



DEMOCRATIC SERVICES
SESSIONS HOUSE
MAIDSTONE

Tuesday, 4 March 2008

To: All Members of the County Council

Please attend the Annual Meeting of the County Council in the Council Chamber, Sessions House, County Hall, Maidstone on Thursday, 13 March 2008 at **10.00 am** to deal with the following business. **The meeting is scheduled to end by 4.30 pm.**

1. Declarations of Interest
2. Chairman's Announcements
3. Flood Risk Management in Kent - Motion for time limited debate (Pages 1 - 34)
Mr R Gough will move, Dr M R Eddy will second:-

- (i) In order to improve the protection and preparedness of Kent and its property from flooding, a Task Force should be set up of relevant agencies and utilities to draw together and implement an Action Plan for Kent based on the findings of the Select Committee Report, the Pitt Review and the Environment Agency Report of 2007 Floods;
- (ii) that Members are invited to regular seminars with the relevant agencies and utilities to be informed of the progress of the Action Plan;
- (iii) that existing KCC protocols are used to monitor the flood risk situation in Kent; and
- (iv) that KCC welcome the additional funding which will be available in the future from Government for flood defence work but, given Kent's high vulnerability to flooding, make efforts to secure extra funding to support improved flood risk management."

Peter Sass
Head of Democratic Services and Local Leadership
01622 694002

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By: Mr R Gough, Cabinet Member for Regeneration and Supporting Independence

To: County Council – 13 March 2008

Subject: **FLOOD RISK MANAGEMENT IN KENT**

Summary: To receive and comment on the report of the Select Committee on Flood Risk Management in Kent

Introduction

1. The Environment and Regeneration Policy Overview Committee convened a Select Committee for a short period in the summer of 2007 to gain a broad overview of the current situation regarding the management of flood risk in the County.

Terms of Reference

2. The terms of reference for the Select Committee Topic Review were to:-
- (1) To gain an overview of sustainable flood risk management in Kent in light of current Government policy on funding.
 - (2) To gain an overview of action taken since 2001 to minimise flood risk to the residents of Kent (with reference to recommendations of KCC 2001/2006 review).
 - (3) To gain an overview of issues relating to planning control, flood resilience and flood risk in Kent and consider local planning authority roles in influencing planning decisions.
 - (4) To consider what action or initiative by Kent County Council could lead to greater flood protection and resilience for Kent residents.
 - (5) To consider what action or initiatives might benefit Kent residents in terms of preparedness and emergency planning for flood events; and
 - (6) To make specific recommendations on the topic of flood risk management for Kent County Council and partner organisations.

Floods in the Summer of 2007

3. (1) While the Review was at the planning stage in June 2007, unprecedented intense rainfall caused unseasonal flooding. Parts of Kent were affected but the most devastating and severe floods occurred in other parts of the country, ie Gloucestershire and Rotherham, and tragic loss of life occurred. These floods highlighted several important issues, not least they served to illustrate to the Select Committee that flooding can happen at any time, in any season, with enough severity to overwhelm defences.

(2) The flood severity was so great that immediately following the events two reviews were instigated: the Pitt Review by Government and the Environment

Agency Review of the Summer Floods 2007. The interim findings of these reviews need to be taken into account fully for agreeing action in Kent. Summaries of each are contained within the papers for the meeting. Short presentations will be made of these two reviews.

Executive Summary

4. (1) The executive summary of the Select Committee's report is attached for all Members of the County Council. If you wish to see a full copy of the report then please contact Angela Evans on (01622) 221876 or e-mail her at angela.evans@kent.gov.uk. Copies are available in the Information Point and in the Members' lounge.

(2) The Select Committee has suggested a range of steps that can be taken to contribute to the overall reduction in flood risk and the better management of it. It is absolutely crucial that we follow guidance and take care where we site a new development so we can maintain defences to a good standard, incorporating a margin for climate change impacts; use sustainable drainage systems and put in place measures to make buildings more flood-proof and communities more resilient. More importantly, it is essential that we do not take our eye off the ball and become complacent about flooding. We must retain a constant focus on flood risk in Kent, and pull together expertise at all levels. The Select Committee suggests oversight is provided by a standing flood risk committee and multi-level involvement is secured through Flood Liaison Advice Groups which bring together experts including those in the local community.

(3) The Select Committee recognised that in an environment of tight budgetary control we will need to constantly ask ourselves:

'What are the potential costs of not taking a particular action?'

(4) The Select Committee recommends that the Government give much greater priority to flooding, by ring-fencing funding and ensuring that important schemes are not delayed.

(5) The risk of sea flooding is very real and it is acknowledged that a repeat of the set of conditions leading to flooding in 1953 could have dire consequences.

(6) It is therefore of the utmost urgency that we take action to ensure that people are aware of the risk, aware of what is being done to protect them and what they can do for themselves, and that our flooding, planning and warning systems are both comprehensive and flexible enough to ensure everyone's safety.

Recommendation

5. I commend the motion as set out in the summons to the meeting of the County Council.

Mr R Gough
Cabinet Member for Regeneration and Supporting Independence

Flood Risk Management in Kent

Select Committee Report

2007



Executive Summary

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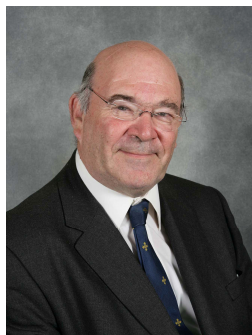
Executive Summary

1.1 *Committee membership*

The Select Committee consisted of eight Members of the County Council: five Conservative; two Labour and one Liberal Democrat.



Mrs Sarah Hohler



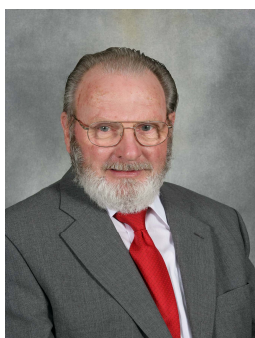
Mr Godfrey Horne



Mr Ivor Jones



Mr Richard King



Mr John Muckle



**Mrs Paulina
Stockell**



Mr Martin Vye



**Mr Frederick
Wood-Brignall**

1.2 *Terms of Reference*

- To gain an overview of sustainable flood risk management in Kent in light of current government policy and funding
- To gain an overview of action taken since 2001 to minimise flood risk to the residents of Kent (with reference to recommendations of KCC's 2001/2006 Reviews)
- To gain an overview of issues relating to planning control, flood resilience and flood risk in Kent and consider local planning authority roles in influencing planning decisions
- To consider what action or initiatives by KCC could lead to greater flood protection and resilience for Kent residents

- To consider what action or initiatives might benefit Kent residents in terms of preparedness and emergency planning for flood events
- To make specific recommendations on the topic of flood risk management for Kent County Council and partner organisations.

