



Sustainability Committee

SC(3)-09-09 Paper 1: 13 May 2009

Inquiry into the effects of flooding on individuals, communities and businesses in Wales and the mechanisms in place before, during and after a flooding event to help them

Submission by Environment Agency Wales, May 2009



The Environment Agency's role

- If climate change impacts are as predicted, flood risk from all sources will inevitably increase. It is unlikely that we will ever have sufficient money and resources to defend everywhere. Indeed, flooding is a natural process and it is not possible to prevent flooding altogether. We have already moved to providing a more comprehensive range of flood risk management measures. These include: preventing inappropriate development in the floodplain; making property at risk more resilient; helping people to be better prepared; providing effective emergency response and recovery; maintaining existing levels of flood protection; building new flood defences in areas of high risk; and, considering with communities whether to protect certain areas. What is required will vary from location to location and community to community. We need to move to much greater community engagement to assist people to be both more aware of the flood risks and to seek their views on how best to deal with these.
- Environment Agency Wales' aim is to manage flood risk to reduce the impact of flooding, including the human and economic costs. We take action to reduce the likelihood of flooding and to reduce the consequences of flooding, should it occur.
- Under current legislation, we have a "supervisory duty" over all matters to do with flood defence. We expect the forthcoming Floods and Water Management Bill to extend our remit and to reinforce the shift in emphasis that we have already made from flood defence to flood risk management.
- We are responsible for managing flood risk from inland main rivers and the sea. However, under current legislation, we are not responsible for managing the flood risk from ordinary watercourses, surface water, sewers or groundwater, or for coastal erosion. Responsibility for surface water flooding in particular is not clearly defined. The forthcoming Floods and Water Management Bill is expected to confirm these responsibilities.
- We have permissive powers to build and maintain hard defences to protect people and property. We have built defences that have protected more than 5,000 properties over the last 6 years. Since 2001, we have seen a four fold increase in the amount of money we invest in major capital schemes (£4m in 2001-02 to a forecast £16m in 2009-10).
- Managing flood risk is about much more than just building defences. Under TAN15 we provide technical advice to Local Authorities and developers on flood risk and its management and this advice is increasingly being heeded. In 2008/09, 97% of our advice was taken up by Local Planning Authorities. We have recommended to WAG that climate change effects needs to be built into flood consequence assessments and the lifetime of developments.
- We forecast and monitor flooding, and provide warnings. We have invested significantly in updating our mapping and modelling capabilities. A total of 47,000 people are registered with us to receive flood warnings direct to their phone or email

account. We also provide guidance and advice on what people can do to protect themselves from the worst effects of flooding.

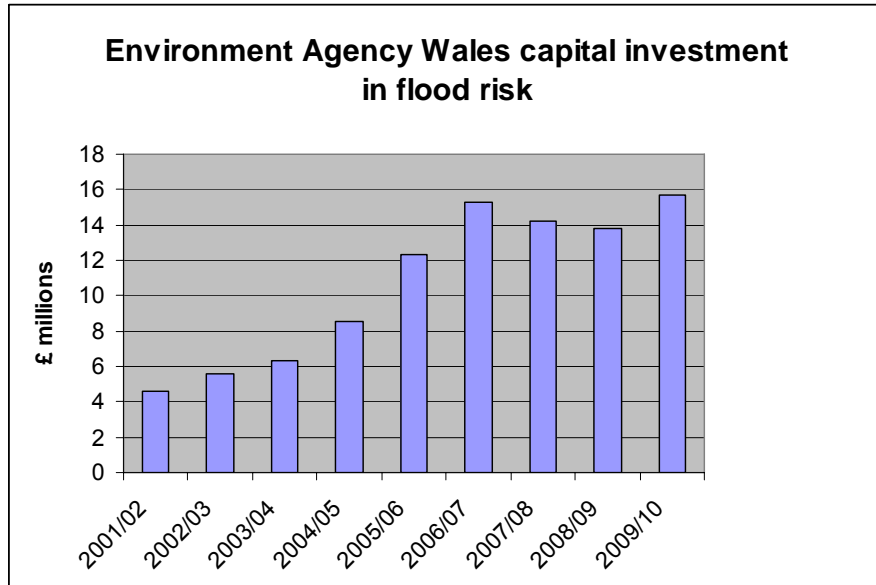
- We are responsible for 2,500km of flood banks in Wales, and we inspect over 12,000 flood defence assets annually to make sure these are fit for purpose. During incidents, we regularly inspect these assets to ensure that they are standing up to the test. We play a key role working with partners planning for and responding to flood incidents.

Environment Agency flood risk finances

Broadly speaking, capital budgets are used to build flood defence schemes, and revenue budgets are used for all our other services.

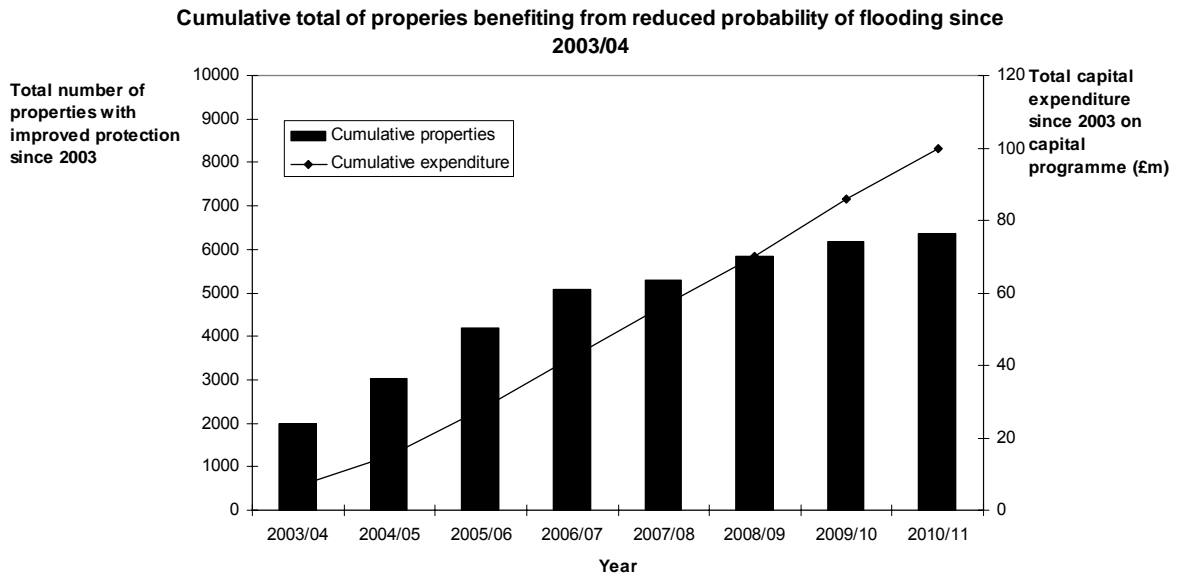
Capital budget

- The figure below shows our capital budget since 2001/02:



