to reduce flood risk in the Lincolnshire town of Gainsborough.

The work to create pools, scrapes and wet ditches was funded by the Heritage Lottery Fund, Waste Recycling Environmental Ltd (WREN), Natural England, Environment Agency, RSPB and Biffa Award and supported by local RSPB and community volunteers and RSPB expertise.

The new reserve has nearly 100 large wet ponds, 4km of ditches and three wind pumps to circulate water around the wetland features. This will provide ideal conditions for breeding wading birds, water voles, dragonflies, amphibians and aquatic plant life. In winter, the flooded fields will also attract wildfowl. A new visitor trail and wetland at Beckingham Marshes was opened in September 2012.

Shoreline Management Plans (SMPs) suggest that about 2,200 hectares of European site and Biodiversity Action Plan habitat could be lost by 2025 on the coast. Rivers and wetlands are also impacted. WFD evidence indicates 13% of river water bodies are failing to achieve good ecological status due to flood protection measures.

Last year, the Environment Agency created or improved 369 hectares of water-dependent habitat, 0.6 hectares of intertidal habitat, and 8 km of designated rivers to help meet WFD objectives. In addition, the Environment Agency improved nearly 28 km of rivers through river restoration activities to support flood risk management this year.

Overall, flood and coastal erosion risk management work contributed to 83 projects to restore and create biodiversity - a total investment of nearly £9.76 million. External partners contributed £2.42 million to this work.

5.2 Eel Regulations

Across Western Europe, eel numbers have dropped very sharply in recent decades, partly because man-made structures such as weirs and dams are stopping young eels reaching the freshwater habitats where they mature. The Eel (England & Wales) Regulations 2009 require the owners of assets (including flood risk management authorities) to improve the passage of eels. During the year, the Environment Agency invested over £1.55 million on ensuring that new capital schemes improved fish and eel passage and screens, whilst creating new passages and screens around existing structures. This improved 47 Environment Agency owned structures in the North East, North West, Midlands and Anglian regions. Awareness has been raised amongst risk management authorities about the Eel Regulations and requirements for compliance.

5.3 Land use planning

Identifying areas for land use change to take account of existing flood risk management and land use strategies, plans and projects, could help mitigate flooding and reduce diffuse pollution. As an example, the Environment Agency in the Midlands has been working with the Forestry Commission, Natural England and the Woodlands Trust to identify priority areas for woodland creation and improved management of existing woodlands to help reduce flood risk.

5.4 Reducing carbon emissions

The Environment Agency has an overarching aim to reduce its reliance on non-renewable energy to power the necessary pumping activities it carries out. Many pumping stations have been switched from diesel to electricity. However, the focus on reducing carbon remains unchanged and the Environment Agency will, by the end of 2013, have saved £1.3 million in operational costs (and 7,300 tonnes of CO_2) since 2006. The aim is to reduce carbon use across the business by 33% by 2015.

A significant proportion of the carbon produced by the Environment Agency's flood risk management activities is generated by its 320 pumping stations in England. Pumping, and therefore carbon emissions, increases during flood events when additional drainage is required. 2012-13 was a particularly challenging year in this regard.

Reducing reliance on electricity for pumping is a key part of reducing carbon use. Spring 2012 saw the use of a pumping station efficiency tool, which has already produced successful results. One pumping station assessment identified ways of reducing carbon emissions by around 32%.

In February 2012, the Environment Agency launched a competition to stimulate innovative solutions to carbon reduction, seeking a zero carbon pumping system capable of pumping 40 litres per second at a head of up to five metres. From 13 submissions, two companies have been contracted to manufacture full scale prototypes.

6. Working in partnership

Joint projects, training, research and development are key in helping risk management authorities and partners share information and good practice.

6.1 Risk management authorities

Regional Flood and Coastal Committees (RFCCs)

RFCCs[19] guide flood and coastal erosion risk management activities within catchments and along the coast, advising on and approving programmes of work for their areas, and raising local monies (including local levies) to fund priority projects. RFCCs raised £30.4 million in local levies for 2012-13.

With a majority membership of local authority councillors, the RFCCs ensure a measure of local democratic accountability and independence. In the past year, environmental and, where appropriate, coastal members have been appointed to Committees to balance expertise across all aspects of flood and coastal erosion risk management.