1.3 Evidence gathering

The Select Committee were resourced for a three and a half month period over the summer and during this period gathered evidence through desk research and received oral and written evidence from range of stakeholders including local councils, the Environment Agency, DEFRA, Kent Highways Service, Southern Water and Natural England. A list of witnesses who attended Select Committee hearings is given as Appendix 1 and a list of those submitting written or supplementary evidence is at Appendix 2.

1.4 Visits

Members undertook visits to a number of sites representing different aspects of flood risk management. A one day itinerary included visits to the Isle of Sheppey (Elmley and Warden Point); Ingress Park in Greenhithe and the Leigh Barrier south of Tonbridge.

1.5 Glossary of terms and acronyms

ACE	Association for Consultancy and Engineering
ADA	Association of Drainage Authorities
CAP	Common Agricultural Policy
CFMP	Catchment Flood Management Plan
CLA	Country Land & Business Association
CIRIA	Construction Industry Research and Information Association
COW	Critical Ordinary Watercourse
CPA	Compulsory Purchase Act (2004)
CPRE	Campaign to Protect Rural England
CSO	Combined Sewer Overflow
Culvert	Covered structure that conveys a flow under a road, railroad or other obstruction. Culverts are mainly used to divert stream or rainfall runoff to prevent erosion or flooding on highways.
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment Food and Rural Affairs
EA	Environment Agency
Enmainment	Designating a critical ordinary watercourse as a main river
EU	European Union
FLAG	Flood Liaison Advice Group
FRA	Flood Risk Assessment
GIS	Geographical Information System
GOSE	Government Office for the South East
GPS	Global Positioning System
Hereditaments	Property that can be inherited
HLT	High Level Target
KFRS	Kent Fire & Rescue Service
IDB	Internal Drainage Board
IT	Information Technology
KCC	Kent County Council
KHS	Kent Highway Services
KRF	Kent Resilience Forum
LDA	Land Drainage Act
LDD	Local Development Documents
LDF	Local Development Framework

LGA	Local Government Association
MAFF	Ministry of Agriculture, Fisheries and Food (now DEFRA)
MOD	Ministry of Defence
MSW	Making Space for Water
NAO	National Audit Office
NE	Natural England
NFCDD	National Flood and Coastal Defence Database
NFU	National Farmers Union
NGO	Non-Governmental Organisation
OFWAT	The Office of Water Services
OW	Ordinary Watercourse (any watercourse not a main river)
Pluvial	Relating to rainfall
RFDC	Regional Flood Defence Committee
Riparian	Relating to the banks of a river
RSS	Regional Spatial Strategy
SEERA	South East England Regional Assembly
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
SSSI	Site of Special Scientific Interest
Soakaway	Structure to collect rainfall from a catchment area prior to discharge into surrounding soil
SUDS	Sustainable Urban Drainage System
Swale	A grassed depression which leads surface water overland to a storage or discharge system, typically using the green space of a roadside margin. (Source: EA)
SWG	Severe Weather Group
UNECE	United Nations Economic Commission for Europe
WFD	Water Framework Directive

1.6 Introduction

- a) The Environment and Regeneration Policy Overview Committee convened a Select Committee for a short period in early summer to gain a broad overview of the current situation regarding the management of flood risk in the county. Kent has one of the longest coastlines of any English county¹ with many important coastal settlements, a rich and varied landscape with 28,500 hectares of designated conservation sites and a good deal of key infrastructure on low-lying land. Over 70% of Kent comprises agricultural land hence its fame as the 'Garden of England'. Kent has two of the major growth areas in the south east region: Ashford and Thames Gateway and numerous smaller growth areas which are likely to undergo intense development. Substantial sections lie in flood risk areas and, despite earlier Select Committee recommendations, pressure for house building may mean that some development in these areas goes ahead. Effective flood risk management is clearly a key component of Kent communities if they are to be sustainable into the future.
- b) Sustainable flood management has been defined in many ways including that which:

'provides the maximum possible social and economic resilience against flooding, by protecting and working with the environment, in a way which is fair and affordable both now and in the future'

*Source: Scottish National Technical Advisory Group, 2004
(Flood Issues Advisory Committee)*

- c) While the review was at the planning stage in June 2007, unprecedented intense rainfall caused unseasonal flooding. Parts of Kent were affected but the most devastating and severe floods occurred in the south west midlands and tragic loss of life occurred. These floods highlighted several important issues, not least they served to illustrate to the Committee that flooding can happen at any time, in any season and with enough severity to overwhelm defences.

'Few, if any, surface water systems would have coped with the intensity or duration of rainfall experienced in other parts of the country; we in Kent were very fortunate to have escaped.'

Source: I.D. Oliver, Romney Marsh Area Internal Drainage Board, written evidence

¹ 217km

- d) However, bouts of heavy rainfall have continued to affect Kent, overwhelming drainage systems and causing flooding, particularly in Folkestone, Hythe and Whitstable. Media coverage has provided a graphic background to this review and while we need to acknowledge that no defences can provide absolute protection from flooding, and no individual in this country has the absolute right to be defended against flooding, we are reminded both that there are numerous sources of flooding and that an effective emergency response is required to deal with any eventual flooding and its aftermath.
- e) Some flooding is avoidable with intelligent forward planning and adequate funding. Many of the recent floods have been exacerbated by ageing drainage systems which cannot cope and 'flash floods' following heavy rain have become a familiar and unwelcome sight. Clearly, funding must be made available to update these systems and all new developments must incorporate sustainable drainage with integral flood storage to avoid increasing runoff and adding to flood risk downstream. Failure to invest now will inevitably lead to increased costs later on, both in human and economic terms. It is essential to plan for the long term, factoring in increased risk of flooding due to the effects of climate change. Where there cannot be a total avoidance of risk, there are a number of options for building flood resilience into new properties and a growing flood protection industry that, if developed, could save homeowners, businesses and government alike, millions in lost revenue, insurance claims and distress.
- f) It is worth restating that in terms of climate change impacts, it is evident that past experience is no longer a good indication of what is likely to happen in the future.
- g) Although the Environment Agency has responsibility for the bulk of flood risk management, KCC has a number of roles and functions principally as a drainage body and highway authority, but also in relation to environmental management, strategic and emergency planning. The county council can also make a key contribution to flood risk management by performing a number of 'non-structural' actions for example by raising public awareness of flood risks and helping to publicise what is being, and could be, done to mitigate against them.
- h) Other KCC Select Committees have reported on topics relevant to this review in 2001 (Flooding in Kent), in 2005 (Water and Wastewater, particularly in Ashford) and in 2006 (Climate Change). The recommendations of the Climate Change Report are currently being progressed and KCC has appointed a Project Manager to ensure that climate change is factored in to all future business plans. As the 2001 review took place in the wake of serious flooding, the majority of its recommendations related to the emergency response at the time. This Select Committee has taken a fresh look at flood risk management in Kent and while there was insufficient time to follow up on each of the earlier recommendations in detail, they were borne in mind throughout this review.

