7 Delivering the CFMP

7.1 Action Plans

Our proposals for managing flood risk within the Thames CFMP area highlight a different approach to some of the work we already do, together with the need for some new activities. We cannot do this work on our own. It can only be achieved through working together with other organisations.

The proposed action plans for each policy unit highlight the start of some of the work that needs to be done to allow us to manage the flood risk for the people and properties within the Thames CFMP area.

The actions are in addition to our main responsibilities for managing flood risk. These include:

- Preventing inappropriate development in the floodplain
- Providing a flood warning service
- Maintaining flood defence structures and watercourses
- Creating and maintaining floodplain habitat
- Planning new flood risk management schemes

There are four points to consider in taking the proposed actions forward:

1. The Thames CFMP **cannot** be implemented through a series of actions that exist as a project.
2. The outcome of the Thames CFMP is that we need a more integrated approach to managing flood risk within the Environment Agency and strategic partnerships with the organisations that we work with. This will require evolution and adaptation within the business. The Thames CFMP can only be implemented by the whole business evolving and adapting. This cannot be defined in a series of actions.
3. The potential actions develop the sustainable approaches identified within the Policy Appraisal. However, the majority of the most effective actions do not represent business as usual. Change within the business will be required to take forward all of the actions.
4. As such, many of the actions propose how an approach could be taken forward, but may not represent the best way of doing so (as many of the approaches are untested). This part of the CFMP will change and become more specific over the next few years as we learn more. We will update this chapter continuously and this will make the plan more useful.

The timescales for the actions are classified as short (0-3 years), medium (3-10 years) and long (over 10 years).

Table 7.1 Upper Thames policy unit action plan

The **Upper Thames** policy unit is predominantly a rural part of the region with numerous villages and market towns and characterised by extensive natural floodplain. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas

This approach will deliver our policy for the Upper Thames*: **P6** – take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
UT1	**Making Space for Water** Reduce the uncertainty associated with increased attenuation in the Upper Thames by carrying out some simple investigations in the short to medium-term so that the most effective way of implementing any potential options can be decided. This could comprise: 1. Identify areas of floodplain where the natural characteristics of the floodplain (geology, topography, slope etc) suggest that the capacity to retain water could be enhanced. 2. Identify which of these areas are upstream of settlements at risk of flooding and carry out a very broad assessment of the potential benefits. Assess also the potential environmental benefits e.g. potential expansion of floodplain Biodiversity Action Plan (BAP) habitat. 3. Estimate in broad terms the potential impact of different scales of intervention. For example from changes in the operating regime (likely to be a very small effect) to engineered flood storage (large effect). 4. Look at the outcomes of 1-3 and decide whether any implementation is likely to be (a) through a series of small projects with local impacts, or whether (b) there is a possibility that the local impacts combine to have a more strategic catchment impact. Based on the outcome of this work, in the medium to long term, either: (a) Develop a strategic approach if the likely combined benefits are significant. (b) Develop individual projects if the likely benefits are local. There are areas where the attenuation of water could have local social and economic benefits (by reducing flood risk) and environmental benefits (by increasing the frequency of inundation). Making Space for Water proposes such approaches, but there is still uncertainty as to how it could be best applied in the Upper Thames.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail. In time, depending upon the outcome of this initial action, this could progress to either a Strategy, series of Delivery Plans or individual projects. Waste and Minerals Development Framework	Decision reached on the approach: local or strategic and appropriate action taken (either option a or b). BAP Habitat	Landowners, District Councils Cotswolds, West Oxfordshire, South Oxfordshire, South Northamptonshire Cherwell, Aylesbury Vale Oxford, Vale of the White Horse, North Wiltshire, Swindon Borough, Parish Councils, Regional Planning Body, Natural England, RSPB	Short to medium
UT2	**Conveyance in urban locations** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Seek to make the conveyance in urban areas more efficient where practical (for example, where there are restrictions to flow from undersized culverts or bridges). Identify those locations where relatively minor alterations will increase the efficiency of the river channel. Ensure that these are widely understood by Planning teams so that any opportunities to remove them through redevelopment (action UT4) are taken. • Maintain conveyance by working with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action. • Continue 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 and establish common expectations on respective roles.	Performance Specifications Systems Asset Management Plan Flood Defence Consents Fly tipping protocol	Conveyance optimised and opportunities for solutions through the planning process are recognised Flood Defence Consents	District Councils: Cotswolds, West Oxfordshire, South Oxfordshire, South Northamptonshire, Cherwell, Aylesbury Vale, Oxford, Vale of the White Horse, North Wiltshire, Swindon Borough, Parish Councils, Community Groups	Short to medium
UT3	**Effectiveness of maintenance** Most of the maintenance expenditure in the Upper Thames is targeted at high risk systems and major assets. The distribution of expenditure, generally, reflects the current flood risk. Priority actions are:	Performance Specifications System Asset Management Plan	Performance specifications reviewed and necessary action	Local Authorities, Landowners, Asset owners	Short to medium

