Appendix K: Upper Thames Policy Unit CFMP

Upper Thames Policy Unit

The Upper Thames policy unit is characterised by extensive floodplains, with small clusters of development in a rural landscape. Our flood risk management approach for this type of catchment is outlined below.

Undeveloped natural floodplain

- The floodplain is our most important asset in managing flood risk.
- Maintaining (and in some places enhancing) the capacity of the natural floodplain to retain water, combined with maintaining conveyance of watercourses in urban areas reduces the risk of flooding and has benefits for the natural environment.
- We want to safeguard the natural floodplain from inappropriate development.
- Managing the consequences of flooding will become increasingly important, particularly by buildings and communities becoming more resilient to flooding and those who are at risk taking effective action at times of flooding.

This approach will deliver our policy for the Upper Thames*: Take action to increase the frequency of flooding to deliver benefits locally or elsewhere (which may constitute an overall flood risk reduction, e.g. for habitat inundation)*

Upper Thames - What we want to achieve

- Maintain the capacity and function of the undeveloped natural floodplain to retain water so that it can continue to reduce the impact of low order flood events to people and property.
- Seek to enhance the capacity of the undeveloped natural floodplain. Recognising that this will require structural measures, this is more likely to be achievable upstream of sizeable communities at risk from flooding where the social, economic benefits are more clear-cut. Further refinement of the Upper Thames policy unit may be required to reflect the outcomes from these investigations.
- Align the objective of maintaining or enhancing floodplain capacity with expansion and enhancement of floodplain environments, particularly BAP habitat.
- Continue to reduce the impact of low order flooding in urban areas (up to a 10% to 20% AEP flood – 1in 10 to 1 in 5 year return period) by maintaining conveyance where it is both effective and sustainable to do so.

- Reduce the consequences of flooding through continued action to raise public awareness of flooding, tailoring the advice and approach (e.g. community based) to ensure those 'at risk' take appropriate action to respond to flooding.

- Safeguard the existing undeveloped natural floodplain through the appropriate application of the sequential test within PPS25.

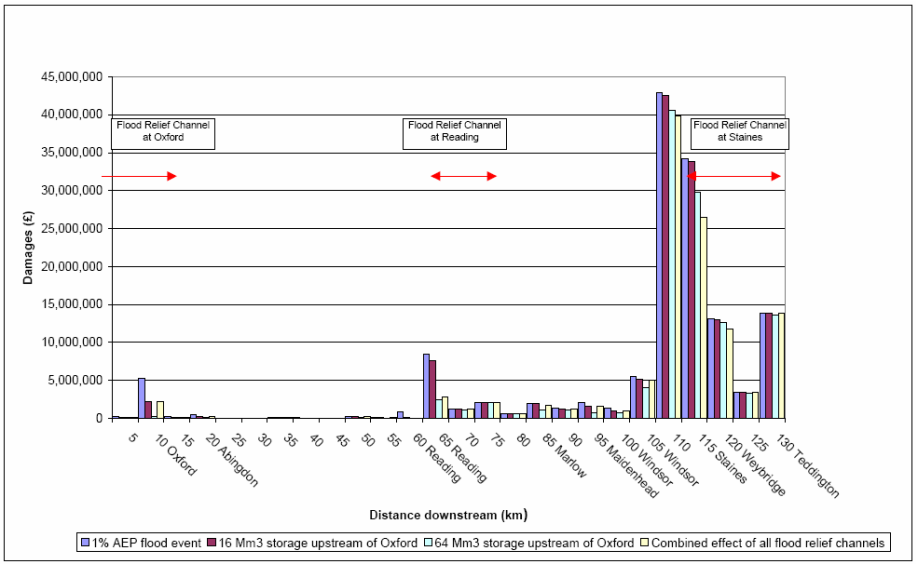
- Maintain, or in some cases re-establish, river corridors so that urban areas can better accommodate flooding (location and layout) and the buildings are more resilient to flooding (design). In the long-term this should be achievable through re-development. It must be recognised that this is a long-term objective.