- i) For flood risk to be managed effectively in future it will be necessary to take account of flooding from all sources: fluvial (river), pluvial (rainfall)/flash flooding, groundwater, as well as drainage (including sewerage related) and, most importantly for Kent, the risk of flooding from the sea. Currently responsibility for various types of flooding lies with a number of different agencies and while there is in most cases a high level of co-operation between them there is the potential for confusion and delay both in the normal course of events and during emergencies. Responsibility for different aspects of drainage and flood risk management is highly complex and, for example, around 200 organisations have a management interest in sea defence and coastal protection.²
- j) The majority of funding for flood risk management comes from the government. However competing demands within the Department for Environment and Rural Affairs (DEFRA) have impacted adversely on funds available over the past two years and although, following recent floods, some of the 'lost' funds will be reinstated, there has clearly been an impact on the progress of plans, defence schemes and essential maintenance.
- k) Having heard from a range of stakeholders the Committee are confident that progress has been made in terms of structural flood defence since the serious flooding in the county in 2000/2001. It will be necessary to retain a focus on the topic and secure adequate funding in order to ensure that these advances are not lost and that the excellent relationships and co-ordination between partner organisations are maintained and enhanced.

1.7 Summary of Recommendations³

Organisational Responsibilities

R1 That KCC look into setting up and resourcing a permanent Flood Risk Committee, in partnership with District Councils, to monitor: organisational changes affecting the management of flood risk in order to minimise the effect of such changes; the KHS gully clearance programme; non-structural means adopted by KCC and District Councils to reduce flood risk, and the Environment Agency's progress on proposed flood defence works as well as maintenance of existing defences.

Funding for Flood Defences

R2 That there should be adequate, ring-fenced, direct government funding for flood risk management to provide a more transparent system which will reassure the public that vital plans, strategies and flood defence work will not be compromised by competing demands within DEFRA or elsewhere.

² Institute of Civil Engineers (2001) Land Drainage and Flood Defence Responsibilities

³ Those recommendations the Select Committee see as most important are in bold type.

R3 That KCC should lobby the government to consider re-designating the flood management arm of the Environment Agency as a dedicated flood risk agency as well as giving the EA a strategic overview of all types of flood risk.

R4 That KCC promotes the further development of an Engineering Consultancy led by Canterbury City Council Engineers to disseminate good practice and offer training/ apprenticeships to build a practical skills-base and retain local knowledge/expertise in flood risk management.

Flood Risk Management plans

R5 That KCC supports development in brownfield and other areas subject to the rigorous application of site specific sequential and exception tests of Planning Policy Statement 25 (PS25).

R6 That KCC oversee the development of further sub-regional flood risk assessments, based on river catchments, and undertakes to monitor this development.

R7 That KCC ensures that its Environment and Waste Team are sufficiently resourced to enable them to: develop a county-wide coastal policy; maintain their oversight of Shoreline Management Plans (SMPs) to promote consistency across the county; and raise public awareness of plans.

R8 That KCC should lead on the co-ordination of work with landowners and other agencies to identify options for the funding of changed land-use or buy-out to ensure that plans to achieve more naturally functioning flood plains and coastline in Kent are arrived at equitably.

R9 That KCC works in partnership with the EA to ensure that River Basin Management planning is fully integrated with existing Catchment Flood Management Plans (CFMPs) and with regard to SMPs.

R10 That Kent Highway Services (KHS) and the EA seek to reconstitute Flood Liaison Advice Groups (FLAGS) in Kent (ideally catchment based), with representation from the insurance industry and local communities.

Urban Development, Drainage and Design

R11 That KCC instigates discussions between local planning authorities, Southern Water and others on the feasibility, benefit and cost implications of using non-return valves/sealed sewage systems in all new developments and existing developments where sewage flooding is proven to be a problem and requiring it to be a condition of planning consent.

R12 That KCC promotes the use of sustainable drainage systems (SUDS) throughout Kent with over-attenuation of surface runoff, guided by best

practice adopted by Canterbury and Ashford councils and findings of the integrated urban drainage pilots.

R13 That Kent planning authorities adopt the requirement for Drainage Impact Assessments for all new developments, following the Canterbury model.

R14 That the Fire & Rescue Service are included as an active partner in the planning process for new developments.

R15 That the Kent Design guide is revised to include information on mitigating flood damage and makes reference to innovative designs for the future, such as floating homes.

R16 That KCC lobbies government to produce a set of Building Regulations for use in flood risk areas so that planners are supported by increased but nationally consistent obligations to assist developers with a high level of flood proofing/mitigation.

R17 For KCC to work in partnership with the EA to publicise actions householders can take to increase the flood resilience of their homes.

R18 That KCC specifically allocate funding to enable the proposed road gully cleansing work to go ahead without delay and, where necessary, to enable the condition and capacity of highway drainage systems to be improved and the location of gullies and their characteristics to be recorded on GPS. That the KHS winter maintenance budget is readjusted to become an extreme weather budget.

R19 That KCC works in partnership with local authorities, the police and traffic wardens to inform the public about road drainage cleansing activities to address the issue of vehicles obstructing gullies and delaying vital works.

Condition of Kent Flood Defences

R20 That the government should urgently consider the EA's request for funding to enable vital works to proceed at Jury's Gap, Camber.

R21 That the EA should encourage the input of local authority and Internal Drainage Board (IDB) experts on local strategies and schemes and that IDBs gain representation on the Southern Regional Flood Defence Committee (RFDC) in order to optimise the benefit to be gained from local knowledge.

R22 That the EA develop and implement a phased rolling programme of maintenance to include 'low risk' areas (in collaboration with the Kent Internal Drainage Boards).

R23 That the EA prioritise clearance of waterways in the Romney Marsh Area.

Emergency Planning

R24 That the Kent Resilience Forum (KRF) Severe Weather Group (SWG) audit and promote the development of emergency plans/specific flood plans for at risk areas in liaison with the Environment Agency and develop and generic flood plan for Kent.

R25 That the government consider placing a duty (with funding) on the Fire & Rescue Service to respond to a flood emergency and further considers designating FRS as the lead body in charge of a flood incident.

R26 That the Kent Resilience Forum Severe Weather Group formulate and publicise an action plan in relation to flooding to raise public confidence in Kent's preparedness for flood events and consideration should be given to merging the SWG with the Flood Warning Planning Liaison Group to reduce duplication and avoid confusion as part of a wider streamlining of the group structure within the Resilience Forum.

R27 That KHS should send officers to work alongside local district colleagues in an emergency situation.

R28 That the Environment Agency, through its chairmanship of the KRF Severe Weather Group, should ensure there is a systematic survey of critical infrastructure (location and flood defences) and through the SWG promote work with utility companies to ensure supplies can be protected and maintained during flood emergency situations.

R29 That the Severe Weather Group liaise with partners in the Kent Resilience Forum and east coast authorities to formulate an emergency response plan for an extreme coastal event and, given the risk to life and property from sea flooding, assess whether the current warning system and communication processes are adequate or whether a siren system should be acquired for Kent, and that people are educated about what to do when they receive a flood warning.