Banbury Flood Alleviation Scheme

In October 2012, the £17 million Banbury flood alleviation scheme was completed. The scheme reduces flood risk to more than 500 properties in the Banbury area, including Banbury Railway Station and Banbury United Football Club. Since Banbury flooded in 1998, flooding 160 residential properties and businesses, the Environment Agency has been working on a comprehensive scheme to protect the town from flooding. Prior to partnership funding the scheme did not qualify for FDGiA so a decision was made by Thames RFCC and partners to save up local levy over a number of years and seek external contributions. The scheme would not have gone ahead without the drive, support, enthusiasm and financial support given by the RFCC, together with the district council, Thames Water, Network Rail and Prodrive.

Local authorities and the Local Government Association (LGA)

Lead Local Flood Authorities (LLFAs) are responsible for local flood risk (from surface water, groundwater and ordinary watercourses). They are also developing local flood risk strategies, carrying out investigations into flood events and producing asset registers. Coastal unitary and district authorities also retain lead responsibility for managing coastal erosion risk.

The LGA[20] is a membership organisation working on behalf of over 400 member councils across England and Wales. They have worked to promote the work of local authorities in responding to the significant challenges presented by flooding during this year and to share lessons learned. The LGA's online flood portal[21], partly funded by the Capacity Programme (see section 6.5), remains an important resource for sharing information and good practice.

Internal Drainage Boards (IDBs) and the Association of Drainage Authorities[22] (ADA)

Co-operative management of water levels has helped manage drought and reduced flood risk to a large number of people and businesses – almost 10% of the total area of England lies within an IDB Drainage District. Many of the activities carried out by IDBs benefit the wider community, for example in reducing flood risk to urban areas.

The nine months to December 2012, the wettest on record, caused significant damage within IDB Districts with oversaturated soils causing many banks to collapse, blocking watercourses and causing overspill onto adjoining land. As a result, maintenance costs have increased significantly.

Districts reliant on pumping stations (over 500 pumping stations are used today) have had to keep stations pumping for extended periods to cope with the flood waters, increasing maintenance and operating costs. Witham Fourth IDB, a 100% pumped catchment, has seen energy bills increase by £57,000 this year, larger than its 1.25% (£40,000) drainage rate increase. Partnership working and funding are therefore crucial as water level management, land drainage and flooding cannot be managed in isolation.

Water and sewerage companies

The ten water and sewerage companies that operate in England are responsible for managing the risks from surface water and combined sewer systems, and have played an essential role in managing flood risk over the last year. Their people, skills and equipment made a real difference to communities during the 2012-13 floods and supported a co-ordinated response and recovery, for example by tankering wastewater to reduce flood risk and providing pumping equipment to partners and managing reservoir levels.

As risk management authorities, they have helped develop a shared understanding of flood risk and supported LLFAs in delivering their duties under the Flood and Water Management Act 2010. 2012-13 saw good examples of companies contributing to the design and construction of schemes, as well as flood risk and investment planning.

Local flood investigation, Helmdon, Northamptonshire

Northamptonshire LLFA, in partnership with Anglian Water and Helmdon Parish Council, are working to identify the causes of flooding in Helmdon in 2012. The existing drainage systems and watercourses were in a poor state of repair and unable to cope, causing water to flow to other areas. Drainage systems were not able to manage the quantity of water experienced.

Work identified as part of the investigation process is already underway. Anglian Water has identified and fixed a collapsed surface water sewer, and carried out disconnection work on an alternative section of surface water sewer to help provide additional capacity within the network. Work is also ongoing with local partners to identify and disconnect streams, springs and land drainage that enter the sewerage network, and to restore open watercourses and ditches to take these disconnected flows.

Highway authorities

The authorities responsible for operating, maintaining and improving England's road network are: the county or unitary authority for a particular area; and the Highways Agency[23], an executive agency of the Department for Transport (DfT).

In 2012-13, 1,270 flooding incidents were reported on the strategic road network, ranging from minor events to full closures of up to three days on major routes, for example on the A1 in North Yorkshire in September 2012. It is estimated that 17% of the strategic road network is vulnerable to flooding, of which 55% is at high risk. Work is currently underway to identify the cost of flooding to the Highways Agency and road users, and to develop strategies for responding to flood events and incident response, in conjunction with Local Resilience Forums.

6.2 Other key partners

Flood Forecasting Centre (FFC)

The FFC[24] continues to develop as a centre of expertise for hydrometeorology. It continues to strengthen links with the European Flood Awareness System and now receives alerts directly for the UK. It looks to extend links and further develop international relationships with other centres – sharing best practice and learning opportunities - all co-ordinated under the overarching strategies of both the Met Office and the Environment Agency.

Network Rail

Network Rail[25] owns and operates Britain's rail infrastructure. It runs, maintains and develops Britain's rail tracks, signalling, bridges, tunnels, level crossings, viaducts and 17 key stations.