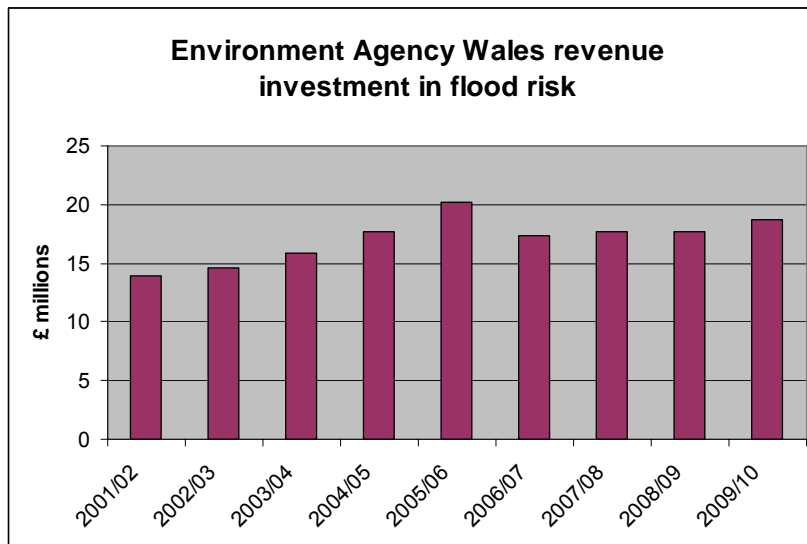
- Between 2004 and 2008, we obtained £6m of additional European Union funds under the Objective 1 programme to boost our capital budget. This was match funded by Welsh Assembly Government to enable us to complete 10 new schemes which reduced flood risk for over 2,000 homes and businesses across Wales at locations such as Aberdare, St Clears, Glynneath, Pwllheli and Bangor.
- We have also successfully bid into the new round of EU funding, called Convergence. This will again help us to bring forward schemes across Wales. We are expecting £3m worth of Convergence funding in 2009-10.
- We do not expect further EU funding for capital projects after 2015.
- We have identified projects with a total value averaging £20m per year over the next 20 years. It is important to note that this future spend figure is approximate; for example it depends on the outcome from studies such as those currently underway for the Dee, Clwyd and Severn estuaries.
- This predicted future average spend of £20m per year compares with the capital funds we currently receive from Welsh Assembly Government of £13m – an obvious shortfall. This is likely to increase when the impacts of climate change are also incorporated.
- We look for value for money in all our projects and work. We assess cost-benefit and we maximise other opportunities e.g. habitat creation, reuse of aggregates to minimise impact, and building in recreation facilities into flood schemes.

- The figure below shows the growth of our capital programme and the properties protected.



Revenue budget

- The figure below shows our revenue budget since 2001/02:



- All of our operational services that are not associated with capital schemes are funded from our revenue budget. This includes all of our flood forecasting, flood warning, awareness raising, mapping, development control, planning advice, asset maintenance and incident response services.
- We continually seek to make efficiencies on our revenue budget. For example, we have delivered a 3% efficiency saving on revenue budgets year on year.
- Cuts to our revenue budget will have a direct impact on the flood risk management service we can provide to the people of Wales.

Income and Expenditure in 2008/09

- 2008/09 is the last complete budget year, so it is useful to look at the break down of income and expenditure for this period.

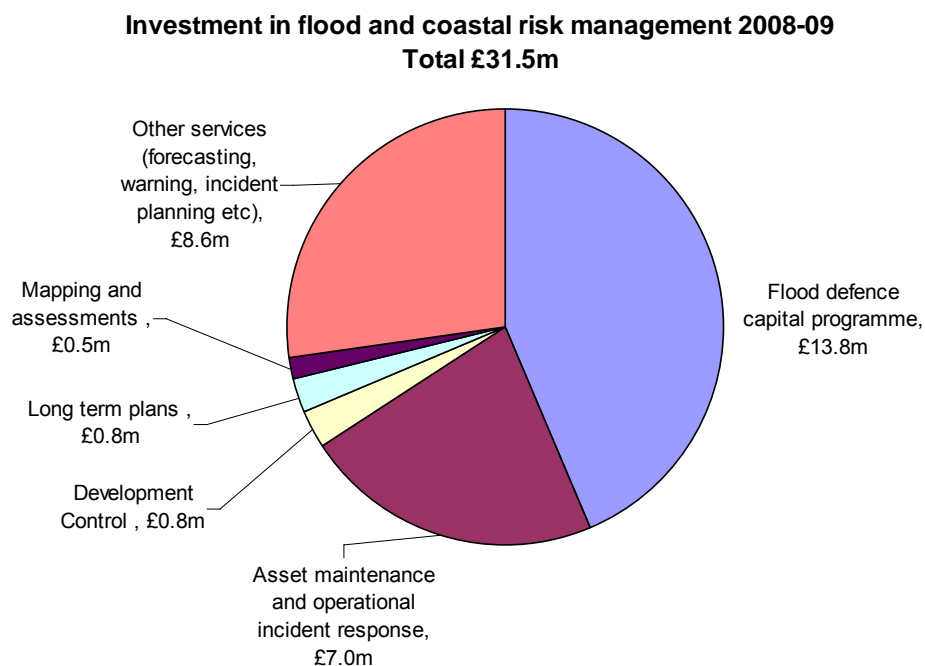
Income

Our income break-down was as follows:

○ Capital:	
Welsh Assembly Government Grant in Aid:	£12.7m
Contributions and other income	£1.1m
Total	£13.8m
○ Revenue:	
Welsh Assembly Government Grant in Aid	£16.9m
Other income	£ 0.8m
Total	£17.7m

Expenditure

The figure below shows where we invested this money in 2008-09.



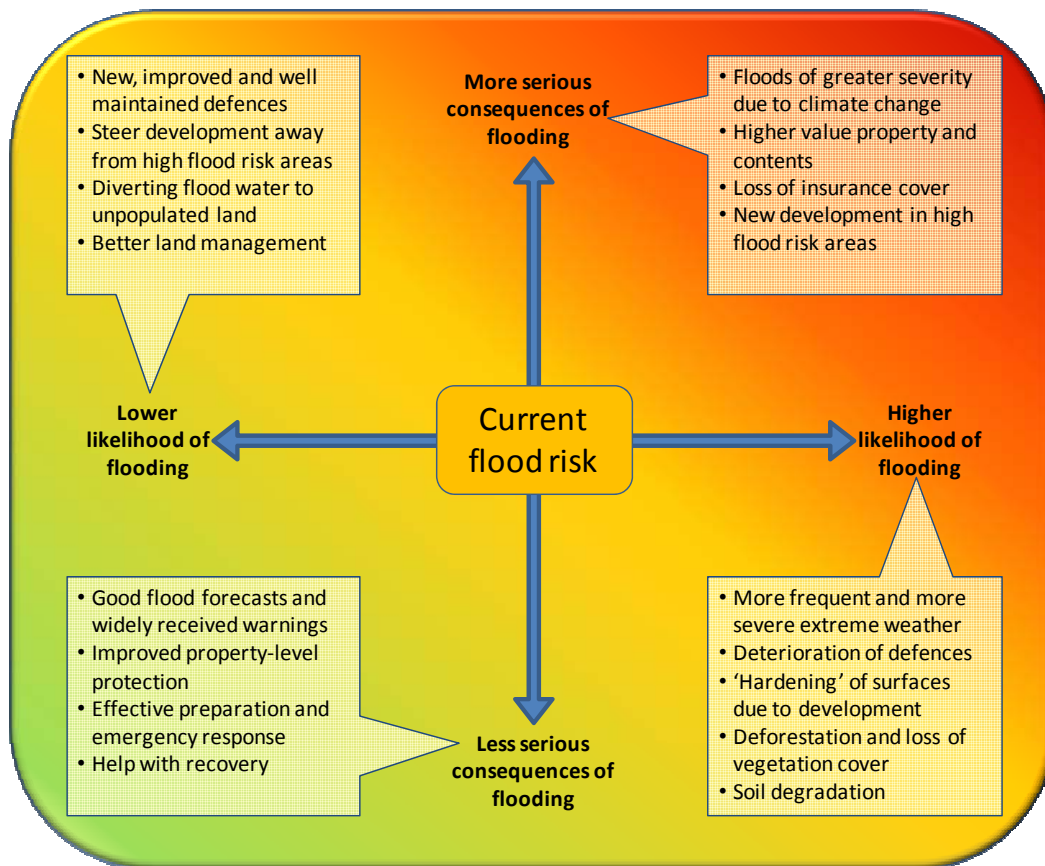
Overall Financial Position

- Under the current financial circumstances, there will be pressures on all budgets. However, failure to maintain an adequate capital budget will mean increased future capital investment costs if climate change predictions are correct. Failure to maintain our revenue budget will reduce our vital operational services, such as essential front line maintenance and incident response activities.
- There is a need for a long term investment plan for all flood risk management activities in Wales. We need to maximise the use of the resources we have, in the face of the immediate short term effects of the current economic situation and the longer term effects of climate change.