Raising Public Awareness

R30 That KCC support the Environment Agency in raising flood risk awareness (including the appointment and training of flood wardens and to ensure that vulnerable people are identified and supported in emergency situations) via town and parish councils and similar community groups.

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Extracts from Learning Lessons from the 2007 Flood

An independent review by Sir Michael Pitt

Including:- Executive Summary
 Interim Conclusions
 Recommendations

Executive Summary

Background

During August 2007, Sir Michael Pitt was asked by ministers to carry out a review of the flood-related emergencies which occurred during the summer of 2007. This is the interim report of the Review. It is being published now to achieve three objectives:

- to identify issues which need urgent action;
- to set out the direction for the remainder of the Review; and
- to provide a document for consultation before the final report is published next summer.

The floods during June and July 2007 were a wake-up call. The three months from May to July were the wettest since records began and the events that followed have been linked to the deaths of 13 people. They also resulted in damage to approximately 48,000 homes and 7,000 businesses. Power and water supplies were lost, railway lines, eight motorways and many other roads were closed and large parts of five counties and four cities were brought to a standstill. From an emergency response standpoint, this was a new level of challenge. The flooding triggered a series of emergencies which stretched local resources to the limit.

Conversations with victims illustrated the scale of distress and human misery experienced by many people. Even considering the extraordinary degree of disruption caused by the floods, the country was fortunate that the impact was not much more severe. There were several near disasters of an even greater magnitude. While the scale of loss and damage was massive, the crisis would have been worse had it not been for the dedication, quick thinking and effective action of those involved in the rescue and recovery operation.

Flood risk is here to stay. The Review recognises the findings of other reports, such as Stern and Foresight, which predict climatic change and state that this country can expect more extreme weather, with periods of intensive rainfall. The Review proposes that the country should confront these mounting challenges and adapt accordingly, recognising that this process of adaptation will take place over a generation. The impact of the floods and the high level of risk involved could have been significantly reduced with stronger local leadership of flood risk management, clarification of roles, more effective cooperation between responsible organisations, better protection of infrastructure and wider and deeper public engagement.

Given the severity of the emergencies this summer and the risks we face in future, the over-riding purpose of the Pitt Review is to learn lessons from the

floods of 2007 and to bring forward recommendations that will help the country adapt and deal more effectively with future flooding incidents.

The findings

The Report contains a total of 15 recommendations and 72 interim conclusions. They are strategic in nature but with implications for every locality in the country. The Report also considers one or two of the 'myths' surrounding flooding. These include strongly held views about standards of waterway maintenance and the belief that some communities were deliberately allowed to flood to reduce the impact on places further downstream.

Chapters 1 and 2 provide the context for the Review, describing the severity of the emergencies and their wider social and economic impacts. They summarise the events of June and July and the effects the floods had on individuals, their families, businesses and communities. They are drawn from social research commissioned specifically for the Review, published in full as a supporting document to this Interim Report.

Climate change and the risk of flooding are discussed in **Chapter 3**. Ideally, experts would be able to accurately forecast bad weather and predict well in advance which properties will flood even more effectively than they already do. Doing so would give the emergency services and others more time to respond and to make the right decisions in a crisis. In practice the distribution, timing and intensity of rainfall and the dynamics of water flow once rain hits the ground are notoriously complex to model. Also, the nature of flooding is changing. In the past, considerable attention has been paid to the risks of coastal and river flooding. However, the greater intensity of rainfall and increasing urbanisation are leading to more flash floods caused by water running off the surface of the land. River, surface water and groundwater flooding all took place this summer, adding to the complications.

During the emergencies, the Met Office and the Environment Agency worked well together, but the limitations of some existing processes, together with technical limitations of flood prediction, meant that many property owners received warnings after their property had already flooded or not at all. Research into flood prediction is advancing and we believe this should be a priority subject to feasibility and cost effectiveness. Rapid progress must be made over the next few years to ensure that flood risk planning and management, including public warnings and emergency response, is underpinned by an improved understanding of when and where flooding will occur.

There are obvious concerns about the large number of properties currently at risk of flooding and the likelihood of further significant development in flood risk areas. **Chapter 4** discusses the need to strengthen and enforce the provisions of PPS 25 and Building Regulations to ensure that flood resistance and resilience measures are fully built into all new development where necessary.

The law relating to drainage systems is complex and numerous bodies are involved including the Environment Agency, water companies, local authorities, internal drainage boards and private owners. It is not surprising that the public are confused and that they wonder who is accountable. There is room for improved inter-agency cooperation. This Review recommends that the Environment Agency should take strategic direction of managing inland flood risks, while local authorities should adopt a new leadership and scrutiny role overseeing flood risk management within their local area.

In general, insurance companies responded quickly and effectively to the emergencies despite the vast number of claims they received from residents and businesses. However, some were less efficient than others and some people have received an unsatisfactory level of service. The Review is discussing with the insurance industry ways of achieving uniformly high standards and this subject will be reviewed again next year.

Chapter 5 deals with the calling of Gold, Silver and Bronze Commands and the response to the flooding emergencies. Relevant aspects of the Civil Contingencies Act were put into practice effectively and there is admiration for the way in which the emergency services and other responders worked tirelessly throughout one of the most complex, challenging and lengthy series of emergencies for many years. However, the Review also believes that the country was not as well prepared as it should have been.

Responders were surprised by the scale and duration of the emergencies and they often found themselves reacting to unexpected events. Sometimes basic information about operation and characteristics of the local drainage systems was unavailable when needed. The vulnerability of critical infrastructure and consequences of its failure were not fully appreciated in advance. The country must be better prepared and the Review makes a series of recommendations about national and local leadership, emergency planning, protection of local emergency facilities, water supplies, rescue and funding mechanisms.

In **Chapter 6** the Review is concerned about the major loss of essential services during the floods. Sites containing critical infrastructure were poorly protected. For example, tens of thousands of people found themselves without tap water and power, 10,000 were stranded on the M5 motorway overnight and 500 were left stranded at Gloucester Railway Station. Even greater loss of essential services was only narrowly avoided and there were major concerns about the complete failure of Ulley Reservoir. The Review makes recommendations on sharing information, building greater standards of protection and the closer involvement in preparedness planning of essential service providers, such as the water and power companies.

People depend on warnings and advice during an emergency. They will have important decisions to make about their safety and that of others, and about the risk of damage to their property. **Chapter 7** describes the efforts made by responders to keep the public informed and the contribution of local media – especially the ability of local radio to transmit up-to-the-minute broadcasts. The public appreciated the efforts of local

authorities and other organisations which systematically knocked on doors and checked on the well-being of residents and businesses. The Report sets out proposals for ensuring that advice and warnings from various agencies are better coordinated, that councils play their full part in reassuring the public and that people are made fully aware of any flood risk when they buy or rent property. It also makes clear that individuals and communities must share responsibility for actions to deal with flooding.