- Progress options to reduce the risk of flooding in Banbury and in the Churn catchment.

SEA, Key Approaches and Regional Priority

	Summary of the Preferred Approach
Policy Unit	Upper Thames
Problem / Risk	2.2% of the economic consequences of fluvial flooding in Thames region 1.5% of the social consequences of fluvial flooding in Thames region 35% of the floodplain, channel and designated environmental assets in Thames region • 4800 properties at risk from a 1% AEP flood event • 6280 properties at risk from a 0.1% AEP flood event • Low levels of social deprivation • Approximately 60km^2 of floodplain BAP habitat (predominantly floodplain grazing marsh with small areas of fen and reedbed). • 312km^2 of floodplain (96% undeveloped and 4% urban) • There are six SSSIs that have been recognised at European level in this policy unit. For each of these sites, flood risk management policy and practice has a direct impact on the conditions of the site. Four are collectively designated as the **Oxford Meadows** SAC. Oxford Meadows includes vegetation communities that are extremely rare across the world, reflecting the influence of long-term grazing and hay cutting on lowland meadows. The Oxford Meadows are critically dependent on groundwater levels and annual flooding. The remaining two SSSIs make up North Meadow and Clattinger Farm SAC. This is considered to be one of the best areas of lowland hay meadows in the UK. To maintain the habitat, winter flooding should be maintained and if possible increased. • 1230km of natural channel • 27km of maintained or modified channel. Predominantly bank lining and some small sections of raised embankment (for example in Banbury, Standlake and Kidlington) People and property at risk of flooding is widely dispersed, with some clusters

	of property at risk mainly in historic market towns (e.g. Banbury, Cirencester, Witney).
Policy	P6: Take action to increase the frequency of flooding to deliver benefits locally or elsewhere (which may constitute an overall flood risk reduction, e.g. for habitat inundation).
Existing Approaches and Impacts	• Approx £1100k pa on maintaining channel conveyance to reduce the impact of high frequency, low order events (up to 10% AEP). Based on the available detailed flood modelling from the Upper Thames (covering the Thames upstream of Lechlade and the Windrush), approximately 30% (over 1500) properties are potentially at risk from a 10% AEP flood. There are no major defences in the Upper Thames and maintenance is aimed at maintaining the capacity of the natural channel to convey flow. Maintenance expenditure per length of watercourse is low in the Upper Thames, whilst expenditure per property at risk is above average for the region. This can be expected in the Upper Thames where there are relatively few flood defences and a greater dependence upon watercourse maintenance to manage the probability of flooding. • Flood Warning. Approximately 20% of properties at risk are signed up to the Direct Flood Warning service. The majority of properties at risk are in locations where it is possible to provide an adequate flood warning for fluvial flooding. • Application of PPS25.
Justification (Balancing Objectives)	Based on the current drivers for flood risk management, there is unlikely to be a step change in any of the indicators in the near future. Within the Upper Thames, the biggest potential is to increase the environmental assets of the region. This could be achieved at different locations and scales within the policy unit with small, but positive, impacts on both economic and social indicators under a P6 policy. FRM priorities will mean that there are limits in how far we can implement this policy in the next 5 years. The intention is to achieve the selected policy (P6) across the whole of the Upper Thames. In most places we will be seeking to attenuate water, but recognise that across such a large policy unit we will not do this everywhere. One of the actions in the Action Plan proposes a broad assessment of some of the Making Space for Water principles (for example flood attenuation). Following this work it is likely that there will need to be a refinement of precisely how the policy will be implemented in the Upper Thames.