	• Review maintenance in Witney, Moreton-in-Marsh, Radcot Cut, where expenditure has been high in recent years. • Review the effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood. • Review maintenance close to SSSIs that require winter flooding. There are also a significant number/value of Third Party Owned assets in this policy unit. Attention should be given to the policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition.		taken		

UT4	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	• Increase public awareness, including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	• Identify those places where an adequate flood warning is not currently provided. This should include Witney and Bampton. Investigate whether this situation can be improved and where possible do so e.g. through the installation of river level monitoring.
	• Encourage communities to work together with parish councils to produce community flood plans that will:
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

UT5	**Land use planning** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Upper Thames floodplain are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Influence the Local Authority to adopt and apply Local Development Framework (LDF) policies that ensure that all new development in the 0.1% AEP floodplain is resistant / resilient to flooding. This should include all areas, including those being currently protected by defences e.g. Kidlington.	PPS25 SFRA LDF Regional Spatial Strategy Local Area Agreement River Restoration Action Plans Planning applications Developer contributions Joint initiatives with partners	CFMP informs SFRA SFRA informs LDF LDF policies in Place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils: Cotswolds West Oxfordshire, South Oxfordshire, South Northamptonshire, Cherwell, Aylesbury Vale, Oxford, Vale of the White Horse, North Wiltshire, Swindon Borough, Regional Planning Body Regional Development Agency, Parish Councils, Developers	Short to medium
UT6	**Progress existing improvement options and strategies that are complementary to the policy** • Progress the Banbury Flood Alleviation scheme (flood storage). • Progress the development of options proposed in the Churn strategy (flood storage upstream of Cirencester and reactivation of water meadows). • Ensure that all measures do not cause harm to the internationally designated sites in the policy unit, North Meadow and Clattinger Farm (SAC) and Oxford Meadows (SAC). If there is a potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	FRM Strategies	Delivery of strategies and proposed options	Landowners, Local Authorities, Natural England	Short
UT7	**Maintain specific defences** • Maintain the Kidlington Flood Alleviation Scheme (FAS) and Moorfield Brook Pumping Station.	SAMP	Kidlington FAS maintained to appropriate standard	Landowners, Local Authorities	Short to medium

Examples	
UT1 + UT2	The aerial photograph below shows the River Windrush flowing through Witney (looking upstream). Actions UT1 – to maintain or increase the capacity of the floodplain to retain water, and UT2 – to maintain conveyance in urban area are complementary and achieve the overall policy objective. 

Table 7.2 Swindon policy unit action plan

The **Swindon** policy unit is characterised by planned urban expansion close to floodplain. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale
- These areas are susceptible to rapid flooding from thunderstorms

This approach will deliver our policy for Swindon: **P4** – accept the risk – but in the longer term take action to ensure that risk does not increase from current level

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Sw1	**Land use planning – Location of new development and the management of run-off** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in Swindon are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature. This particularly applies to those areas of major development planned for Swindon, such as the Eastern Development area.	PPS25 SFRA LDF RSS Local Area Agreement Planning applications Developer contributions	CFMP informs SFRA SFRA inform LDF LDF policies in place Percentage of agreed actions undertaken as part of Local Area Agreements	Swindon Borough Council, North Wiltshire, Vale of the White Horse, Windsor and Maidenhead, Reading, Woking, Regional Planning Body, Regional	Short to medium

			Planning decisions	Development Agency	
Sw2	**Land use planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors in Swindon, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Remove obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Increase the available storage within the river corridor. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. The action recognises that there is not a single flood defence solution in Swindon and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA RSS LDF Planning applications River Restoration Action Plan Developer contributions	CFMP informs SFRA SFRA inform LDF LDF policies in place Planning decisions BAP habitat	Swindon Borough Council, North Wiltshire, Vale of the White Horse, Windsor and Maidenhead, Reading, Woking, Regional Planning Body, Regional Development Agency, Developers, Housing Associations, Business Associations	Medium to long
Sw3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan (SWMP) (or a further iteration of the Swindon Water Cycle Study) for those areas of Swindon that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SFRA SWMP Water Cycle Strategy	SWMP progress	Local Authorities, Thames Water, Regional Planning Body	Short to medium
Sw4	**Maintaining conveyance and where practical increase its efficiency** Carry out investigations at the locations where the removal or modification of restrictions to flow will reduce the probability of flooding from low order flood events (typically 10% to 5% AEP) to assess potential impact. The “Swindon Flood Review: July 2007” has identified these locations which include Haydon Wick, Covingham and Nythe on the River Cole and on the Dorcan Brook where further investigation will take place.	Surveys System Asset Management Plan	SAMP reviewed and appropriate action taken	Landowners	Short to medium
Sw5	**Flood proofing and flood resilience to existing properties** We will encourage flood proofing and flood resilience in Swindon for existing and new development. In Swindon it is unlikely that flood defences can be provided for the all homes and businesses at risk of flooding. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects SFRA Joint initiatives with partners	Damage to properties is reduced	Swindon Borough Council, Developers, Housing Associations, Business Associations,	Medium to long
Sw7	**Maintenance of defences** Carry out appropriate maintenance for flood storage areas that provide protection for Swindon.	Performance Specifications	Appropriate level of maintenance	Swindon Borough Council, Landowners	Short to medium