Next steps

This first Report sets out the Pitt Review's initial thinking and proposals after just four months' work. The Review has benefited from the extensive evidence already submitted, but much more needs to be considered before the final Report will be ready next summer.

In particular, further work needs to be done to consider the costs, benefits and feasibility of the interim conclusions. Interested individuals and organisations should let us have their views and join in a discussion over the coming months. You can find different ways to contact the Review Team set out in **Chapter 8**. The deadline for comments and further evidence is 31 March 2008.

Full List of Interim Conclusions

Chapter 3 – Building a better understanding of the risk

IC 1 - The interim conclusion of the Review is that Government takes the lead in making the case for the need for adaptation to climate change and particularly in mitigating the potential impacts on communities.

IC 2 - The interim conclusion of the Review is that the Government develops a clear strategy and action plan to deliver the provisions of the Climate Change Bill to support adaptation to increasing impacts from flooding.

IC 3 - The interim conclusion of the Review is that the Environment Agency further develops its tools and techniques for predicting and modelling river flooding, especially to take account of extreme and multiple events; and takes forward urgently work to develop similar tools and techniques to model surface water flooding.

IC 4 - The interim conclusion of the Review is that the Environment Agency revises its flood maps to identify areas where there is a risk of significant depths and velocity of water, to improve the effectiveness of emergency planning.

IC 5 - The interim conclusion of the Review is that the Environment Agency works more closely with Local Resilience Forums to provide information drawn from flood risk modelling and mapping tools to improve the accuracy and consistency of flood risk information in Community Risk Registers.

IC 6 - The interim conclusion of the Review is that the Environment Agency progressively develops and brings into use flood visualisation tools, designed to meet the needs of flood risk managers, emergency planners and responders.

IC 7 - The interim conclusion of the Review is that the Met Office and the Environment Agency produce an early assessment of the costs, benefits and feasibility of techniques which can predict where rain will fall and where surface water flooding will occur.

Chapter 4 – Managing Flood Risk

IC 8 - The interim conclusion of the Review is that PPS25 should be rigorously applied by local planning authorities, including giving consideration to all sources of flood risk and ensuring that developers make a full contribution to the costs both of building and maintaining any necessary defences.

IC 9 - The interim conclusion of the Review is that householders and business owners should not longer be able to lay impermeable surfaces as of right.

IC 10 - The interim conclusion of the Review is that the automatic right to connect surface water drainage of new developments to the sewerage system should be removed.

IC 11 - The interim conclusion of the Review is that no new building should be allowed in a flood risk area that is not flood-resilient, and that the Government should work with organisations such as the Royal Institute of British Architects and the building industry to encourage flood-resilient building and development ad development design.

IC 12 - The interim conclusion of the Review is that the Government should incorporate flood resistance and resilience requirements for new properties in flood risk areas into Building Regulations as part of the current process of revision.

IC 13 - The interim conclusion of the Review is the Government should incorporate requirements for resistant or resilient refurbishment of flooded properties in high flood risk areas into Building Regulations as part of the current process of revision.

IC 14 - The interim conclusion of the Review is the local authorities and housing associations should take a more active role in increasing the uptake of flood resistance and resilience measures, leading by example by repairing their properties with appropriate materials where it is cost effective.

IC 15 - The interim conclusion of the Review is that local authorities in high flood risk areas should extend eligibility for home improvement grants and loans to encompass flood protection and resilience products.

IC 16 - The interim conclusion of the Review is that local authorities, as they discharge their responsibilities under the Civil Contingencies Act 2004 to promote business continuity, should encourage the uptake of property-level flood resistance and resilience measures. This should be reflect in guidance from the Government.

IC 17 - The interim conclusion of the Review is that local authorities should lead on the management of surface water flooding and drainage at the local level with the support of all responsible organisations including the Environment Agency, water companies and internal drainage boards, the Highways Agency and British Waterways.

IC 18 - The interim conclusion of the Review is that local authorities in flood risk areas should assess their capabilities to deliver the wide range of responsibilities in relation to local flood risk management.

IC 19 - The interim conclusion of the Review is that the Environment Agency should have a national overview of all flood risk and that, Defra's work on the development of a national overview role for the Agency in relation to surface water flooding should be progressed.

IC 20 - The interim conclusion of the Review is that Surface Water Management Plans, as set out under PPS25, should provide the basis for managing surface water flood risk. These plans should be coordinated by the local authority and be risk-based, considering all sources of flooding.

IC 21 - The interim conclusion of the Review is that a local register of all the main flood risk management and drainage assets (overland and underground) should be compiled by the relevant local authority, including an assessment of their condition and details of the responsible owners.

IC 22 - The interim conclusion of the Review is that Defra should issue guidance on how all organisations can be brought together to work with local authorities on surface water flood risk management, sharing information, modelling and expertise on a consistent basis.

IC 23 - The interim conclusion of the Review is that the Government, as part of its Water Strategy, should resolve the issue of which organisations should be responsible for the ownership and maintenance of sustainable drainage systems.

IC 24 - The interim conclusion of the Review is that Defra should work with Ofwat and the water industry to explore how appropriate risk-based standards for drainage systems (including pumping stations) can be achieved.

IC 25 - The interim conclusion of the Review is that, as part of the forthcoming water industry pricing review, the water companies, in conjunction with local authorities and other partners, should develop proposals for investment in the existing drainage network to deal with increasing flood risk.

IC 26 - The interim conclusion of the Review is that local authority scrutiny committee review SWMPs and other linked plans, such as Local Development Frameworks and Community Risk Registers, to ensure that flood risk is adequately considered and to ensure greater transparency and progress in the management of that risk.

IC 27 - The interim conclusion of the Review is that it is appropriate for the Environment Agency and other local organisations to continue to focus investment on area of highest assessed long-term risk, whether or not they have been recently flooded.

IC 28 - The interim conclusion of the Review is that the Government should commit to a strategic long term approach to its investment in flood risk management planning up to 25 years ahead.

IC 29 - The interim conclusion of the Review is that the Environment Agency should open dialogue with all those landowners who will be affected by either a withdrawal from or significant reduction in maintenance of rural watercourses.

IC 30 - The interim conclusion of the Review is that the Government should develop a single national set of guidance for local authorities and the public on the use of usefulness of sandbags and other alternatives, rather than leaving the matter wholly to local discretion.

IC 31 - The interim conclusion of the Review is that Defra, the Environment Agency and Natural England should work with partners to establish a programme and framework to achieve greater working with natural processes, including the identification of appropriate sites and the development of more incentives for creating water storage, restoring the natural course of rivers and establishing green corridors.

IC 32 - The interim conclusion of the Review is that the Environment Agency should provide an analysis of the effect that land management practices had or would have had on the impact if flooding during the summer 2007 floods.

IC 33 - The interim conclusion of the Review is that flooding legislation should be updated and streamlined under a single unifying Act that amongst other outcomes addresses all sources of flooding, clarifies responsibilities and facilitates flood risk management.

IC 34 - The interim conclusion of the Review is that the Government and the insurance industry should work together to deliver a public education programme setting out the benefits of insurance in the context of flooding.