1 The current extent of flooding and flood risk in Wales and the potential future flooding threats using various climate change scenarios

1.1 What is flood risk?

- In order to manage flood risk we need to understand what it is.
- Flood risk is the frequency of flooding multiplied by the consequences of flooding. The diagram below shows how various factors can change the risk of flooding.



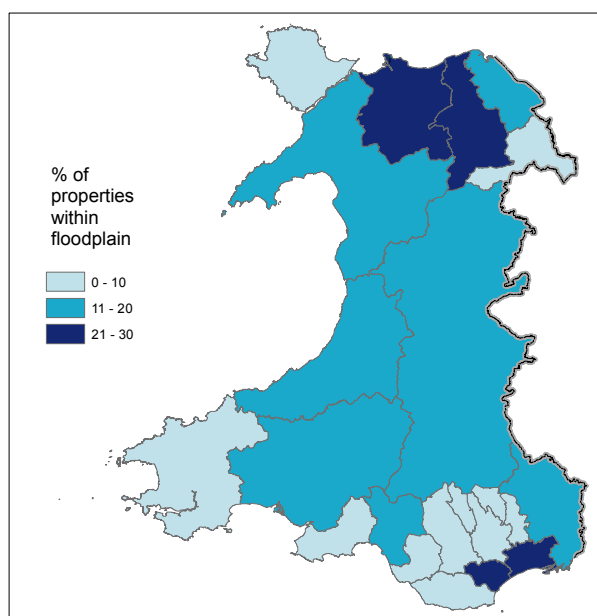
- Flood risk depends on many things, and differs from place to place. It depends on factors such as:
 - the size of the flood;
 - the degree of protection by defences;
 - the condition of the defence;
 - the nature of the flooding (extent, depth, velocity, speed of onset);
 - who lives where – their ability to respond to or cope with a flood threat;
 - the type of development;
 - availability of infrastructure to support communities during floods (e.g. roads to bring in aid);
 - availability of hospitals and similar health services;

- rescue capability, to move people to safe havens;
- whether safe havens are in place, and the extent to which facilities are available;
- whether the water is polluted or contaminated.

Clearly the nature of the flood risk varies in different locations.

1.2 Current extent of flooding and flood risk

- Wales has some of the highest flood risk locations in England and Wales. Across the 373 Local Authorities in England and Wales, 7 of the top 15 in the highest risk category are in Wales.
- The map below shows the proportion of properties at flood risk by Local Authority.



Properties at flood risk, by Local Authority

Coastal flooding

- We lead on protecting people and property from flooding by the sea but Local Authorities lead on coastal erosion.
- This is one of the highest flood risks in Wales. We have a long coastline with a large land area and many people at risk of tidal flooding and wave action. Flooding depths would be significant in a major event. The North Wales coast from Deeside to Llandudno is at particular risk due to the nature of much of the housing (many caravans and single storey buildings) and a high proportion of tourists and elderly people. Certain locations around the Severn Estuary are also at relatively high risk from tidal flooding.

River Flooding

- We lead on flooding from Main Rivers, and Local Authorities lead on flooding from Ordinary Watercourses.

- We have many hilly and steep catchments in Wales and, as a result, many areas are at high risk of flash flooding from rivers. The speed of onset of flooding in these catchments is fast. Fast and deep water make these types of floods very hazardous. It is very difficult to forecast floods in short steep catchments, and so it is also very difficult to warn people in these areas.
- On the larger rivers in Wales, the Wye, Dee and Towy for example, flooding happens more slowly. Reasonable flood forecasts, and so earlier warnings, are possible. Wide tracts of floodplain are regularly inundated with floodwater. This is a natural process which has always happened.
- We have mapped the extent of potential flooding from all rivers and the sea. This mapping shows that of the 1.4 million properties in Wales¹, there are approximately 170,000 (12%) in the floodplain and at risk of river or coastal flooding. An estimated half a million people, or approximately 1 in 6 of the whole population of Wales, lives or works in the floodplain.
- Using a technique called Lidar, which measures very accurately ground relief from the air, we are now assessing the depth and velocity of potential flooding in high risk locations.
- We have an extensive system of 300 rain gauges and river level monitors across Wales, and we have installed 29 new rain and river gauges in the last 3 years. We use river and coastal models where possible to forecast where and when flooding might occur and issue warnings. However, it is not yet possible in all locations.

Surface water and sewer flooding

- Local Authorities, acting as Highways Authorities, lead on flooding from roads. Water Companies lead on flooding from sewers.
- The Summer 2007 floods showed the vulnerability of communities to surface water flooding. Barry and Prestatyn suffered from this type of flooding, where the drains simply could not cope with the amount of water.
- We have mapped locations in Wales that are susceptible to surface water flooding, and this information has been shared with the Local Resilience Fora (LRFs) across Wales.
- The Integrated Surface Water Management Group (comprising Welsh Assembly Government, Environment Agency Wales, Dŵr Cymru Welsh Water, and Welsh Local Government Association) has mapped the location and frequency of surface water flooding from highways and sewer surcharges using data from Dŵr Cymru Welsh Water and Local Authorities. This is to be provided to Local Resilience Fora as useful additional information.
- We are researching modelling techniques to help us predict where this sort of flooding is more likely to occur as part of a wider modelling development programme for all flood risks. This programme is scheduled to run until 2013.
- Roles and responsibilities for surface water flooding are not clear. We anticipate that the Floods and Water Bill will help resolve this.

¹ Data taken from the Ordnance Survey Address point dataset, February 2009 issue

Reservoir flooding

- Reservoirs over 25,000 cubic metres capacity come under the Reservoirs Safety Act 1975. The Environment Agency enforces the conditions of this Act. Reservoir owners are responsible for the safety of their own reservoirs.
- The Summer 2007 flood event also demonstrated the vulnerability of reservoirs to dam breaks and consequent flooding of downstream areas. We have acted on these lessons and, by December 2009, we will provide inundation maps to Local Resilience Fora. These will show the potential flood outline, as well as depth of water, velocity and time it will take to reach various locations.
- Owners of reservoirs will be required to produce plans of how they will manage these risks.

Groundwater flooding

- No one has responsibilities for flooding from groundwater.
- Groundwater flooding results from saturated soil and high ground water levels, but it is not a major concern in Wales. There have been a few instances in the last 10 years of groundwater flooding mostly associated with pasture land in carboniferous limestone areas. No-one has any powers or duties in relation to flooding from groundwater.

Flooding from rural overland flow

- No-one has responsibility for flooding from rural overland flows.
- Much of Wales is underlain by hard rock under relatively thin soils. Heavy rainfall can exceed the infiltration rate of these soils. Surface water runs off the hillsides under these conditions. Relatively few properties are at risk, and the damage is thought to be small. In rare cases, runoff from hills can pond behind defences, where the pumping capacity of drainage systems is insufficient to clear it.

1.3 Future Flood Risk – Global Warming & Sea Level Rise

- Current Government guidance² recommends we should design our defences to assume nearly a metre of sea level rise around the coast of Wales. It also recommends we should cater for 20% greater river flows in the design of our flood defences. These increases mean that not only will more locations flood in the future, but also the flooding will be deeper in places where it floods now.
- We also expect stormier weather. This will lead to bigger waves eroding our shores and tidal defences in addition to the increased sea level.