Example	
Sw2	The aerial photograph below shows the upper part of the River Cole in Swindon as it flows through an industrial estate. As these types of area are redeveloped in the very long-term there will be opportunities to achieve some of the outcomes identified in Action Sw2 e.g. restoration of river corridors, greater resilience to flooding, naturalising watercourses so that there is a reduced risk of blockages. The Environment Agency and the Local Authority need to decide what will be the most effective and practical way of achieving these outcomes and the wider objectives for the area. To start to take forward the spatial planning actions identified we could for example: • Map those areas of potential regeneration over a long time period. • Develop a vision on what the features of these sites could be when they are ultimately redeveloped. The focus here is likely to be on layout to achieve more of a river corridor and making the river part of the urban fabric. • Gain some sort of recognition for this vision with the Local Planning Authority. Even if the site is not due for redevelopment within the current plan period, can it become part of the SFRA? • Align our asset replacement to the vision rather than today’s conditions to impact upon whether we replace certain assets, either at all, or like for like.


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Table 7.3 Oxford policy unit action plan

The **Oxford** policy unit is characterised by development across an extensive floodplain. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable

This approach will deliver our policy for Oxford*: **P5** – reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ox1	**Oxford strategy** Complete the Oxford Flood Risk Management Strategy to identify in detail the most effective and sustainable options for managing flood risk. Ensure that all measures do not cause harm to the internationally designated site (Oxford Meadows SAC) in the neighbouring Upper Thames policy unit. If there is a potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	Oxford FRM Strategy	Completed and communicated with partners	Local Authorities, Landowners, Natural England	Short
Ox2	**Shorter-term land use planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in Oxford are: • Encourage safeguarding of land that may be needed to implement future options to manage flood risk as identified in the finalised Oxford Flood Risk Management Strategy (e.g. Botley Road).	PPS25 SFRA LDF RSS	CFMP informs SFRA SFRA inform LDF LDF policies in place	Oxford City Council, Oxfordshire County Council, Regional Planning Body,	Short to medium

	• Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) Documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Influence the Local Authority to adopt and apply Local Development Framework policies to ensure that all new development in the 0.1% AEP floodplain is resistant and resilient to flooding.	Local Area Agreement Planning applications Developer contributions	Percentage of agreed actions undertaken as part of Local Area Agreements Planning decisions	Regional Development Agency, Developers	
Ox3	**Long-term adaptation of the urban environment to be more flood resilient** The priorities to achieve long-term adaptation of the urban floodplain linked to the redevelopment of Oxford are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding, including potential relocation of the most vulnerable developments. These priorities are likely to be most applicable in those areas where redevelopment is more likely in the foreseeable future (e.g. West End, Osney Industrial Estate). This redevelopment will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. In Oxford much of the previous development in the floodplain are now established residential areas (e.g. Osney, Abingdon Road, Botely Road, Wolvercote). In the foreseeable future there is unlikely to be major redevelopment of these areas, but there may be opportunities to reduce the consequences of flooding as there is a high level of property renovation and conversion taking place: • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding to establish whether it will be possible to include policies in their Local Development Framework or other document, that seek an increase in the resistance and resilience of houses at risk from flooding as they are renovated or redeveloped. In the longer-term consider the following type of investigation may complement this action: • A broad assessment of the residual life of buildings at risk from flooding to establish over what timescale the cycle of redevelopment would lead to a significant reduction in flood risk.	SFRA LDF Joint initiatives with partners Local Area Agreement Oxford FRM strategy River Restoration Action Plan	CFMP informs SFRA SFRA inform LDF Oxford FRM strategy informs LDF LDF policies in place BAP habitat Percentage of agreed actions undertaken as part of Local Area Agreements	Oxford City Council, Oxfordshire County Council, Regional Planning Body, Regional Development Agency, Developers, Housing Associations, Business Associations	Medium to long
Ox4	**Maintaining urban conveyance** Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction to reduce the impacts from low order flood events (up to approximately 10% AEP).	SAMP Performance Specifications	Conveyance maintained	Landowners, Local Authorities	Short to medium

Table 7.4 Abingdon policy unit action plan

The Abingdon policy unit is characterised by development across an extensive floodplain. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk.
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option.
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable.