IC 35 - The interim conclusion of the Review is that the Government and the insurance industry work together to develop options to improve the availability and uptake of flood risk insurance by low-income households and assess the costs, benefits and feasibility of these options, before the Review's final report.

IC 36 - The interim conclusion of the Review is that, in flood risk areas, a note on flood risk and the simple steps that could be taken to mitigate it should be included with all insurance renewal notices. Moreover, if Flood Warning Direct is available in a customer's area, one of the conditions of renewal could be sign-up to this service.

Chapter 5 – The Emergency Response

IC 37 - The interim conclusion of the Review is that the Met Office and the Environment Agency should produce an assessment of the options for issuing warnings against a lower threshold of probability, including costs, benefits and feasibility; this will be considered further in the final report.

IC 38 - The interim conclusion of the Review is that unless agreed otherwise locally, 'upper tier' local authorities should be the lead organisation in relation to multi-agency planning for severe weather emergencies at the local level, and for triggering multi-agency arrangements in response to severe weather warnings.

IC 39 - The interim conclusion of the Review is that where a Gold Command is established, the police, unless agreed otherwise locally, should convene and lead the multi-agency response.

IC 40 - The interim conclusion of the Review is that Gold Commands should be established at an early stage on a precautionary basis where there is a risk of serious flooding.

IC 41 - The interim conclusion of the Review is that Local Resilience Forums should assess the effectiveness of their Gold facilities, including flexible accommodation, IT and communications systems.

IC 42 - The interim conclusion of the Review is that the Local Government Association should consider how best mutual support might be enhanced between local authorities in the event of a future wide-area emergency.

IC 43 - The interim conclusion of the Review is that Cabinet Office guidance to local planners should specifically include incidents which leave large numbers of people stranded on motorways and trunk roads.

IC 44 - The interim conclusion of the Review is that, as part of their emergency plans, Local Resilience Forums should consider the vulnerability of motorways and trunk roads to flooding, and consider the potential for earlier, stronger, more specific warnings, and strategic road clearance and closures, to avoid people becoming stranded.

IC 45 - The interim conclusion of the Review is that Defra should review the current requirement in emergency regulations for the minimum amount of water to be provided in an emergency, to reflect reasonable needs during a longer-term loss of mains supply.

IC 46 - The interim conclusion of the Review is that central government crisis machinery should always be activated if significant wide-area flooding of whatever nature is expected or occurs.

IC 47 - The interim conclusion of the Review is that Defra extends its current departmental programme to share best practice and provide training in emergency response across the organisation.

IC 48 - The interim conclusion of the Review is that Defra and the Environment Agency work together to establish a single London situation room to coordinate flooding information, to act as a focal point for cross-Defra efforts, and to support Defra ministers.

IC 49 - The interim conclusion of the Review is that is that a national flooding exercise should take place at the earliest opportunity in order to test the new arrangements which central government departments are putting into place to deal with flooding and infrastructure.

IC 50 - The interim conclusion of the Review is that financial assistance for local responders in relation to emergency response and recovery should be revised to improve speed, simplicity and certainty.

IC 51 - The interim conclusion of the Review is that Local Resilience Forums should be aware of recent Cabinet Office guidance setting out the transition to recovery. Recovery sub-groups should be established from the onset of major emergencies and in due course there should be formal handover from Gold Command to the local Recovery Coordinating Group(s), normally chaired by the Chief Executive of the affected local authority.

Chapter 6: Critical Infrastructure: Keeping Our Essential Services Going

IC 52 - The interim conclusion of the Review is that the Government should establish a systematic, coordinated, cross-sector campaign to reduce the disruption caused by natural events to critical infrastructure and essential services.

IC 53 - The interim conclusion of the Review is that the Government should develop and issue guidance on consistent and proportionate minimum levels of protection from flooding and critical infrastructure.

IC 54 - The interim conclusion of the Review is that infrastructure operating companies should present the case for further investment in flood resilience through the appropriate regulatory process.

IC 55 - The interim conclusion of the Review is that a duty should be introduced on critical infrastructure operators to have business continuity planning to BS 25999 in places to more closely reflect the duty on Category 1 responders. This should include minimising the loss of supply as far as practicable in the event of a serious emergency resulting from flooding.

IC 56 - The interim conclusion of the Review is that, in relation to information-sharing and cooperation, the Civil Contingencies Act and Regulations should be extended to require Category 2 responders to more formally contribute information on critical sites, their vulnerability and the impact of their loss.

IC 57 - The interim conclusion of the Review is that single points of failure and the complete loss of assets need to be explicitly considered in the risk assessment and contingency planning undertaken by operators, emergency planners and responders.

IC 58 - The interim conclusion of the Review is that Local Resilience Forums should ensure that Community Risk Registers reflect risks to critical infrastructure from flooding and other hazards.

IC 59 - The interim conclusion of the Review is that Category 2 responders should be required to participate fully at the Gold and Silver Commands and that the Government should deliver this through the Civil Contingencies Act or other regulatory regimes.

IC 60 - The interim conclusion of the Review is that emergency plans and business continuity plans of essential service providers should be reviewed annually by local authority scrutiny committees.

IC 61 - The interim conclusion of the Review is that critical infrastructure planning should become a separate discipline within civil protection at the local level.

IC 62 - The interim conclusion of the Review is that the Government should implement the legislative changes proposed in the recently published Environment Agency biennial report of dam and reservoir safety.

IC 63 - The interim conclusion of the Review is that all reservoir undertakers should be required by Defra to prepare inundation maps and share them with Local Resilience Forums to improve Community Risk Registers and emergency planning.

Chapter 7: Engaging the Public

IC 64 - The interim conclusion of the Review is that the Environment Agency should produce a sliding scale of options for greater personalisation of public warning information, including costs, benefits and feasibility, before the final report.

IC 65 - The interim conclusion of the Review is that the Environment Agency works with local responder to raise awareness in flood risk areas and identify a range of mechanisms to warn the public, particularly the vulnerable, in response to flooding.

IC 66 - The interim conclusion of the Review is that advice by telephone during a flood emergency should come from just two sources – the Environment Agency for flooding information and local authority contact centres for local advice.

IC 67 - The interim conclusion of the Review is that advice disseminated via the internet should be coherent by ensuring integration and consistency between local websites, including that of the Local Resilience Forum and those of the all category 1 responders.

IC 68 - The interim conclusion of the Review is that essential service providers should maintain continuous provision of public information during an emergency, through a website linked to other responders and local authority contact centres.

IC 69 - The interim conclusion of the Review is that the Government works towards a single definitive set of flood-related health advice for householders and businesses, which can be used by media and the authorities locally and nationally.

IC 70 - The interim conclusion of the Review is that council leaders and chief executives play a prominent role in public reassurance and advice through the local media during a flooding emergency as part of a coordinated effort overseen by Gold Commanders.