The severe flooding events in 2012-13 caused significant damage to rail infrastructure and disrupted services, highlighting issues of the network's current and future resilience to extreme flooding. The company is working to improve its detailed understanding of current and future risks, and also supports the development of flood and coastal erosion risk management schemes and strategies which impact on rail infrastructure, for example at Exmouth and Dawlish Warren in the South West.

Coastal Groups

These groups, comprising mostly local authority coastal erosion risk managers, and with members from across risk management authorities and other partners, provide a valuable source of expertise on coastal management matters.

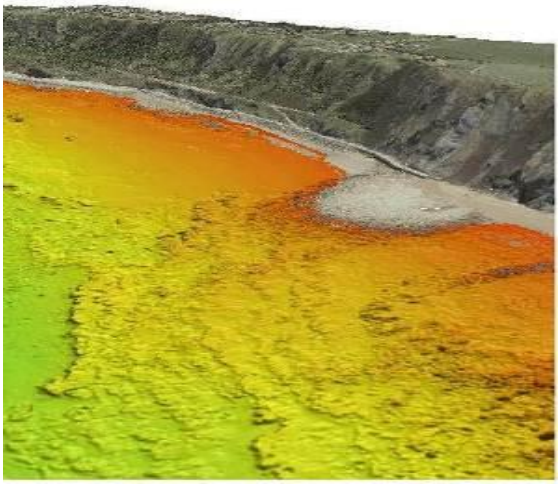


Figure 6 3D imagery from integrated topographic, Lidar and bathymetric data

Coastal Groups support the development and implementation of Shoreline Management Plans (SMPs) and, during this year, have helped develop processes to maintain and review them and report on progress. There has been one change to a management policy option, although this has not changed the overall proportion of coastal management policy options in England. 23 minor changes were also reported. Of a total of 2,672 actions in the 20 SMPs reported on, 4% are complete, 42% are progressing, 12% are planned or programmed, and 9% are on hold. The remainder are unspecified.

Coastal Groups receive Environment Agency funding for strategic work they contribute to, including participating in national projects and contributing to the research and development programme. Projects such as the national coastal monitoring programme, using 3D imagery from integrated topographic, Lidar and bathymetric data such as that shown in figure 6, and the Strategic Coastal Programme Initiative will help improve collaboration and consistency and drive efficiency.

National Flood Forum (NFF)

The NFF[26] is a national charity which supports and represents communities and individuals at risk from flooding. During 2012-13 the NFF helped people come to terms with the impacts of flooding and guided them to access services and support, for example in Bracklesham Bay and Earnley in West Sussex. Using links to local and national services, the NFF were able to tackle things that people needed directly, rather than simply providing information, and although recovery is still ongoing, work continues with communities to help them understand and address their flood risks.

In Buckingham, and following previous local levy funding provided by the local RFCC to install property-level protection measures in 87 properties, the NFF have supported the community in establishing 'FA4B', or Flood Action for Buckingham, with the Environment Agency, Aylesbury Vale District Council and local voluntary group 'Churches Together'. FA4B works on a rolling action plan which it has tested and promoted through a fair in the town to raise awareness amongst local residents.

Public Health England (PHE)

Public Health England[27] (previously the Health Protection Agency) is responsible for protecting the nation's health through the national health protection service, and preparing for public health emergencies. Health risks presented by flooding and coastal erosion include drowning. Serious injury can be caused by falling into fast flowing water or from hidden dangers under the water, such as missing manhole covers. The stress and strain of being flooded and cleaning up can have a notable impact on mental health and wellbeing.

During the past year, PHE has published guidance and information[28] for responders and the public on mental health and flooding, health impacts from extreme events (water shortages) and secondary stressors and extreme events and disasters. This complements existing guidance and advice on health, safe clean-up following flooding and coping without mains water.

6.3 Innovations and developments

Asset Information Management System (AIMS)

With partners, the Environment Agency has produced a replacement flood asset inventory that will be available to all flood and coastal erosion risk management organisations to use. AIMS is now the current source of all main river and coastal flood asset information in the Environment Agency. Coastal Groups, IDBs and local authorities have each contributed expertise towards its development. Each organisation is currently running a pilot, prior to the system being rolled out nationally.

Costs of flooding tool

The Environment Agency has developed a method for estimating the economic impacts of flooding which enables rapid assessments of flood events during and shortly after they have occurred. This is useful for comparing different events, for communicating the scale and severity of flooding, and will help to build up a better picture of the impacts of flooding in England.