Policy unit-wide Opportunities & Constraints	Maintaining or enhancing floodplain capacity to store water to provide direct environmental benefit and small, localised economic and social benefits. Small to moderate scale redevelopment of towns provides an opportunity to gradually reduce the consequences of flooding. Large scale flood storage in the Upper Thames could significantly reduce the flood risk to Oxford and other towns along the River Thames (with the impacts diminishing downstream). The diagram below shows the impact storage in the Upper Thames on downstream receptors. Firstly the impact of large scale storage (16 million cubic metres) and secondly, very large scale storage (64 million cubic metres). Damages in Oxford are reduced by about 50%, in Reading by 10 to 20% and in the Lower Thames by 3%.  For the attenuation of water to significantly reduce the probability of flooding, large scale engineered flood storage would be needed. Storage upstream of Oxford on the Thames may be possible and is being investigated through the Oxford flood risk management strategy, but there are many uncertainties associated with this approach. In summary these are that; • The storage area will need to be very large to reduce the flood risk to Oxford and the Thames corridor (covering an area perhaps 10 to 20 square kilometres). Land may simply not be available to implement such an option. • The cost of such a construction maybe too high compared with the potential benefits and will not therefore be justified economically. • There are many sensitive water-dependent environmentally designated sites downstream of any potential flood storage area.
Assessment of proposed approach (Against Economic, Social and Environmental Indicators)	To manage the economic consequences, approaches that are more effective at managing dispersed risk are most suitable: Application of the Sequential test, Flood Warning, Flood Awareness and Maintenance focused on reducing the impacts from low order flood events and Community Engagement. There are technical constraints in progressing possible Flood Defence schemes in most places in this policy unit and they will not generally be a priority for national funding. If Resilience and Resistance approaches prove to be a viable part of the flood risk management toolkit, there could be a more significant change to the economic and social consequences of flooding. Actions are focused on these approaches.

	The existing flood risk from low order flood events in the many towns and villages in this policy unit is reduced by maintaining the conveyance (up to 1500 properties may be at risk from low order flooding up to a 10% AEP event). There is a very large increase in damages arising under a P1 and P2 policy. However, the effectiveness of maintenance under policies P3 to P5 will need to be considered if the impacts of climate change are as severe as anticipated. P4 can only realistically be achieved in this policy unit (in the short-term) with quite a significant increase in resources (to remove restrictions to flow in most towns and villages) or to make more of the existing properties at risk resilient to flooding. P6 assumes the same level of resource so that this risk reduction can take place alongside environmental improvements. The potential (at a technical level) to enhance and expand the existing habitat is very high in the Upper Thames. The existing habitat is significant at a regional scale, there is potential for improvement and this would be compatible with our aim of maintaining or enhancing the capacity of the natural floodplain to store water. The areas where there is the highest potential for wetland BAP creation are on the lower-lying, flatter areas of floodplain along the Thames and the downstream reaches of the Cherwell. This is where the relevant geology and environmental conditions overlap with areas with a high groundwater table and/or that are inundated with floodwaters. There is also high potential in a number of catchments in the Upper Thames, for both land use and land management change. These factors have been the primary drivers for the policy selection. The selected policy supports the requirement for regular flooding to the internationally designated sites that make up the Oxford Meadows SAC and the maintenance of water levels at North Meadow and Clattinger Farm SAC.
Risks, Uncertainties & Dependencies	Dependent on the application of Making Space for Water principles (floodplain management, resilience and resistance measures) for a significant change. Dependent upon successful application of the sequential test, community engagement and acceptance of flood risk for an evolutionary change.
Regional Priority (0-5yrs)	Low overall. Some can be achieved through an evolution of approach and the priority recognises that the rate of change will be moderate.
Policy key and policy approaches	Selected Policy
	Sustainable Policy (not selected because of constraints)
	Most likely short-term outcome (where this differs from the selected policy)
P1	Do Nothing
P2	Flood Warning and awareness through existing mechanisms Emergency maintenance to remove blockages in urban locations
P3	P2 + Maintain conveyance in urban areas & the capacity of the natural floodplain within and upstream of this policy unit Application of PPS25 Maintain weirs
P4	P3 + Removal of restrictions to flow in urban locations on the tributaries BAP creation
P5	P4 + Resilience Banbury FAS
P6	P5 + Application of Making Space for Water with a focus on attenuation in key catchments

Resource Impliations	Gradual shift of resource towards Making Space for Water. £100k of planning in the next five years. Widespread attenuation would require capital resources to implement. The planning will need to identify the potential more precisely.
Key Actions (Developed in Action Plan)	Asset management and maintenance planning Spatial Planning Flood warning and flood awareness Making Space for water approaches (particularly relating to use of floodplains)

Policy Unit Commentary

We want to maintain the conveyance of watercourses in developed areas and maintain and where we can, enhance the ability of the floodplain to retain water. This is to manage the impacts from low order – normal winter – fluvial flood events.