IC 71 - The interim conclusion of the Review is that flood risk should be made part of the mandatory search requirements when people buy property and should form part of Home Improvement Packs.

IC 72 - The interim conclusion of the Review is that the Government launches a public information campaign which draws on a single definitive set of flood prevention and mitigation advice for householders and businesses, and which can be used by media and the authorities locally and nationally.

Recommendations

REC 1 - The Review recommends that more frequent and systematic monitoring of groundwater levels at times of high risk should be undertaken by the Environment Agency, which should begin as soon as possible to predict and mitigate further serious ground water flooding from this winter onwards.

REC 2 - The Review recommends that the environment Agency, supported by local authorities and water companies, should urgently identify areas at highest risk from surface water flooding where known, inform Local Resilience Forums and take steps to identify remaining high risk areas over the coming months.

REC 3 - The Review recommends that the Environment Agency should urgently develop and implement a clear policy on the use of temporary and demountable defences.

REC 4 - The Review recommends that all Local Resilience Forums urgently review their current local arrangements for flood rescue to consider whether they are adequate in light of the summer's events and their local community risk registers.

REC 5 - The Review recommends that all Local Resilience Forums should undertake an urgent review of designated rest centres and other major facilities to ensure either that they have the necessary levels of resilience to enable them to be used in the response to flooding and other major emergencies, or that alternative arrangements are put in place.

REC 6 - The Review recommends that the Cabinet Office, with other departments, should urgently consider the costs, benefits and feasibility of establishing arrangements for the urgent acquisition of supplies during a major emergency, including the use of call-off contracts or the creation of national or regional stockpiles of equipment and consumables.

REC 7 - The Review recommends that that the Department of Health guidance clarifying the role and accountabilities of organisations involved in providing scientific and technical advice during a major incident should be implemented as soon as possible and understood by Gold Commanders.

REC 8 - The Review recommends that the guidance currently under preparation by Cabinet Office to provide local responders with advice on the definition and identification of vulnerable people and on planning to support them in an emergency should be issued urgently.

REC 9 - The Review recommends that, in order to effectively fulfil its Lead Department role for flood risk management and emergency response, Defra needs to urgently develop and share a national flood emergency framework.

REC 10 - The Review recommends that Category 1 responders should be urgently provided with a detailed assessment of critical infrastructure in their areas to enable them to assess its vulnerability to flooding.

REC 11 - The Review recommends that the Environment Agency should work urgently with telecommunications companies, consulting the Information Commissioner as necessary to facilitate the roll-out of 'opt-out' telephone flood warning schemes to all homes and businesses liable to flooding, including homes with ex-directory numbers.

REC 12 - The Review recommends that Local Resilience Forums urgently develop plans to enhance flood warnings through 'door-knocking' by local authorities based on an assessment of the post code areas likely to flood.

REC 13 - The Review recommends that that Local Resilience Forums urgently make arrangements to involve local media representatives in the local preparedness and response to support their public information role.

REC 14 - The Review recommends that members of the public make up a flood kit – including personal documents, insurance policy, emergency contact numbers (including local council, emergency services and Floodline – 0845 988 1188), torch, battery or wind-up radio, mobile phone, rubber gloves, wet wipes or antibacterial hand gel, first aid kit and blankets.

REC 15 - The Review recommends that members of the public increase their personal state of readiness and resilience to floods by following the Environment Agency's practical advice, where appropriate, as summarised below:

- Make sure you have adequate insurance. Flood damage is included in most buildings insurance but do check your home and contents are covered.
- Access the Environment Agency's website to check flood risks to property (this can be followed up by advice from the Agency, for example whether the property in question is protected to some degree by physical defences).
- Contact the Environment Agency to be registered on their Flood Warnings Direct scheme (however, this does not apply to surface water flooding or sewerage flooding and people should also make sure they remain alert to weather forecasts).
- Keep vital possessions, such as financial and legal documents and items of sentimental value, upstairs or stored as high as possible in waterproof containers and have plans in place to move items at short notice.
- Make a list of other useful numbers you may need – your local council, emergency services and your Floodline quick dial number.
- Make sure you know where to turn off your gas, electricity and water. If you are not sure, ask the person who checks your meter when they next visit. Mark the tap or switch with a sticker to help you remember.

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Extracts from the Environment Agency's 2007 Summer Flood Review

Including:- Executive Summary
 Conclusions
 Recommendations

Executive summary

Over 55,000 homes and businesses were flooded this summer. Many people are still facing several months away from their homes. The human impact is difficult to measure but insured losses are approaching £3 billion. Since rainfall records started to be collected in 1766 there has not been a wetter May to July period. Many locations were deluged with a month's rainfall falling in a few hours. The wet May and early June meant that the ground was saturated and could no longer help absorb rainfall. Extreme rainfall in late June and late July caused flash flooding where it fell and then accumulated in rivers to extend the impact to the floodplain. These floods were different in scale and type from recent severe floods. In particular, a much higher proportion of the flooding than normal came from surface water rather than rivers. Surface water flooding was at its worst in cities such as Hull but many villages and individual properties also suffered across the country from Bristol to Newcastle. Two-thirds of the properties flooded this summer were affected because drains and sewers were overwhelmed. River flooding was extensive in the rivers Don, Severn and Thames and their tributaries. It would have been worse but for the protection given by our flood schemes. Effective warnings went directly to over 34,000 homes to help them cope with the floods. Some locations – notably on the river Severn between Tewkesbury and Gloucester, the Thames upstream of Oxford, and South Yorkshire suffered record breaking flood levels. Many flood defences were just overwhelmed. Over 140,000 homes in Gloucestershire lost water supplies for over a week. There was serious damage to many schools in Hull and the M1, M4, M5, M18, M40, and M50 were closed as were many railway stations and lines. The floods highlighted few new issues. What they did was bring known issues into sharper focus. We welcome the Government Review led by Sir Michael Pitt into the floods. Our review has looked at the things that went well and those where more needs to be done. It highlights three areas of policy where action is needed by Government:

Strategic overview of inland flooding

In line with the Government's *Making space for water* strategy and its consultation on inland and urban flood risk management, the Environment Agency should be given a clear overview role for urban flooding from all sources which would provide the framework for local authorities and other partners to plan locally and work together to manage urban flood risk.

Critical infrastructure

Measures should be put in place to ensure that key utilities and public services take responsibility for climate change proofing critical infrastructure, facilities and services. All public authorities and private sector utilities that provide essential public services should have a duty under the forthcoming Climate Change Bill to take account of climate change impacts when providing their services.

Flood risk management investment

Future flood risk management investment needs to increase so that we can adapt to our changing climate. It also recommends three key areas for us and our partners to act on:

Flood warning

This summer over 35,000 homes and businesses flooded from surface water for which there is no specific warning service. Our warning service on rivers was effective for the majority. But we were not able to provide 4,100 properties – mainly on rivers which reacted quickly to the rain - with warnings due to the technical limitations of flood forecasting systems. Specific

warning to individual homes and properties about floods from surface water flooding is likely to be technically challenging and costly. We should examine with the Met Office what broader scale warnings about severe weather and potential floods can be provided to professional partners.