This approach will deliver our policy for Abingdon: ***P5*** *– reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ab1	**Land use planning**	PPS25	CFMP informs SFRA	Abingdon Town Council,	Short to medium

	The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in Abingdon are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. A large proportion of the houses at risk of flooding in Abingdon were constructed between 1950s and 1980s and these areas are unlikely to be redeveloped in the foreseeable future. • Establish with the Local Authority whether any redevelopment is likely along, or close to, the River Stert or Larkhill Stream. Seek to put in place policies that would lead to river restoration and the opening-up of culverts (reducing the risk of blockages) and set-back from these watercourses (see Action Ab2).	SFRA LDF RSS River Restoration Action Plan Planning applications Developer contributions Local Area Agreement Joint initiatives with partners	SFRA informs LDF LDF policies in place Planning decisions Flood defence consents BAP habitat Percentage of agreed actions undertaken as part of Local Area Agreements	Vale of the White Horse District Council, Oxfordshire County Council, Developers, Housing Associations, Business Associations	
Ab2	**Maintain the current standard of protection through maintenance** • Continue to remove blockages and maintain the Flood Storage Area (FSA) on the River Stert and Larkhill Stream. These are heavily modified watercourses that convey water through suburban north Abingdon. These watercourses are prone to blockage from the build up of debris as very low (or even no flow) is normal. • Continue to maintain conveyance through an annual programme of bank and weed clearance on the larger River Ock.	Performance Specifications System Asset Management Plan	Current standard of protection maintained	Landowners, Local Authorities	Short to medium

Ab3	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Identify those places where an adequate flood warning is not currently provided. This should include a site along the River Stert. Investigate whether this situation can be improved and where possible improve e.g. through river level monitoring and improvements on River Stert.
	
	• Encourage communities to work together with parish councils to produce community flood plans that will:
	
	  ◦ Identify the flood risks to the community and take action to reduce them.
	  ◦ Identify vulnerable people in the community and develop plans to assist/protect them.
	  ◦ Identify resources in the community available to assist during an emergency.
	  ◦ Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations
		
		Evolution of the FIM Day Job
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority (Emergency Planners), Parish Council, Category 1 responders, Media, Community Groups	Short to medium

Ab4	**Investigate opportunities to reduce flood risk including the impact of storage on the Ock** Assess the viability of flood storage upstream of the A34 to reduce the probability of flooding from the River Ock in Abingdon. Investigate whether further betterment including flood storage could be designed into the potential Upper Thames Major Resource Development (UTMRD) (recognising that this resource will require major earthworks) can help reduce flood risk. Following investigations it is important to note that any potential UTMRD cannot be operated to alleviate flooding.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Flood storage either accepted or dismissed as a possible option to reduce flood risk in Abingdon		Short
Ab5	**Flood proofing and flood resilience to existing properties** We will encourage flood proofing and flood resilience. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers and tanking (waterproofing internal walls).	Resilience and resistance projects Joint initiatives with partners	Damage to properties is reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Examples	
Ab1 & Ab2	The River Stert through north Abingdon. In the longer-term we will be looking to remove restrictions to flow along this watercourse as most flooding is caused by backing up from under capacity culverts and other restrictions to flow. We will seek Planning policies that lead to this outcome. 

Table 7.5 Ock policy unit action plan

The **Ock** catchment is predominantly rural in character. Our flood risk management approach for this policy unit is outlined below:

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints
- Individual action will play an increasingly important role in these areas

This approach will deliver our policy the Ock: ***P6*** *- take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Oc1	**Land use planning** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Ock are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences.	PPS25 SFRA LDF RSS Planning applications Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions	Vale of the White Horse District Council Oxfordshire County Council, Regional Planning Body, Developers, Housing	Short to medium

		Joint initiatives with partners	undertaken as part of Local Area Agreements	Associations, Business Associations	
Oc2	**Conveyance in urban locations** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Seek to make the conveyance in urban areas more efficient where practical (for example, where there are restrictions to flow from undersized culverts or bridges). Identify those locations where relatively minor alterations will increase the efficiency of the river channel. Ensure that these are widely understood by Planning teams so that any opportunities to remove them through redevelopment (action Oc1) can be taken: • We will work with landowners, providing advice on design, maintenance considerations and consent requirements. For example, in Wantage there are numerous structures that affect flooding, they consist of trash screens, possible redundant service crossings and bridge abutments. Improvements to flood conveyance could be achieved locally via removal or re-design of some of these structures. • Maintain conveyance by working with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action. • Continue 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.	Performance Specifications SAMP Fly tipping protocol	Performance specification reviewed and appropriate action taken	Landowners, Local Authorities, Community Groups	Short to medium
Oc3	**Effectiveness of maintenance** Most of the maintenance expenditure in the Ock and tributaries is concentrated in the Wantage / Grove and Steventon areas. Priority actions are: • Review the level of maintenance in the Ginge Brook System (Steventon), where expenditure has been high in recent years. • Review the effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood throughout the policy unit.	Performance specifications SAMP	Performance specifications reviewed and appropriate action taken		Short

Oc4	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Identify those places where an adequate flood warning is not currently provided. This should include Wantage, Grove and East Hanney. Investigate whether this situation can be improved and where possible implement e.g. through level monitoring.
	