² Flood and Coastal Defence Appraisal Guidance, FCDPAG3 Economic Appraisal, Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006

- We expect more frequent severe summer storms, like the one that caused catastrophic flooding at Boscastle. Such convective storms can also cause widespread surface water flooding of streets and highways in urban areas.
- The *Foresight study on future flooding*³ estimated that the annual economic damages in Wales will rise from £70m in 2004 to £1,235m in the 2080s under the most likely scenario – an 18-fold increase. However, it also said that a range of interventions could reduce this to £191m (a less than 3-fold increase).
- The 2008 update of the 2004 Foresight report concluded that the challenge may be even greater:

The threat of rising sea levels⁴

.... there is now a small but plausible risk of much greater sea level rise than was estimated in 2004. Coastal flooding is therefore one of the key priority areas for better science, innovative engineering and social policy development.”

Rising precipitation: *the update of climate change scenarios has indicated a wider range of possibilities in relation to precipitation than in relation to 2004. This means we may have to cater for bigger increases in river flows than previously envisaged.*

- The latest projections from the United Kingdom Climate Impact Programme (UKCIP) will be published during 2009. This will give us the latest forecast of how the climate might change. We will work with Welsh Assembly Government and Defra to understand what this means for rainfall events, and then assess likely impacts on flooding so that we all understand what increases in flows might have to be accommodated or managed.
- A Treasury Review led by Sir Nicholas Stern on the Economics of Climate Change⁵ concluded that the benefits of strong and early action far outweigh the economic costs of not acting to deal with the impacts of climate change. It proposes that 1% of global Gross Domestic Product (GDP) per annum is required to be invested in order to avoid the worst effects of climate change, and that failure to do so could risk global GDP being up to 20% lower than it otherwise might be. In June 2008, Lord Stern increased the estimate to 2% of GDP to account for faster than expected climate change.

1.4 Strategic assessments of flood risk

- We have recently completed the ten Catchment Flood Management Plans that cover Wales. These look at flood risk now and in the future, up to 100 years ahead,

³ Foresight Study on Future Flooding (2004)
http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/index.htm

⁴ Evans, E.P., Simm, J.D., Thorne, C.R., Arnell, N.W., Ashley, R.M., Hess, T.M., Lane, S.N., Morris, J., Nicholls, R.J., Penning-Rowse, E.C., Reynard, N.S., Saul, A.J., Tapsell, S.M., Watkinson, A.R., Wheeler, S. (2008) *An update of the Foresight Future Flooding 2004 qualitative risk analysis*. Cabinet Office, London.

⁵ The Stern Review on the Economics of Climate Change (2006)
http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_index.cfm

so we can consider what will be the consequences of climate change on flood risk. Based on these assessments, we are working up action plans. Importantly, this body of evidence will help us explore with each community what is their risk, and what might be appropriate ways of managing that risk.

- Similarly on the coast, we are working with maritime Local Authorities, who are undertaking reviews of their Shoreline Management Plans to assess the threat to the coast from erosion and flooding. Again, this looks at the current and future scenarios. These reviews are due to be completed in 2011.

1.5 Meeting future challenges

- We are already building in allowances for increased river and sea levels into the design of the defence schemes that we are constructing.
- We will need to strengthen and/or increase the height of the defences we have built over previous decades to adapt to climate change impacts.
- We cannot defend all communities against flooding. With climate change impacts, we will have to build more and higher defences in order to achieve the same level of protection.
- If we do build higher defences, then the consequences if they overtop or fail will be more severe.
- Maintaining flood defences is funded from revenue budgets. As we build more defences, we will need to do more maintenance, and revenue allocations will need to increase. With climate change increasing the frequency of floods, defences may need to be repaired more often.
- All of the above means that we will have to spend more on capital and on revenue in the future than we do now.
- Where possible, we will work with land owners to see how we can better manage the land to increase infiltration and so reduce runoff. These may help compensate for the increased impact of climate change. We recognise that research shows reduced runoff is possible at a local level for relatively frequent floods. However, it is unproven at the catchment scale, and it remains to be proven how effective changes to land use management might be in reducing major floods.

2 The effects of recent flooding episodes on individuals and communities; and their attitudes to the risks of flooding threat, and responses to flooding threat

2.1 Context

- We are keenly aware of the impacts of flooding on people. Understanding these issues will help us to understand the best approaches to helping people respond to flooding threats and risk, described in section 1.
- The last major floods in Wales were the fluvial flooding in South Wales in 1979, and the coastal flooding in Towyn in 1990. Since the formation of the Environment Agency in 1996, we have seen notable flooding to Talgarth in April 1998 and to Llandovery, Aberdulais, Aberfan and Builth Wells in October of the same year. There was widespread flooding in the areas of Mold and Rossett in North Wales in October and November 2000. Elsewhere in North Wales, the communities of Llanrwst and Trefriw in the Conwy Valley flooded in 2004 and 2005.
- Recent events have been relatively small by comparison, but of course any event, however small, has the potential to affect people and property. If it is your property that is flooded, it is significant to you.
- Most recently there appears to be a change in weather patterns and flooding events. We no longer see major flooding confined only to winter. High intensity rainfall events in the summers of 2007 and 2008 caused both surface and fluvial flooding.

2.2 Impact on people and communities

- We understand from our own experiences working with people that have been flooded that flooding is often traumatic and its effects can be devastating. The stress can lead to physical and mental health problems. However, we are not the health or social science experts.
- The Pitt Review⁶ explored many of the health and wellbeing issues caused by flooding. Studies showed people experienced:
 - increased levels of stress, anxiety and depression and a loss of interest in everyday activities;
 - strain on family relationships, especially increased arguments;
 - more difficulty in managing long-term health problems such as angina and arthritis;
 - drinking more alcohol as a coping strategy;
 - finding it harder to adhere to usual practices of healthy eating and exercise;
 - rises in their mortgages, fuel, water, council tax and rent arrears;
 - increases in the stress amongst staff dealing with response and recovery, due to prolonged additional duties.

⁶ Sir Michael Pitt's final report: 'Learning lessons from the 2007 floods', Section 7; Chapter 25 pp357-366, http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html

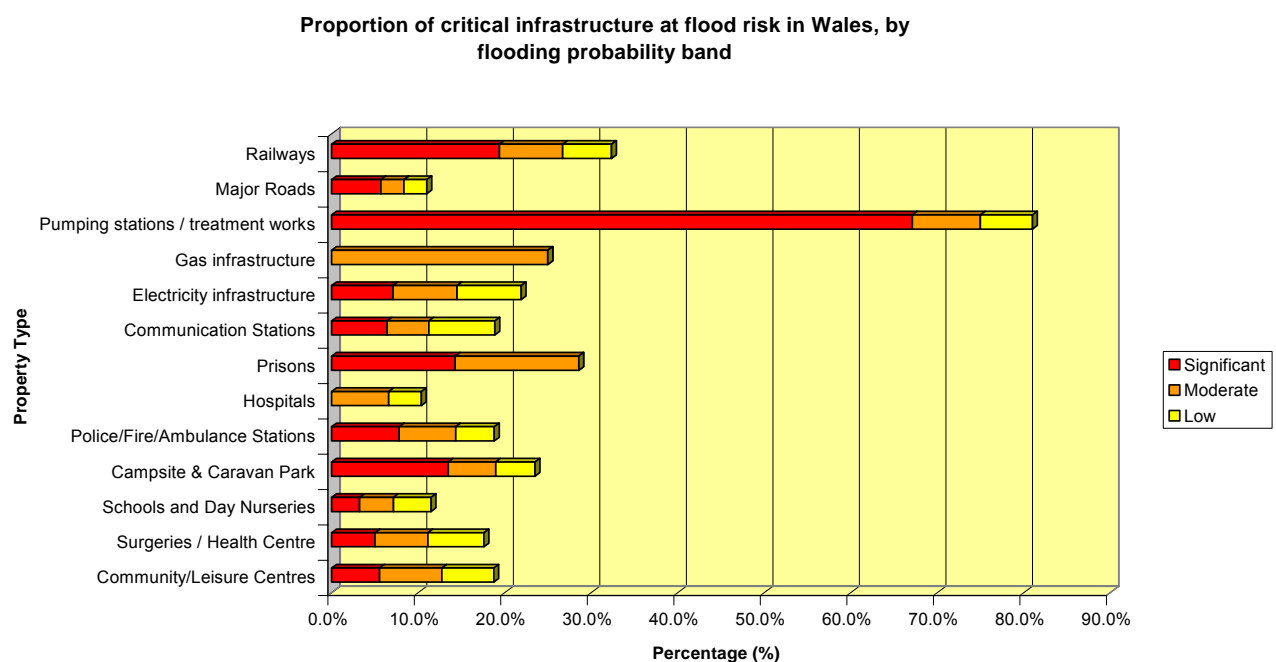
- The cost of damages from flooding is immense. The key cost is, as evidenced above, to people, their health and welfare. However, the economic cost is also significant. The annual economic cost of flooding in Wales was estimated at £70 million in 2004⁷. The estimated cost of damages from the 2007 flooding in England was £3 billion. Some people were still not back in their homes by Christmas 2008, 18 months on from the original floods.