Flood event information and advice

The public, businesses including farmers, and our professional partners depend on the quality of our advice and information to make informed decisions and take action. We need to ensure that our advice, forecasts and warnings effectively trigger action by all of these groups. The extremely heavy demand on our services shows how people depend on our website (four million visits) and telephone (260,000 calls) systems. We need to ensure they offer clear, accurate and timely information which is readily accessible. We must work more closely with the media in the early stages of events

Incident response

Multi-agency incident response plans need to consider the possible impact on critical infrastructure more effectively. Our support to 'Gold' and 'Silver' control needs to be adequately skilled and resourced. We need to agree policy on temporary flood defences with our partners and consider responsibility for deploying them.

Conclusions

The strategic lessons identified from the summer floods are not new. The confusion over who is responsible for surface water flooding and the lack of a strategic lead on the issue was identified in previous flood reviews. Our work on developing ideas for Government to tackle this issue is included in Annexe A. Similarly, the vulnerability of critical infrastructure has been highlighted before. Work is in progress on both matters and needs to be concluded and decisions put into action as swiftly as possible. We believe that our overall performance was satisfactory. However, we have identified lessons from the floods and made recommendations for those things we need to improve. We are committed to taking action on these recommendations. We will develop an action plan to take forward the recommendations in our control by February 2008.

Our full list of recommendations is presented below. We have grouped them to provide clarity on who has lead responsibility for action. The most significant recommendations are presented in larger text. Generally the recommendations for Government are to ensure we have a solid framework to manage flood risk from all inland sources for the benefit of society in a changing climate.

Recommendations for the Environment Agency focus on improving further our forecasting and warning service and learning how better to communicate and use the results with our professional partners, businesses including farmers and the public.

The recommendations about working with others are about improving the services and advice provided by us and our partners so that others are well placed to deliver their incident response roles.

Recommendations for Government

Policy development priorities

Recommendation 1. We will review our flood forecasting development programme to make sure it reflects lessons identified from the summer floods and to see what scope there is to improve accuracy, reliability and timeliness.

Recommendation 2. We will review ways of using rainfall forecasts in our flood forecasting system to provide more timely warnings in fast-responding catchments.

Recommendation 3. Together with the Met Office, we should look at the best way of presenting and explaining weather forecasts and flood warnings so that our professional partners and the public better understands them.

We have limited numbers of flood forecasting staff. They were under intense pressure to provide advice during the flooding.

Recommendation 4. We will review the resilience of our flood forecasting teams.

Recommendation 5. With our professional partners, we will review how sirens and loudhailers are used for flood warning. We will review our flood forecasting models and threshold levels where flooding was not forecast sufficiently in advance.

Recommendation 6. The Government should help us to pre-register more people who could receive a flood warning by allowing us to use ex-directory numbers and the full electoral roll.

Recommendation 7. We will address the problems experienced in the floods by some of the public in obtaining an accurate picture of the flood situation on all our systems.

Recommendation 8. We will work with the farming and boating communities and their representatives to find ways of improving advice and warning about flood flows.

Recommendation 9. We will review our professional partners' specific needs, so that we and the Met Office provide forecasts and warnings which mean they can easily take action.

Recommendation 10. We and our professional partners should review the ways we coordinate the provision of advice and information on all aspects of flooding to the public.

Recommendation 11. The Government should consider our proposals to develop surface water risk mapping and flood warning tools for our professional partners with a view to later wide scale application.

Recommendation 12. The Government should act in line with its Making space for water programme, responses to its consultation on inland and urban flood risk management and the lessons learned from the summer floods to give the Environment Agency a strategic overview role for inland flood risks.

Recommendation 13. The Government should review if flood risk protection standards for inland, coastal and surface water flooding are still appropriate in view of climate change.

Recommendation 14. The Government should consider whether investment in flood risk management for all sources of flooding is adequate.

Recommendation 15. We will use information collected about the performance of flood defences to refine our asset management system.

Recommendation 16. We will review the timing and frequency of certain river maintenance activities and explain clearly the reasons for our approaches to river maintenance to affected communities.

Recommendation 17. We will revisit our business continuity plans to make sure procedures are appropriate for the direct and indirect impacts of extreme floods.

Recommendation 18. We will raise the profile of critical infrastructure with resilience forums so they review how vulnerable critical infrastructure is to flood risk, and revise risk registers and plans. The pollution and health risks should be integrated into plans.

Recommendation 19. The Government should put measures in place to make sure that key utilities and public services take responsibility for protecting their assets and facilities appropriately. We propose that all public authorities and all private sector utilities that provide essential public services should have a duty under the forthcoming Climate Change Bill, in line with those for Category 1 and 2 responders under the Civil Contingencies Act, to take account of future climate change impacts when providing their services.

Recommendation 20. We will review whether we can use our permitting systems more effectively to encourage industry to make sure that sites are capable of coping with flood events.

Recommendation 21. The Government should review the reservoirs legislation to improve the way it protects the public.

Recommendation 22. It is essential that policy on development in the floodplain, PPS25 in England and TAN15 in Wales, is firmly applied. Where development does go ahead in areas of flood risk the developers must be responsible for achieving adequate flood risk management.

Recommendation 23. Multi-agency emergency response plans should be reviewed to make sure that they are consistent with the Civil Contingencies Act, and that all professional partners have access to adequate resources for managing flood events.

Recommendation 24. We need to be clear about the information and data COBRA and Defra expect from us, and build these requirements into our systems and procedures. Government should consider the benefit of a web based system to share incident information.

Recommendation 25. We will review our capability to provide effective data management and computer simulations. We will also review our incident room facilities.

Recommendation 26. We will widen our training and development programme to make sure we can provide appropriate support through effective roster arrangements to all levels of emergency incident management throughout events that last a long time.

Recommendation 27. We will review how we handle data and reporting during major incidents to reduce the risk of duplicated effort, help timely reporting and minimise the pressure to gather data after the event. We also need to consider introducing an event management computer system.

Recommendation 28. We will review our policy on temporary flood defences.

Recommendation 29. We and our professional partners should explore new ways to get the safety message across to the public and media.

Recommendation 30. We will be more visible early in incidents to reassure the public and make sure we provide authoritative and consistent messages to the media. People need to know when we are on-site and in incident rooms.

Recommendation 31. We should maintain and regularly update policy and operational guidance for the environmental management aspects of floods with the Health Protection Agency and Local Government Association.

Recommendation 32. We need to revise our good practice guidance and share this with our partners, so that we effectively plan to include the work of flood ambassadors and flood surgeries in the response and recovery phase.

Recommendation 33. People need to be more aware of the risks of flooding and better prepared to protect themselves and their properties. We should promote more people signing up to our flood warning service, protecting their properties more by using door guards and air brick covers and other measures to protect them from the effects of flooding, and increasing the number of homes being built or restored to withstand flooding.