	• Encourage communities should work together with parish councils to produce community flood plans that will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations
		
		Evolution of the FIM Day Job
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Oc5	**Investigate the impact of storage in the Ock in reducing flood risk downstream** Assess the viability of flood storage upstream of the A34 to reduce the probability of flooding from the River Ock in Abingdon. Investigate whether further betterment including flood storage could be designed into the potential Upper Thames Major Resource Development (UTMRD) (recognising that this resource will require major earthworks) can help reduce flood risk. Following investigations it is important to note that any potential UTMRD cannot be operated to alleviate flooding. Ensure that all measures do not cause harm to the internationally designated site in the policy unit, Cothill Fen (SAC). If there is a potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Flood storage either accepted or dismissed as a possible option to reduce flood risk in Abingdon		Short to medium
Oc6	**Flood proofing and flood resilience to existing properties** We will encourage individual flood protection and flood resilience measures. Possible measures include; raised finished flood levels, raised cupboards &	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers,	Medium to long

	electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).			Housing Associations, Business Associations	

Examples	
Oc2	Both photographs are from the Letcombe Brook in Wantage and show the types of restriction to flow typical in this policy unit. The left photo shows two masonry culverts with a vertical trash screen on the upstream end. In low order flood events, culverts like this can be difficult to clear, holding back flows and elevating flood water levels locally. In larger floods, once the flows upstream had exceeded the culverts capacity, any trash screen blockage will have less of an impact as flood water would bypass the structure. On the right are two service pipes crossing the river where debris can accumulate. As redevelopment occurs, there will be opportunities to remove these types of restriction to flow.  

Table 7.6 Sandford to Cookham policy unit action plan

The Thames (**Sandford to Cookham**) policy unit is predominantly rural in character, but with some significant urban areas along its course. Our flood risk management approach for this policy unit is a combination of two types of message reflecting the alternating rural and urban character.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Thames corridor between Sandford and Cookham (excluding Reading): ***P4*** *– accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
SC1	**Land use planning in the short to medium-term** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Thames floodplain between Sandford and Cookham are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF), Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans.	PPS25 SFRA LDF RSS Planning applications	CFMP informs SFRA SFRA inform LDF LDF policies in place Planning decisions	District Councils Vale of White Horse, Wycombe, South Oxfordshire, West Berkshire,	Short to medium

	• Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. A large proportion of the houses at risk of flooding are unlikely to be redeveloped in the foreseeable future, therefore it is important to adapt what is there.	Local Area Agreement	Percentage of agreed actions undertaken as part of Local Area Agreements	Parish Councils, Regional Planning Body, Developers, Housing Associations, Business Associations	
SC2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Thames between Sandford and Cookham, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages on tributaries. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding, including potential relocation of the most vulnerable developments. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS Joint initiatives with partners Local Area Agreement	CFMP informs SFRA SFRA inform LDF LDF policies in place Percentage of agree actions undertaken as part of Local Area Agreements	District Councils Vale of White Horse, Wycombe, South Oxfordshire, West Berkshire, Landowners, Regional Planning Body	Medium to long
SC3	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners. • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service. • Encourage communities to work together with parish councils to produce community flood plans. The Plans will: ◦ Identify the flood risks to the community and take action to reduce them. ◦ Identify vulnerable people in the community and develop plans to assist/protect them. ◦ Identify resources in the community available to assist during an emergency. ◦ Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.	Multi-Agency Emergency Response Plan Community Flood Plans Communication plan Projects to install gauging at key locations Evolution of the FIM Day Job.	Appropriate level of flood warning service Flood Warning provision reviewed	Local Resilience Forums, Local Authority Emergency Planners, Parish Councils. Category 1 responders, Media, Community Groups	Short to medium
SC4	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way, including locations at Henley and Purley. Actions include: • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land if proposals likely to proceed.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Locations chosen and options taken forward	Local authorities	Short to medium
SC5	**Flood proofing and flood resilience to existing properties** We will encourage flood proofing and flood resilience. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Table 7.7 Thame policy unit action plan