2.3 Impact on our staff

- Flooding is also distressing to our own staff, who have received verbal abuse and even been threatened on occasions. Our staff are often the first into a flooded community. Initially people are shocked and distressed but understandably this often soon turns to anger.

2.4 Impact on community infrastructure

- Flooding has other major impacts that directly affect individuals and communities, as the floods in 2007 showed:
 - failure of transport infrastructure - people are unable to get to work, essential deliveries cannot be delivered, access by recovery services difficult or impossible;
 - risk of power failures and loss of water supplies;
 - contamination of flood waters from surcharged sewers;
 - strains on the health services, social and other council services, police, fire service who have to help people deal with and recover from flooding.
- The figure below shows the proportion of different types of key infrastructure and important public services that are located in flood risk areas.



⁷ Foresight Study on Future Flooding (2004)
http://www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/index.html

2.5 People's attitudes to flood risk

- We need to try to change people's attitudes to flood risk so that they take up flood warnings and prepare for what might be a rare but catastrophic flood event. The Pitt Review stated:
 - *Flood risk is not well understood by most people, unless they have had direct experience.* Pitt Review, Executive Summary paragraph ES.59
 - *The public need to be aware of a flooding risk before they can take action to minimise it. But even being aware of risk may not be enough – of those we talked to who actually knew prior to the floods that they were actually at risk, relatively few had done anything to prepare.* Pitt Review, Executive Summary, paragraph ES.97.
- People need to know and understand the risks and consequences posed by flooding and then, crucially, ensure they are aware of what they can do to lessen the impact.
- We carry out two main activities to help people prepare for flooding: a range of awareness-raising activities, and a free flood warning service called Floodline Warnings Direct.

2.6 Public awareness activities

- We have used various methods to raise flood awareness with the public, including:
 - TV, radio and press adverts;
 - roadshow flood events in high risk communities e.g. Bala, Cardiff, Ystradgynlais and Broughton in 2008/09;
 - articles in local press and magazines e.g. Valley News, Cardiff Institute of the Blind's magazine;
 - audio CDs of our flood booklets distributed to Royal National Institute for the Blind and Age Concern outlets (these booklets are also available to download on line and in hard copy via the Floodline service);
 - calendars with flood messages, distributed to partner organisations and high risk communities;
 - sponsorship of the weather on S4C;
 - participation in specific campaigns e.g. the BBC 'What If' campaign earlier this year.
- We undertake regular surveys of the public to assess their level of understanding of flood risk and the extent to which they have prepared for a flood. Taking action may have involved people at risk checking their insurance, signing up for flood warnings, knowing how to turn the electricity off, or installing flood resistance or resilience measures.
- Past surveys undertaken for us by Ipsos-MORI show that about 50% of people surveyed are aware their property is at risk of flooding. Of these people, just less than half again (47%) have taken action to prepare.
- Latest survey information from 2008-09 shows that both of these figures have increased to 57%. These results indicate that our awareness raising work is

reaching a wider audience, and we think this may be as a result of the wider range of activities we are carrying out.

- Our main message to the public is that people need to find out if their property is at risk of flooding. They can do this in several ways, but the main way is to phone our 24-hour telephone service called Floodline on 0845 9881188. We also encourage people at risk to sign up to our free flood warning service called Floodline Warnings Direct.

2.7 Flood warnings

- We are able to provide flood warnings in a number of ways. Our preferred method is through Floodline Warnings Direct, whereby the public can register for the service and receive flood warnings direct by telephone, mobile, email, SMS text message, fax or pager. This service started in January 2006. In 2008-09, an estimated 13,000 Flood Warning message (not including the lower level Flood Watch) were sent to people registered on Floodline Warnings Direct in Wales.
- The other main method is to issue warnings via the media. Parts of the North Wales coast, for example, use this system. In other specific locations, we may employ loud hailers, local door knocking, or local wardens.
- Our target is to have an appropriate flood warning service (this will comprise of mainly Floodline Warnings Direct, but also will include the other services mentioned above) available to 72% of properties at risk by 2011 and 80% by April 2013. Coverage has grown from 34% in 2005 to to 63% in 2008.
- Latest figures (March 2009) show 47,000 properties are signed up to Floodline Warnings Direct.
- There has clearly been progress in improving the warning services over the years, and in particular introducing Floodline Warnings Direct. However, there are many people at risk who have not registered for Floodline Warnings Direct. This correlates with the awareness surveys discussed in section 2.6. When the action is down to the individual to sign up (or opt-in) to the service, then not everyone does so.
- We want to increase the uptake of registration of Floodline Warnings Direct. To make this happen, we are moving to a system of 'opt-out' for registration. This system automatically registers properties at high risk of flooding for the Floodline Warnings Direct service, where the information (usually telephone number) is in the public domain. We are working to extend this to include telephone numbers that are ex-directory, and we are planning to include those held by BT by the end of 2009.

2.8 Increasing awareness in the future

- Despite the campaigns we have run and the successes we have had, our market research (see section 2.6) demonstrates that we still have a lot more to do to get people to accept the risk and to take action.
- We are looking at how we can best change people's attitudes to address flooding positively. How can we persuade people to prepare for something that might not happen to them in their lifetime?

- Issues we are considering include:
 - How best to frame the messages to get people to act.
 - Working with others, who have pathways into specific parts of communities and may be better placed to pass on flood messages. We have started a new campaign, called Floodwise, which has at its core working with partners in Local Resilience Fora to get the key messages across in the most effective ways.
 - How to communicate more effectively with the minority groups in Wales. We recognise that a diverse population has different needs in terms of how warnings need to be presented.
- However, communities can also help themselves. Household resilience measures such as flood gates on doors, covers for air bricks and repositioning electrical sockets may all have an important role to play.

2.9 Recovery from flooding

- We work with Local Authorities and other partners, such as the emergency services, on planning the response to flooding. This is a legal duty through the 2004 Civil Contingencies Act, and is done through the four Local Resilience Fora in Wales. However, Local Authorities take the lead responsibility for recovery at a community level.

2.10 Meeting future challenges

- **Improving flood forecasting and warning to increase community engagement**

Flood warnings need to be both timely and accurate, so that there is sufficient time to take action. In many parts of Wales, e.g. the Welsh valleys, the lag between rain falling and flow increasing in the river can be measured in minutes. The time a flood peak takes to travel from the top of a catchment (say, Treherbert on the Rhondda) to the bottom (Trehafod) can be as little as an hour. Therefore, to provide a timely warning, we have to warn early, before we can be totally confident that rivers will flood. Given the circumstances, it is the best we can do, but this can lead to warnings that do not result in flooding.

To improve this situation, we need reliable rainfall forecasts at least 3 to 6 hours ahead, which we can use in our models to predict river levels. This would reduce the number of warnings where flooding does not happen, and so provide greater confidence for people in those communities to take action when warned.