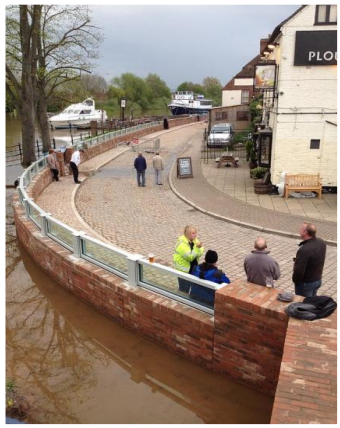
Social Media

The Environment Agency is increasing its use of social media for communication. Social media channels have been used to warn and inform communities at risk of flooding, engage with communities and partners to raise awareness of flooding, gather intelligence to inform operational responses and consult on major flood defence schemes. Over 100 Environment Agency staff have been trained in using social media channels in this way.

The Environment Agency also worked to share data on social media, including a FloodAlerts Facebook app, developed with partners Shoothill, which feeds personalised warnings direct to 19,000 users.

Innovative Upton-upon-Severn Flood Alleviation Scheme

The second phase of the Upton-upon-Severn flood alleviation scheme was officially opened in July 2012 by Harriet Baldwin, MP for West Worcestershire. The defences consist of a permanent flood wall with innovative glass panels to maintain the view of the river while protecting 64 properties. Pedestrian gates enable access to the river and the scheme also included regeneration features such as raised walkways and pedestrianisation of the waterfront area.



Upton has a long history of flooding with over 70 floods since 1970. The Environment Agency trialled the use of temporary flood barriers here in 2005. More recently work with the local community has led to the development of the permanent scheme to replace the temporary barriers. The new defences proved their worth during the wet winter and helped to keep Upton open for business during the floods of 2012.

6.4 Research, development and guidance

The Joint Environment Agency / Defra Flood and Coastal Erosion Risk Management Research and Development Programme continues to provide the evidence base that underpins flood and coastal erosion risk management work. Highlights from this year include:

- Work on how to improve probabilistic flood risk modelling through validation and reuse of existing models[29]
- Investigation into optimising the operational efficiency of Environment Agency Mechanical and Electrical, Instruments, Control and Automisation (MEICA) assets[30]. This has included a pumping station efficiency tool which has markedly reduced CO_2 outputs from our activities (see Chapter 5).
- The Living With Environmental Change (LWEC) Flood Research Strategy[31] has generated significant investment (around £12 million) from Research Councils (EPSRC and NERC) to meet FCERM needs. In addition, a proposal for a network of academic FCRM researchers (FCRM-Net) has also been submitted to EPSRC, which will allow us to access expertise across a range of disciplines more effectively and shape research to meet business need.
- A cross-Government project, in collaboration with ScienceWise and involving multiple partners, to examine how risk across a range of hazards might be better communicated.
- A Defra-funded project on establishing the cost effectiveness of a range of resilience and resistance measures in reducing flood risk. This showed that, for certain measures, there was a benefit of £5 for every £1 invested. It is hoped to roll this out in future as a tool to help people assess the likely cost of installing measures.

Guidance for practitioners published this year includes two documents published by CIRIA:

- The management of landfill sites and contaminated land on eroding or low-lying coastlines[32], a collaborative project between coastal erosion risk management and waste management authorities, waste operators, the Environment Agency and engineering consultants to help join up waste and coastal erosion risk management.
- The International Levee Handbook[33] provides a good practice guide for whole life management of flood embankments and draws on experience from the UK, Ireland, USA, France, Netherlands and Germany.

In September 2012, the Environment Agency published the ‘Coastal Research, Development and Dissemination Framework’ (CoRDDi), a new management framework providing a single ‘gateway’ for new coastal research that will reduce duplication, focus research needs and, importantly, ensure outputs of R&D are disseminated effectively.

6.5 Conferences, workshops and training

Risk management authorities across England hosted, supported and participated in a number of conferences and workshops during the year to help share information and good practice in flood and coastal erosion risk management. Examples include the 'Kring' (circle of engineers) conference in Bournemouth in September 2012; hosting Norwegian Water Resources and Energy Directorate (NVE), who were seeking to understand more about coastal adaptation in England, and an invitation to the Environment Agency to speak at the February 2013 Association of State Floodplain Managers Foundation in Virginia. Other conferences included one to mark the 60th anniversary of the 1953 east coast tidal inundation, hosted by the East Coast Flood Group and Humber Local Resilience Forum on 31 January 2013.

The FCERM12 events, aimed at supporting risk management authorities and other organisations interested in flood risk management to deliver their roles effectively, were held in Bristol, Birmingham, Gatwick and Leeds and were attended by over 500 delegates. These were a useful way of disseminating the strategic national picture whilst enabling local discussions to take place.