The **Thame** policy unit is characterised by extensive floodplain, but with some small clusters of development towards the headwaters of the catchment. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Thame*: **P3** - accept the risk – our current scale of actions is sufficient to manage the current risk and future increases will be acceptable*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Th1	**Land use planning** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Thame is: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses.	PPS25 SFRA LDF RSS Planning applications	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils Aylesbury Vale, South Oxfordshire, Wycombe, Dacorum, Regional Planning Body, Developers	Short to medium
Th2	**Conveyance in urban locations** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP, for example, in Dorchester and Chalgrove.	Performance Specifications SAMP	Conveyance maintained	Landowners, Local Authorities	Short to medium

Th3	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with parish councils to produce community flood plans. The Plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority (Emergency Planners), Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Table 7.8 Aylesbury policy unit action plan

The **Aylesbury** policy unit is characterised by planned urban expansion close to floodplain. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for Aylesbury: ***P4*** *– accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ay1	**Land Use Planning - Location of new development and the management of run-off** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in Aylesbury are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF), Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development.	PPS25 SFRA LDF RSS Planning applications Water Cycle Strategy	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	Aylesbury Vale District Council, Aylesbury Local Delivery Vehicle, Developers	Short to medium
Ay2	**Land Use Planning - Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors in Aylesbury, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these areas in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Remove obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding, including potential relocation of the most vulnerable developments within the river corridor in Aylesbury. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. The example below shows how this type of action could be applied in Aylesbury.	SFRA LDF RSS Planning applications Local Area Agreement Water Cycle Strategy River Restoration Action Plan Developer contributions	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP habitat Percentage of agreed actions undertaken as part of Local Area Agreements	Aylesbury Vale District Council, Aylesbury Local Delivery Vehicle, Housing Associations, Business Associations, Developers	Medium to long
Ay3	**Maintain existing defences** Maintain the Aylesbury Flood Storage area (Bear Brook and Stocklake Flood Storage Areas) (provides a 1% AEP standard of protection to people and property in Aylesbury.)	SAMP	Standard of protection provided by the Aylesbury flood storage area is maintained		Short to medium

Examples	
Ay2	The aerial photograph below shows the Bear Brook (flowing from right to left alongside the railway line) in Aylesbury. As these types of area are redeveloped in the very long-term there will be opportunities to achieve some of the outcomes identified in Action Ay2 e.g. restoration of river corridors, greater resilience to flooding, naturalising watercourses so that there is a reduced risk of blockages. The Environment Agency and the Local Authority need to decide what will be the most effective and practical way of achieving these outcomes and the wider objectives for the area. To start to take forward the spatial planning actions identified we could for example: • Develop a vision on what the features of these sites could be when they are ultimately redeveloped. The focus here is likely to be on layout to achieve more of a river corridor and making the river part of the urban fabric. • Gain some sort of recognition for this vision with the Local Planning Authority. • Align our asset replacement to the vision rather than today's conditions to impact upon whether we replace certain assets, either at all, or like for like. • Consider land swapping opportunities. In the bottom right of the photograph, the playing fields are on the periphery of the floodplain; whilst sites further in the floodplain and at greater risk are being redeveloped. It is now too late in the process to reasonably challenge this. However, there are places along the river corridor in Aylesbury where we could identify similar opportunities early enough to be considered.

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Table 7.9 Kennet policy unit action plan

The Kennet policy unit is characterised by natural floodplain, with some urban centres. Our flood risk management approach for this type of catchment is outlined below:

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Upper Thames*: **P6** - take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ke1	**Maintaining and Improving designated sites** Within the Kennet catchment are water-dependent internationally designated sites; Kennet and Lambourn floodplain and Kennet Valley Alderwoods. Priority actions are: • Maintain the perennial flow of the Kennet with natural flow variations at the Kennet and Lambourn Floodplain Special Area of Conservation (SAC) (consisting of four SSSIs including Thatcham Reedbeds, which is one of the largest inland reed beds in southern England). The SAC is one of the best areas in the UK for Desmoulin's whorl snail (a British Red Data Book species). The flora of the River Kennet is species-rich and diverse, it has the highest average number of species per site surveyed of any other lowland river in Britain. • Assess whether it is viable to increase the length of flooding of the water meadows at the Chiltern Foliat SSSI. • Maintain the current hydrological conditions resulting from variation in the water levels (from surface flooded to relatively dry) and to maintain the level of flooding during winter for the Kennet Valley Alderwoods SAC (this is the principal water level objective). Kennet Valley Alderwoods SAC are considered to be one of the best areas in the UK for alder woodland on floodplain, which is now rare throughout Europe.	Water Level Management Plans Biodiversity Action Plans KCRP SuRCASE	Site conditions maintained and where possible improved BAP habitat	Natural England, British Waterways, Thames Water, District Councils of West Berkshire, North Wiltshire, Swindon, Kennet, Basingstoke and Deane, Wokinghams,	Short to medium

	• Support ongoing partnership working within the Kennet including the Kennet Chalkstream Restoration Project (KCRP) and Sustainable River Catchment for the South East (SuRCase). • Ensure that all measures do not cause harm to the internationally designated sites in the policy unit. If there is a potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.			Reading, Kennet Valley Fisheries Association, Kennet and Avon Canal Trust, SEEDA, South East Water and Southern Water	
Ke2	**Efficient and effective targeting of maintenance** Priority actions are: • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Review the effectiveness of maintenance in low and medium risk systems e.g. Lambourn. • Review maintenance and management of flood risk management structures in Newbury in light of future redevelopment opportunities (refer Ke5). • Review maintenance close to SSSIs that require winter flooding.	Performance Specifications SAMP	Performance specifications reviewed and appropriate action taken	Landowners, Local Authorities,	Short to medium

Ke3	**Flood Warning, Flood Awareness and Emergency Planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• 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.
	