Recent discussions with the Met Office suggest that rainfall predictions may be improved by their next generation of computer forecasting models. However, it is probably necessary to also improve the radar coverage. Additional rainfall radar covering the South Wales Valleys could make a significant improvement to short term rainfall forecasts.

We are discussing with Welsh Assembly Government the possibility of taking forward a feasibility study to confirm the benefits of a new rainfall radar to cover the South Wales Valleys.

3 The effectiveness of TAN 15 (Development and Flood Risk)

3.1 Introduction

- Technical Advice Note 15: Development and Flood Risk (TAN 15) was published by the Welsh Assembly Government in July 2004. It sets out the precautionary framework within which Local Authorities are able to assess the risk arising from river and coastal flooding, and/or from additional run-off from development, when preparing their local development plans or taking decisions on individual planning applications.
- The findings of the Pitt Report and the likelihood of more frequent and more severe rainfall events as a result of climate change, coupled with continued pressure for development, means there is now a greater need than ever for robust policies for development and flood risk at all levels of the planning system.

3.2 Roles

- Welsh Assembly Government sets land-use planning policy for Wales. Flood risk planning policy and technical advice is contained with Planning Policy Wales and TAN15. It has the power to call in individual applications.
- The Local Planning Authorities decide whether to grant planning permission or not. They advise applicants on the requirements set out in TAN15. They determine if the proposed development is justified under section 6 of TAN15, and whether the consequences of flooding can be managed to an acceptable level.
- The Environment Agency's role is to provide expert advice to Local Planning Authorities on flood risk in accordance with Planning Policy Wales and TAN15. This includes commenting upon the acceptability of the likely risks and the consequences of flooding. We make data and expertise available to assist developers in the preparation of their flood consequence assessment. We advise, where appropriate, on the acceptability of any measures proposed to manage the risk to an acceptable level.

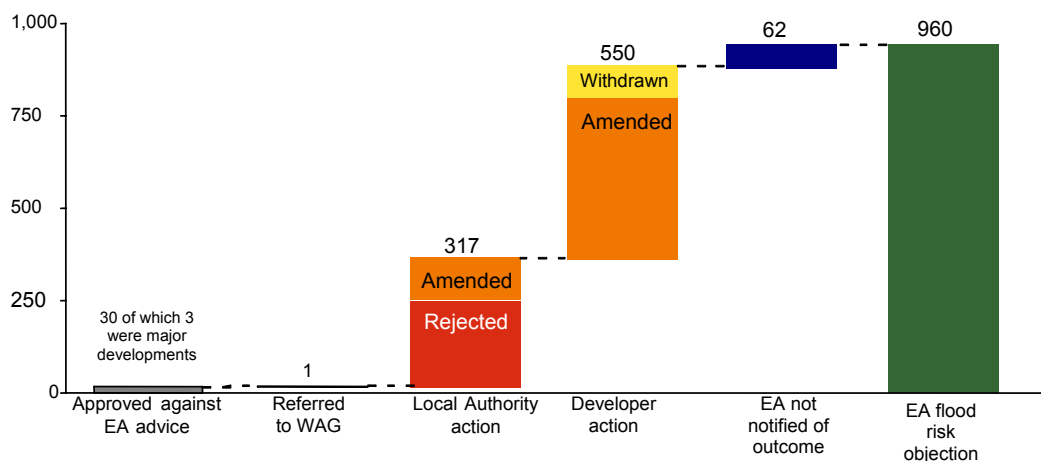
3.3 Where we believe TAN15 is working

- The diagram below shows that of the 960 objections we made⁸ to planning applications on flood risk grounds in 2008-09, we received decision notices for 898 (or 94%) of them. Applications were approved against our advice in only 30 cases. This means that 96.7% of the decisions we know about were in line with our advice. This figure has progressively increased since 2005/06, when it was 84%. This shows that the Agency's advice on flood risk is in the vast majority of cases being followed by Local Planning Authorities as required under TAN15.

⁸ Source: *High Level Target 13 report for 2007/8: Environment Agency / WLGA.*

Planning applications where Environment Agency Wales objected on flood risk grounds, 2008-09

Number planning applications



3.4 Where we believe TAN 15 is not working

- **Too many poor Flood Consequence Assessments:** Developers are often making inadequate assessments of the risks to people from flooding from their development. A total of 79% of our sustained objections were because of missing, incomplete or inadequate Flood Consequence Assessments. Without this information, we are unable to give Local Planning Authorities the technical flood risk advice they need to make informed decisions.
- **Local Development Plans:** All Local Planning Authorities are required to apply rigorously TAN15 to their Local Development Plans, and ensure that flood risk is taken fully into account during the production of the plan. Local Planning Authorities in Wales are not, however, required to undertake a Strategic Flood Consequence Assessment. We are encouraging them to carry these out and we have provided guidance to assist them.

3.5 Improvements we have made to our internal processes in relation to TAN15

- We are clear about the Environment Agency’s role and have prepared internal written guidance for our staff. We have trained our staff to provide expert advice on flood risk and mitigation to Local Planning Authorities.
- We have also run training roadshows to explain what our role is for Local Authorities across Wales.
- We have surveyed all Main River floodplains with LiDAR and have remodelled the flood extent. This has made a great improvement to our maps of flood extent. We

have passed this information to Welsh Assembly Government so it can update their maps accordingly.

- We commissioned a broad scale assessment of locations at risk from surface water flooding. This has been passed to Welsh Assembly Government and we understand these maps will be made available to Local Planning Authorities soon.
- We try to ensure that the level of detail required in Flood Consequence Assessments is proportionate to the nature, scale and risk of the development, in order to avoid unnecessary costs to the applicant.

3.6 What would improve TAN15 and the planning process further?

- More rigorous application of TAN15 in Local Development Plans
 - We believe that Local Planning Authorities should be required to undertake a Strategic Flood Consequence Assessments when developing their Local Development Plans. Strategic Flood Consequence Assessments would help ensure that flood risk is properly taken into account when considering future land allocations and appropriate development control policies. Where a Local Planning Authority is unable to direct new development away from areas at high risk of flooding, it will help them focus their efforts on the most appropriate sites. It can also be a useful source of information for developers when producing a site specific flood consequence assessment. We have produced guidance to assist Local Planning Authorities undertake Strategic Flood Consequence Assessments.
- Improvements in the availability of information
 - Developer's access to the TAN15 Development Advice Maps is limited as they are not available on line. Our environmental data and information is readily available to the public and developers through the 'what's in your backyard' facility on our website (<http://www.environment-agency.gov.uk/homeandleisure/37793.aspx>). This service can provide an insight into a range of issues, such as waste and flood risk, that may need to be taken into account prior to submitting a planning application.
- Ensuring that climate change is built in to Flood Consequence Assessments and lifetime of development.
 - We have recommended to WAG that Flood Consequence Assessments should incorporate climate change predictions of the extreme flood outline, as the TAN15 guidance suggests. We are awaiting a decision.
- Encouragement of pre-application discussions
 - We would always encourage developers to undertake discussions with the Local Planning Authorities, and all statutory consultees, prior to submitting their planning application. This will ensure the most efficient use of resources by identifying potential issues, such as environmentally sensitive locations or flood risk, at an early stage. It may also prevent developers from needlessly spending money on unviable development proposals. Developers are welcome to discuss their proposals with the Environment Agency, free of charge.

- Standard Planning Application Form
 - We fully support the need for a Standard Planning Application Form in Wales. In particular, an electronic version that would not only require applicants to complete all relevant fields but could be used to minimise the occasions where the information submitted is incomplete or incorrect. Large numbers of applications are still being submitted to Local Planning Authorities, and subsequently the Environment Agency, without the necessary information. For example, in the period from April 2007 to March 2008, 79% of all Environment Agency Wales' sustained flood risk objections related to either the lack of a flood consequence assessment being provided, where one is required, or where the level or quality of the information provided was unsatisfactory. This introduces unnecessary delays into the consultation process.
- Monitoring the overall effectiveness of TAN15.
 - The true test for whether TAN15 is effective is the extent of inappropriate development on floodplains. We believe the application of the sequential approach (see Annex A) should be monitored as this is fundamental to evaluating the success of TAN 15.