To manage the impacts from bigger flood events or other sources, in most locations consequence responses, will be more effective, achievable and sustainable in the long-term. This includes a minimum standard of flood warning provision, collective community and local authority based action and emergency planning and adaptation of vulnerable assets including homes and businesses.

Any investigations into the implementation of this policy following the July 2007 floods in the Upper Thames will develop these principles.

The Upper Thames policy unit covers a very large area of the Thames catchment upstream of Oxford. This includes the river Thames from its source to Oxford, it's main tributaries along this stretch and many kilometres of smaller watercourses, ditches and drains.

In the past many of these watercourses have been managed by landowners and organisations, for land drainage purposes. This has involved adapting and periodic clearance of the channels to maintain capacity.

In terms of managing the probability of flooding, our approach is based on maintaining adequate channel capacity within developed areas, coupled with maintaining the capacity of the natural floodplain to retain water. This approach will continue to reduce the impacts from low order flood events. This will be a general objective throughout the policy unit.

Over such a large area, however, there are a range of flood risk issues. For example, there are clusters of properties at risk from flooding in many of the market towns located within this predominantly rural policy unit. In some of these places, some specific localised measures to reduce the probability of flooding may well be implemented. They will however be localised and not be implemented on a scale which would compromise our overall objective. Rather than trying to identify every localised measure that may be implemented we have defined a general

approach for the whole policy unit, but recognise that it will not be implemented comprehensively everywhere.

The Upper Thames has the following characteristics;

- A wide, predominantly natural, Thames floodplain.
- Tributaries draining from the Cotswold Hills, notably the Churn, Windrush, Evenlode and Cherwell.
- 4,800 properties at risk from flooding. Most are widely dispersed throughout the policy unit, but there are clusters of properties at risk (more than 100 properties) in Banbury, Kidlington, Bicester, Witney and Cirencester.
- A range of floodplain environmental assets including extensive areas of BAP habitat (mainly grazing marsh).
- Fluvial flooding tends to occur following periods of prolonged heavy rain, more likely between October and April.

Our proposed approach to managing the flood risk is based on maintaining the capacity and function of the floodplain to retain water. The floodplains of much of the Upper Thames provide natural storage of water during times of flood. This reduces the impact of flooding to property locally within this flood risk area and downstream. We are adopting a policy of accommodating more flooding in the undeveloped; this recognises the current value of the Upper Thames floodplain and how with further intervention its value can be maintained or enhanced. This approach may, for instance, have a role in our adaptation to the possible impacts of climate change.

Taking an approach that utilises the floodplain and catchment characteristics presents a new opportunity for risk management in these locations. The amount of benefit that is realised will be dependent upon the scale of our interventions. There may be the potential to deliver this policy on such a scale that it contributes to the flood risk management of downstream areas. This will need a close collaboration between land and water management. Even at this scale of intervention the majority of the benefits are likely to be local. However there could prove to be cumulative benefits, particularly in the long term.

At present our ability to **deliver** this approach to managing the flood risk is uncertain. This entire approach is dependent upon Making Space for Water principles being put into practice. We will need to work alongside new partners, and establish different ways of working.

How we could deliver the approach of enhancing the ability of floodplain to retain water, alongside maintaining channel capacity in developed areas

The list below shows examples of the different scales of intervention that could be used to deliver the flood risk policy. In broad terms the cost of measures and the amount of benefit increases moving down the list.