	• Encourage communities to work together with parish councils to produce community flood plans. The Plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Ke4	**Land Use Planning** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Kennet are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Encourage Local Authorities to adopt policies that ensure that all new development in the floodplain is resistant / resilient to flooding. This is vital in those locations where there is no prospect of flood defences in the foreseeable future (for example in Theale) and important in all locations because of the uncertainty associated with possible flood defences (for example in Hungerford, Marlborough and Newbury).	PPS25 SFRA LDF RSS Planning applications Joint initiatives with partners	CFMP informs SFRA SFRA informs LDF LDF policy in place Planning decisions	District Councils Kennet, Basingstoke and Deane, West Berkshire, North Wiltshire, Regional Planning Body, Developers, Housing Associations, Business Associations	Short to medium
Ke5	**Long-term adaptation of the urban environment to be more flood resilient in Newbury** The priority actions to achieve long-term adaptation of urban floodplain river corridors in Newbury, linked to the redevelopment of these areas are:	SFRA LDF	CFMP informs SFRA	District Councils Kennet,	Medium to long

	• Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and so there is a reduced risk of blockages. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	RSS Planning applications Local Area Agreement River Restoration Action Plan.	SFRA informs LDF LDF policy in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreement BAP Habitat	Basingstoke and Deane, West Berkshire, North Wiltshire, Regional Planning Body, Developers, Housing Associations, Business Associations	
Ke6	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way, including Hungerford and Marlborough. Priority actions are: • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land if considered likely to proceed.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Locations chosen and options taken forward	Local authority, Landowners	Short to medium
Ke7	**Surface Water Management Plan** Encourage the development of a surface water management plan (SWMP) for Thatcham due to history of surface water flooding.	SWMP	SWMP progress	West Berkshire Council	Medium
Ke8	**Water Level Management** Progress FRM related actions within Water Level Management Plans as part of the Biodiversity Outcome Measure Programme to improve the condition of water dependent SSSIs	WLMP	WLMP Actions	NE	Medium

Examples	
Ke4 and Ke5	This aerial photograph shows the River Kennet flowing from left to right through Newbury. Downstream of the town centre are large areas of industrial and semi-industrial land use that are at risk from flooding. When are these areas likely to be redeveloped? Does the potential timing affect the decisions we make now about our asset management? What should this river corridor look like and contain when it is redeveloped?  © 2008 Google-Map data © 2008 Tele Atlas 

Table 7.10 Reading policy unit action plan

The **Reading** policy unit is characterised by development across an extensive floodplain. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk.
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option.
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable.

This approach will deliver our policy for Reading: ***P5*** *– reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Rd1	**Middle Thames Flood Risk Management Strategy** Undertake a strategy covering Reading and the River Thames immediately upstream and downstream ("The Middle Thames"). The Middle Thames strategy should include and consider: • The outcome of the Oxford strategy and whether upstream storage is part of that strategy. • The extent to which long-term adaptation of the urban environment will reduce the consequences of flooding and how this can be maximised (see Action Rd3). • Locations at risk immediately upstream and downstream, including Purley-on-Thames, Sonning, Shiplake and Wargrave. • A more detailed assessment of the impacts of attenuating water in the Thame and Kennet catchments on Reading and locations downstream as far as Maidenhead. The indication is that there are technically viable options that could reduce flood risk to parts of Reading and Caversham. There is uncertainty whether any option would necessarily be economically viable or sustainable. However, the current and future levels of flood risk do justify further consideration of these options alongside those that will reduce the consequences of flooding.	FRM Strategy River Restoration Action Plan	All options assessed and an appropriate solution is taken forward	Local Authorities	Short to medium
Rd2	**Land use planning - Short-term land use planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in Reading are: • Encourage safeguarding of land that may be needed to implement future options to manage flood risk as determined by the Middle Thames Flood Risk Management Strategy. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) Documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Influence Reading Borough Council to adopt and apply policies to ensure that all new development in the floodplain is resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Reading Borough Council	Short to medium
Rd3	**Land use planning - Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of the urban floodplain linked to the redevelopment of Reading are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these areas in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding.	Spatial Delivery Plan or part of the Middle Thames strategy LDF RSS River Restoration Action Plan Joint initiatives with partners.	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	Reading Borough Council, West Berkshire Council, Regional Planning Body, Developers, Housing Associations,	Medium to long