Annex A

From TAN15:

“6.2 New development should be directed away from zone C and towards suitable land in zone A, otherwise to zone B, where river or coastal flooding will be less of an issue. In zone C the tests outlined in sections 6 and 7 will be applied, recognising, however, that highly vulnerable development and Emergency Services in zone C2 should not be permitted. All other new development should only be permitted within zones C1 and C2 if determined by the planning authority to be justified in that location. Development, including transport infrastructure, will only be justified if it can be demonstrated that:

- I. its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement;

or,

- II. its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and,

- III. it concurs with the aims of PPW and meets the definition of previously developed land (PPW fig 2.1); and,
- IV. the potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in sections 5 and 7 and appendix 1 found to be acceptable.”

4 The response of the insurance industry to properties and land at risk of flooding and to flooding events

4.1 Responsibilities

- HM Treasury and Welsh Assembly Government have lead responsibilities for insurance matters.
- The Association of British Insurers (ABI) represents the collective interests of the UK's insurance industry.

4.2 Our advice

- We advise people to take out insurance to minimise the consequences of flooding. We recognise the very important role that the insurance industry plays in helping communities and individuals to recover from flooding. By paying premiums, policyholders pool their risks and can gain access to the funds they need to recover quickly following a flood. However many people in high risk areas are on low incomes and do not take out insurance.
- Our maps of fluvial and coastal flood risk areas are publicly available and are on our website. People can use these to make choices about where they might choose to live and the risk they would be exposed to.

4.3 How insurance interacts with our responsibilities

- The improvement in risk information from the Environment Agency has potential implications for the insurance industry and policyholders. As risk information improves, insurance companies could raise premiums or withdraw policies from those most at risk. However, the ABI and its members recognise this and have made an agreement with Government that they will continue to provide insurance cover to those at most risk as long as certain conditions are met. This agreement is called the 'Statement of Principles'.
- We understand discussions to update the Statement of Principles in Wales are being held between the Association of British Insurers and Welsh Assembly Government. The two parties are exploring how more people can be persuaded to take out insurance, and how to encourage building flood resilience into new and repaired homes. We welcome these discussions.
- The Association of British Insurers states "Insurers want to continue to provide flood cover, but poor planning decisions will lead to more homes becoming unsaleable, uninsurable and uninhabitable."

5 The response to flooding events, focussing on roles and responsibilities both during and after the events

5.1 Background

- Successful planning, with regular exercising and practice, leads to a co-ordinated and effective response when flooding occurs.
- The Civil Contingencies Act (CCA) 2004 provides the framework for planning for all types of emergency, including flooding. Organisations with a key local role, such as Local Authorities, emergency services and the Environment Agency are all termed Category 1 responders.
- All Category 1 responders have a legal duty to work together to assess the risks and then make plans to prevent, reduce, control and mitigate the effects of an emergency.
- Category 2 responders are other organisations such as the Utilities who have a duty to provide information and co-operate with the production of plans.
- The CCA includes a statutory duty to set up Local Resilience Fora as the body under which the Category 1 responders come together to manage the risks. Local Resilience Fora follow the police force boundaries, and there are four in Wales. Each Local Resilience Forum is chaired by a Chief Constable.
- All Local Resilience Fora have identified flooding as a significant risk to people and their properties.
- In Wales, Local Resilience Fora are supported at Government level by the Wales Resilience Forum (WRF), chaired by the First Minister. The Director of Environment Agency Wales is the lead for flooding.
- The Pitt Review recommends that at the local level, Local Authorities should be the lead responders in relation to multi-agency planning for severe weather emergencies and for triggering multi-agency arrangements in response to severe weather warnings and local impact assessments.

5.2 Before flooding

Our role

- Emergency planning
 - As well as being a Category 1 responder, we are also the lead body in the Local Resilience Fora for flooding. We chair the Local Resilience Forum Flooding Sub-Groups, where we lead on the preparation of Multi-Agency Flood Plans (MAFPs).
- Flood Warnings
 - We issue flood warnings for flooding from main rivers and the sea, where this is possible, by monitoring weather forecasts, rainfall and river flows and, where possible, by forecasting river levels.

- We have set up the new Flood Forecasting Centre, which started operations on 1 April 2009. This is a joint venture with the Met Office, combining weather forecasting and flood risk expertise under one roof, to provide longer range forecasts of flooding.
- Flood warnings can be received by any person with a property in an area covered by a warning service. The main route is through registration to Floodline Warnings Direct – see section 2 for more information.
- Flood advice
 - We run public awareness activities, particularly in locations at risk of flooding – see section 2.
 - We encourage everyone to find out if their property is at risk of flooding. The main way to do this is to phone Floodline, our telephone advisory service. For those at risk, we encourage them to sign up to our free warning service, Floodline Warnings Direct.
 - We provide information that explains what to do before, during and after floods.
- Preparing our defences
 - We carry out pre-flood inspections of our flood defences to ensure they are in appropriate condition, and ensure grids and screens are clear of debris before a flood.

Role of others

- Local Resilience Fora lead emergency response planning as described above.
- Professional partners are responsible for their own flood plans.

5.3 During flooding

Our role

- Flood monitoring and advice
 - We operate rotas of flood forecasters, operational staff and base controllers to respond to and monitor flood events. We open incident rooms during significant events.
 - We keep Welsh Assembly Government informed of the flooding situation.
 - We participate at Gold and Silver Commands, and advise on what is happening and what is forecast to happen with river levels and flooding.
- Operating our defences
 - We operate and manage our own river and coastal defences, to ensure these are working as they should.
 - We do not lead on surface water flooding, but will assist if possible, under the direction of Local Authorities and emergency services, or at the request of Gold Command.

- Assisting others on the ground
 - We work with Bronze Commands to manage incidents on the ground as necessary.
 - Where possible and as required, we provide assistance both to other Environment Agency Regions (e.g. we provided assistance to Midlands Region during the Summer 2007 floods) and to other organisations (e.g. at Walham electricity sub-station).
 - We provide sandbags only at the request of Local Authorities, recognising that these are usually not an effective barrier for individual householders.

Role of others

- Police lead the emergency response.
- Fire and Rescue Services lead any rescue that is needed. RSPCA have been involved in rescues where animals are involved.
- Local Authorities lead on dealing with the needs of people who have been flooded – providing temporary accommodation and food, for example.
- Welsh Water leads on sewer flooding.
- Local Authorities lead on surface water flooding. We will assist if asked.
- Many other organisations are also involved, such as the voluntary sector.

5.4 Recovery from Flooding

Our role

- We do not have a lead role in the recovery of people and communities from flooding. However, we do have a support role, as described below.
- We undertake emergency repairs to damaged flood defence assets so that they are ready for the next flood.
- We assess damage and costs to repair defences, when necessary. Following major widespread flooding, where the damage may be very high and beyond our normal budget, we apply to Welsh Assembly Government to assist with additional funding.
- We survey the extent, depth, velocity, timing, causes and paths of flooding, and review our own performance.
- We work with other responders to provide advice to those flooded on how to deal with flooding in the future, e.g. at Sir Richard Gwyn School in Barry.
- We contribute to post-incident reviews.

Role of others

- Recovery is led by Local Authorities assisted by many other organisations, depending on the particular needs and services. For example:
 - building trades to repair flood damaged properties
 - insurance industry to pay for repairs

- health services to deal with the increased physical and mental health problems that can be expected.
- The Pitt Review goes into considerable detail on people's needs during the recovery phase and makes several relevant recommendations – see section 2.