1. Change the operation of the existing water level control structures to retain more water on the land.
2. Removal or modification of structures that prevent inundation of the natural floodplain. e.g. Low level embankments at Chimney Meadows on the River Thames, and locations in the Cherwell catchment.
3. Restore channels e.g. River Cole
4. Re-establish water meadows e.g. Churn catchment
5. Alter land use and management
6. Maximise the use of gravel extraction sites for water level management and flood storage e.g Cotswold water park.
7. Bunds across floodplain to provide increased flood water storage within the natural floodplain e.g. Windrush catchment, Thames upstream of Oxford.
8. Engineered storage reservoirs of significant volume on main rivers.

We do however recognise the current day constraints in making a strategic shift towards the kind of flood risk management activity described above. The uncertainty in our ability to deliver this approach is based on;

- Flood risk within the Environment Agency is managed to a consistent national framework through a set of targets. The approaches to manage flood risk most effectively in Thames region are no longer commensurate with these national targets.
- At present we can only implement a few of these measures in a few locations. There are no UK precedents for these types of actions on this type of scale.
- For some of these interventions we can only demonstrate a local benefit. To justify them we need to demonstrate the cumulative benefit.
- Many of these interventions are not ‘tried and tested’. They appear more risky than other types of intervention.
- There will need to be significant changes to policy and operational practice with some wide ranging implications.

The implementation of this policy recognises the value of the existing watercourses and floodplain as a flood defence. The floodplains of the Upper Thames are not protected by flood defences and provide natural storage of water during times of flood. This reduces the impact of flooding to property locally within this flood risk area and downstream. Through this policy we would like to enhance the effectiveness of the floodplain and catchments in reducing flood risk to people and property.

The interim period – evolution of existing approaches

As highlighted, there is a lot of uncertainty as to whether this approach can be fully implemented and there will be a reliance on adapting our existing approaches in the interim.

One of our main messages is that flood defences cannot be built to protect everything. Where there are clusters of properties at risk in the floodplain, in all but a few cases, it is unlikely that any significant flood defences will be constructed.

As described, some flood protection is provided by the capacity of the river channels and storage within the natural floodplain. The level of maintenance that we carry out to river channels and riverbanks is prioritised according to the level of flood risk and the effectiveness of the maintenance in reducing the likelihood of flooding in a particular place. Maintenance is generally effective in reducing the impacts of flooding that would be expected to occur most winters so the objective of our maintenance is to reduce the impact of low order flooding up to a 20% to 10% AEP flood (1 in 5 year to 1 in 10 year return period). In flood events more extreme than this, channel and bank maintenance (including dredging) has no impact and is therefore ineffective in managing the flood risk in these situations.

Most of the towns and villages where there are properties at risk from flooding are well established. Strategic Flood Risk Assessments in the Upper Thames need to focus on the application of the sequential test to avoid inappropriate development in the floodplain and ensure that policies do lead to risk reduction where redevelopment does occur. The message that new flood defences are highly unlikely in most places enforces this message. This means any planning decision that affects buildings or infrastructure at risk should reduce the likelihood and consequences of flooding. Providing the appropriate Strategic Flood Risk Assessments are carried out and we have policies based on PPS25 within Local Development Frameworks, then a Spatial Planning delivery plan will not be needed across the whole policy unit.

We need to ensure that adequate flood warning is available, that local drainage functions effectively and that vulnerable assets are resistant or resilient to water from any source. These actions could be pursued independently. In many cases there may be a community based collective approach may be more effective. There are questions to be resolved associated with adaptation of vulnerable assets; in particular the role of the individual, private sector (eg insurance industry, Water Companies) and public sector (LA and EA) in planning, funding and implementing these responses. There are three questions that will be investigated;

1. Priorities and timescales for locations within the Upper Thames
2. Defining the most effective blend of these responses
3. Working out who will deliver and with what resource