Training included material provided by the FFC on weather and flood related products for emergency responders, updated in light of the 2012-13 floods, which will be rolled out to Local Resilience Forums in 2013.

The Capacity Programme, led by Defra, the Environment Agency and LGA with CIRIA, CIWEM, ICE and Lantra, has continued to help build the skills and knowledge of flood and coastal erosion risk management staff across risk management authorities, targeting Lead Local Flood Authorities. During the year, 20 workshops were held, on topics including WFD, surface water mapping, property-level protection and designation of assets and were attended by over 720 people. A number of new online e-learning modules[34] have been produced for risk management authority staff, and others are under development.

The programme also funded subsidised places at CIWEM conferences and seminars, and provided options for students and practitioners to gain accredited qualifications. In addition, 28 trainees graduated from the Foundation Degree course run by the University of the West of England this year, with 61% of them securing employment with their host organisation.

The Environment Agency is working with other risk management authorities to establish the Water and Environment Management (WEM) Framework. This will be available in summer 2013, giving access to suppliers in the flood and coastal erosion risk management market. The WEM Framework will be available to all risk management authorities and Defra delivery bodies.

7. Looking ahead

The weather and its consequences in 2012-13 were testing. The combination of drought and flood were unprecedented. If 2012-13 has taught us anything, it is to expect and be prepared for the unexpected.

Flooding can happen almost anywhere and at any time. We must be aware of continued and increasing risks. The nation's hard defences and engineering saved over 200,000 properties in England from flooding and we must continue to invest in building and maintaining these assets, but an alert and better warned population, ready to take personal action, is also key to future flood risk management. 2013-14 will see much more flood data available to help such planning and warning services equally will look to improve coverage, especially for surface water.

Making it easier for people to understand risk of flooding is crucial and 2013 will see risk management authorities working together to turn that understanding of flooding and coastal erosion risk into actions which will be presented in Flood Risk Management Plans and Local Flood Risk Management Strategies. A feature of future flood management and warning will be increased cooperation between risk management authorities, especially water and sewerage companies and LLFAs, in financing and developing flood risk management solutions. The role of the Flood Forecasting Centre remains crucial to such ambition.

The period covered by the Environment Agency's current *Flood Warning Investment Strategy* is coming to an end and, during this year, in consultation with over 100 customers and partner organisations, work began on a new Flood Incident Management (FIM) Plan to set a future vision for flood forecasting, warning and response. The new FIM Plan will describe how risk management authorities will deliver the objectives for flood incident management set out in the National Flood and Coastal Erosion Risk Management Strategy for England (published summer 2011). The work will shape the future direction and delivery of flood incident management.

The Government's provision of an additional £120 million over the next two years to support capital investment in flood defences, coupled with economic growth, will mean more properties and livelihoods are protected from the devastating effects of flooding whilst increasing development opportunities and growth. High quality management of our existing flood defences is essential but limited resources will require increased concentration on areas at highest risk. Continued and increasing access to partnership funding, in addition to Government Flood and Coastal Erosion Risk Management Grant in Aid and local levy, for both capital and maintenance activity will increase the range and extent of flood and coastal erosion risk management activity we can continue to progress.

Accepting that it is not possible to continue all maintenance activity everywhere, the Environment Agency will consult on an approach to reduce the ‘red tape’ burdens on landowners to help them work with communities to manage rivers, achieve effective land drainage and also maintain high wildlife quality in our watercourses. As part of this approach, details of responsibility for the watercourse network will be available to the public.

It is not just people and property that are at risk but the essential infrastructure: roads and rail links, power and water supplies are all equally vulnerable. With increasing expertise in forecasting and warning and targeted investment in infrastructure it is to be hoped that the disruption caused by flooding to these essential services will be reduced.

A drier 2013-14 would be most welcome but the experiences of this year's flooding and the flood incidents over the last decade have put England in a good place to respond when danger threatens.

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9. Acknowledgements

This report has been developed with information from a range of sources. Direct contributors outside the Environment Agency were:

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- Defra
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- The Highways Agency
- All 152 Lead Local Flood Authorities
- The Local Government Association
- Network Rail
- The National Flood Forum
- Public Health England
- 12 Regional Flood and Coastal Committees in England
- 10 Water and Sewerage companies operating in England (Anglian Water, Northumbrian Water, Thames Water, Severn Trent Water, South West Water, Southern Water, United Utilities, Welsh Water, Wessex Water, Yorkshire Water)

The Environment Agency would like to thank these organisations for their contributions.

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