5.5 Improving the response to flooding events

Short term

- We need clarity over who leads on surface water flooding. This needs to be resolved by the Floods and Water Management Bill.
- We have shared data with Local Resilience Fora partners and utility organisations of the location of key infrastructure in flood risk areas. The failure of key infrastructure, such as telephone system failures, loss of power, water supplies, road and rail access, is a key threat to Wales's ability to respond to or recover from major flooding. We organised a conference in Cardiff in September 2008 and invited Local Resilience Fora partners and utility companies to attend. It is clear that different organisations work to different risk scenarios and provide different levels of protection. This needs to be addressed, and a key conclusion of the conference was that the starting point is to define the level of protection needed for key infrastructure and to ensure that a co-ordinated approach is adopted.

Longer term

- In the current economic environment, we anticipate future pressure on funding and in particular revenue budgets. Our key operational services are revenue funded. Significant cuts in our revenue budget could require us to reduce our emergency response activities and the standard of maintenance of our defences.
- We need to ensure that we attract appropriately qualified staff to work in the Environment Agency and retain the staff who have previous experience of flood incidents and response.

6 The effectiveness of the Environment Strategy Action Plans 2006 - 2008 and 2008 - 2011 actions on flooding

6.1 Action Plans 2006 – 2008

- The flood risk management actions from the Environment Strategy are shown in Annex B.

ACTION 12: PUBLIC AWARENESS PROGRAMME

- We are joint lead with Welsh Assembly Government to deliver this action.
- We have previously outlined the progress we have made over the past 10 years on this topic in Section 2.
- In addition, we are developing tools that will describe the consequences of flooding. These will show the depth and speed of onset of flooding, as well as the velocity of the water. We plan to use this information to help people in high risk areas or vulnerable groups understand what flooding might look like for them. Similarly, it will help emergency responders plan their response.

ACTION 13: IDENTIFY MEASURES TO REDUCE FLOOD RISK

- Welsh Assembly Government leads delivery of this action.
- In support, we organised and ran two workshops for Welsh Assembly Government to explore and capture the different ways that could be used to reduce flood risk. A report of this work was prepared for Welsh Assembly Government. An important outcome was that over 200 people from many different organisations and interests across Wales now think differently about how flood risk can be managed and understand the many opportunities for doing so.
- The report identified many options to reduce flood risk, and looked at the strengths and weaknesses of each, under the main headings of:
 - Community resilience
 - Increasing resilience in the built environment
 - Awareness
 - Defences, highways drainage and sewerage
 - Development planning
 - Emergency response and recovery
 - Land use
 - Innovation

ACTION 14: IMPLEMENT PROGRAMMES OF FLOOD AND COASTAL EROSION RISK MANAGEMENT ACTIVITIES

- We have an extensive responsibility for flood risk and are joint lead on this action with Welsh Assembly Government.
- Environment Agency Wales has already made many changes to move towards providing a flood and coastal risk management service.
- Responsibility for coastal erosion risk management rests with Welsh Assembly Government and Local Authorities.
- We have described many of the actions we are taking to manage flood risk elsewhere in this submission.
- We have asked our consultants to consider which of these many actions contributes to managing the flood risk for our major strategies along the North and South-East Wales coasts, including the the Clywd, Dee and Severn estuaries.
- Working with Welsh Assembly Government, we have ensured that capital schemes benefiting from European Convergence funding use as many of these measures as part of their plans as well as providing defences.

6.2 Action Plans 2009 – 2011

- Actions 31 and 32 are extensions of the previous actions. Our plans to improve flood awareness have been described previously. Managing flood risk, rather than just flood defence, is now embedded within the Environment Agency, and we are working with Welsh Assembly Government to deliver the New Approaches initiative for flood risk management.

Annex B

Welsh Assembly Government Environment Strategy Action Plan 2006-2008

	Action	Who responsible / Milestones
12	We will take forward a public awareness programme to ensure that those who are at risk of flooding are aware of the risk, its consequences and the action they need to take to address it.	By 2007 - Review and refine existing programme • Lead: WAG (EnvP&Q) / EAW • Partners: Local authorities By 2008 - Implement revised programme • Lead: EAW • Partners: Local authorities
13	We will identify a comprehensive list of measures designed to reduce flood and coast erosion risk and raise awareness amongst bodies with relevant flood and coast erosion risk interest. These measures will relate to infrastructure, catchment and shoreline management, education and awareness raising, modification of developments at risk (enhanced resilience) and flood warning and response.	By 2007 - List measures • Lead: WAG (EnvP&Q) • Partners: EAW, Local authorities, IDBs, WAG (other departments), CCW, voluntary sector, farmers and land owners By 2007 - Identify relevant bodies and commence communication programme amongst those bodies • Lead: WAG (EnvP&Q)
14	We will implement programmes of flood and coastal erosion risk management activities, to include those measures identified in action 13, to address increasing risk, these programme will be subject to regular review. All existing plans and programmes of flood and coast erosion risk activities in Wales will be reviewed and revised in the light of the measures identified in action 13.	By 2008 - Review of existing programmes • Lead: WAG, EAW Ongoing from 2009 – Incorporate appropriate measures into all new programmes • Lead: WAG, EAW, Local authorities. Ongoing from 2008 - Implement new and revised programmes • Lead: EA, Local authorities, IDBs • Partners: WAG, CCW, National Flood Forum, voluntary

Environmental Outcomes in relation to managing flood risk from Welsh Assembly Government's Environment Strategy Action Plan 2008-2011

No.	Outcome	Indicator	Progress
31.	Appropriate measures are in place to manage the risk of flooding from rivers and the sea and help adapt to climate change impacts.	Annual cost of damage due to flooding.	Improved
		Probability of flooding of assets at risk.	Baseline
		Indicator of percentage of new development permitted in the floodplain to be developed.	No information
32.	Everyone who lives in a flood risk area understands the flood risk they are subject to, the consequences of that risk and how to live with that risk.	Level of use of Floodline.	No clear trend.
		Households registered for flood warnings as a percentage of total number of households at risk of flooding.	Improved
		Indicators of trends in awareness of flood risk to be developed based on a new survey.	Baseline

Actions in relation to managing flood risk from Welsh Assembly Government's Environment Strategy Action Plan 2008-2011

Actions	Lead	Outcomes supported by these actions
4. Flood and Water Management		
<p>We need to ensure that we manage our water resources sustainably in an integrated and strategic way, and to ensure that the Assembly Government's new approaches programme on flood risk is developed and implemented effectively. Specific actions (including ongoing actions from the first Action Plan) are:</p> <p>14. Continue work to develop and implement the new approaches programme to flood risk management in Wales, in particular in relation to the ongoing actions below:</p> <p>a. We will take forward a public awareness programme to ensure that those who are at risk of flooding are aware of the risk, its consequences and the action they need to take to address it.</p> <p>b. We will develop and implement programmes of flood and coastal erosion risk management activities, to address increasing risk. These programmes will be subject to regular review.</p> <p>c. We will increase Wales' resilience to emergencies by:</p> <ul style="list-style-type: none"> • increasing our understanding of potential risk, • ensuring that the needs and interests of vulnerable groups are fully reflected in emergency planning, • highlighting the vulnerability of at risk infrastructure and by facilitating enhanced emergency response and recovery planning. • We will carry out a pilot project in a specific locality, which will establish where vulnerable groups are located relative to flood risk, the information and support they need to minimise the risk they are subject to, and their specific requirements in the event of an emergency. <p>d. We will take action to improve the prevention and management of flooding from surface water through a series of pilot studies across Wales.</p>	<p>WAG (CCWD), with EA, and LAs.</p> <p>WAG (CCWD), EA, with LAs.</p> <p>WAG (CCWD), with Local Resilience Forum, DCWW, and other stakeholders.</p> <p>WAG (CCWD), with DCWW and other stakeholders</p>	<p>1, 3, 5, 6, 8, 13, 14, 15, 17, 31, 32, 35, 36.</p>