Upper Thames - Policy Delivery

What we want to achieve	Action and Mechanism	Indicator	Partners	Timescale
Maintain the capacity and function of the undeveloped natural floodplain to retain water so that it can continue to reduce the impact of low order flood events to people and property. Seek to enhance the capacity of the undeveloped natural floodplain. Recognising that this will require structural measures, this is more likely to be achievable upstream of sizeable communities at risk from flooding where the social, economic benefits are more clear-cut. Further refinement of the Upper Thames policy unit may be required to reflect the outcomes from these investigations. Align the objective of maintaining or enhancing floodplain capacity with expansion and enhancement of floodplain environments, particularly BAP habitat	**Develop a potential action plan to implement a flood risk management regime based on Making Space for Water principles.** This will need to include a broad assessment of the costs and benefits and include a link to Outcome Measures. The plan, initially could, for example, focus on the following: 1. Identify areas of floodplain where the capacity to retain water could be enhanced. Cross check this with the current Performance Specifications and developing Asset System Plans. 2. Identify those areas from (1) that are upstream of property and carry out a broad assessment of the benefits. Build up an iterative picture of the such opportunities within the upper Thames to gain some sense of the cumulative local benefits and cumulative catchment benefits. Assess the degree of attenuation that could potentially be achieved. 3. From areas identified in (1), assess the proximity to existing BAP habitat and the potential to combine the use of floodplain with enhancement or expansion of floodplain BAP habitat 4. From existing work, map those areas where there is potential to reduce rural run-off through land use change or land management change. Assess their potential effectiveness by their proximity to properties at risk from flooding.	AAD Area of BAP Length of natural channel	Environment Agency	0-5 Yrs

What we want to achieve	Action and Mechanism	Indicator	Partners	Timescale
Continue to reduce the impact of low order flooding in urban areas (up to a 10% to 20% AEP flood – 1in 10 to 1 in 5 year return period) by maintaining conveyance where it both effective and sustainable to do so. Align the objective of maintaining or enhancing floodplain capacity with expansion and enhancement of floodplain environments, particularly BAP habitat	**Define adequate conveyance within developed areas through SAMPS and Performance specs** **Define and implement EA maintenance regime to meet these objectives** **Communicate this to communities (link to community consequence management) – perhaps akin to a proactive flood surgery in many communities irrespective of whether flooding has occurred recently** **Encourage communities to self regulate and where critical enforce** Further communication to build on the work of the July 2007 flood surgeries and the flood investigation reports. Use this engagement and information to build effective relationships with both partners and communities. Establish common expectations on respective roles The level of maintenance that we carry out to river channels and riverbanks is prioritised according to the level of flood risk and the effectiveness of the maintenance in reducing the likelihood of flooding in a particular place. Maintenance is generally effective in reducing the impacts of flooding that would be expected to occur most winters so the objective of our maintenance is to reduce the impact of low order flooding up to a 20% to 10% AEP flood (1 in 5 year to 1 in 10 year return period). In flood events more extreme than this, channel and bank maintenance (including dredging) has no impact and is therefore ineffective in managing the flood risk in these situations.	AAD People and properties at risk	Environment Agency	On-going

What we want to achieve	Action and Mechanism	Indicator	Partners	Timescale
Reduce the consequences of flooding through continued action to raise public awareness of flooding, tailoring the advice and approach (e.g. community based) to ensure those 'at risk' take appropriate action to respond to flooding.	Identify those places where an adequate flood warning is not currently provided Investigate whether this situation can be improved and where possible implement e.g. through detection or forecasting. Where this situation cannot be improved, work with the Local Authority to address the question of what is vulnerable, what is the response under what circumstances Compliment the warning available with an awareness and action plan to ensure consequences of flooding reduced.	Vulnerable groups at risk	Environment Agency LPAs	0-2 Yrs
Safeguard the existing undeveloped natural floodplain through the appropriate application of the sequential test within PPS25. Maintain, or in some cases re-establish, river corridors so that urban areas can better accommodate flooding (location and layout) and the buildings are more resilient to flooding (design). In the long-term this should be achievable through re-development. It must be recognised that this is a long-term objective	Carry out an investigation to identify where redevelopment can have the most direct and effective impact on flood risk and then engage in very early dialogue with relevant Local Planning Authorities.	AAD People and properties at risk	LPAs Environment Agency	Ongoing
Progress options to reduce the risk of flooding in Banbury and in the Churn catchment	Progress the Banbury FAS Progress options arising from the River Churn strategy	AAD People and properties at risk	Environment Agency	0-10 Yrs