	These priorities are likely to be most applicable in those areas where redevelopment is more likely in the foreseeable future. This redevelopment will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. In Caversham and Reading much of the previous development in the floodplain are now established residential areas. In the foreseeable future there is unlikely to be major redevelopment of these areas, but there may be opportunities to reduce the consequences of flooding as there is a high level of property renovation and conversion taking place: • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding.			Business Associations	

Rd4	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with parish councils to produce community flood plans that will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Evolution of the FIM Day Job
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority (Emergency Planners), Parish Council, Category 1 responders, Media, Community Groups	Short to medium

Table 7.11 Loddon policy unit action plan

The **Loddon** policy unit is characterised by fairly extensive floodplains, and has some small clusters of development in the downstream part of the catchment close to the River Thames. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the River Loddon catchment*: **P6** - take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Lo1	**Making Space for Water** Reduce the uncertainty associated with increased attenuation in the Loddon by carrying out some simple investigations in the short to medium-term so that the most effective way of implementing any potential options can be decided. This could comprise: 1. Identify areas of floodplain where the natural characteristics of the floodplain (geology, topography, slope etc) suggest that the capacity to retain water could be enhanced. 2. Identify which of these areas are upstream of settlements at risk of flooding and carry out a very broad assessment of the potential benefits. Assess	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Possible attenuation sites identified. BAP Habitat	Landowners, Local Authorities, Parish Councils, Regional Planning Body, Natural England,	Medium

	also the potential environmental benefits e.g. potential expansion of floodplain BAP habitat. 3. Estimate in broad terms the potential impact of different scales of intervention. For example from changes in the operating regime (likely to be a very small effect) to engineered flood storage (large effect). 4. Look at the outcomes of 1-3 and decide whether any implementation is likely to be (a) through a series of small projects with local impacts, or whether (b) there is a possibility that the local impacts combine to have a more strategic catchment impact. There are areas where the attenuation of water could have local social and economic benefits (by reducing flood risk) and environmental benefits (by increasing the frequency of inundation). Making Space for Water proposes such approaches, but there is still uncertainty as to how it could be best applied in the Loddon. Ensure that measures do not cause harm to the internationally designated site in the Loddon policy unit (Thames Basin Heaths SPA). If there is a potential for damage to occur then further study to review the mitigation options must be carried out. This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.			RSPB	
Lo2	**Efficient and effective targeting of maintenance** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Review the level of maintenance in Arborfield and Swallowfield, where expenditure has been high in recent years. • Review the effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood. • Review maintenance close to SSSIs that require winter flooding. There are also a significant number/value of Third Party Owned assets in this policy unit. Attention should be given to the policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition.	Performance Specifications System Asset Management Plans	Performance specifications reviewed	Local Authorities, Landowners, Asset owners	Short to medium

Lo3	**Flood Warning, Flood Awareness and Emergency Planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• 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.
	
	• Communities should work together with parish councils to produce community flood plans. The plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Lo4	**Land use planning** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Loddon are: • Encourage safeguarding of the natural floodplain through the appropriate application of the sequential test in all SFRAs. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. This is particularly important in the villages around Waltham St Lawrence. • Increase the resilience of the urban environment to flooding as redevelopment occurs. In the foreseeable future this could start to reduce the consequences of flooding in the Lower Loddon (Winnersh Triangle and Earley).	PPS25 SFRA LDF RSS Planning Applications Developer Contributions Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning Decisions Percentage of agreed actions undertaken as part of Local Area	District Councils of Basingstoke and Deane, Hart, Windsor and Maidenhead, Wokingham	Short to medium

			Agreements		
Lo5	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way, including Lower Earley and Winnersh. Priority Actions are: • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail. LDF	Locations chosen and options taken forward LDF policy in place	Local authorities, Landowners	Short to medium

Table 7.12 Basingstoke policy unit action plan

The **Basingstoke** policy unit is characterised by a developed floodplain with typically concrete river channels. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for Basingstoke: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ba1	**Land Use Planning – Location of new development and the management of run-off** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in Basingstoke are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) Documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature.	PPS25 SFRA LDF RSS Planning Applications Developer contributions Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policy in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Basingstoke and Deane District Council	Short to medium
Ba2	**Land Use Planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain in Basingstoke, linked to the redevelopment of these areas are: • Support actions from the Basingstoke and Deane Water Cycle Strategy. • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Remove obstructions to flow so there is a reduced risk of blockages. • Where practicable, reduce the current levels of run-off. There is a need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS River Restoration Action Plans Planning applications Local Area Agreements Water Cycle Strategy	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	Basingstoke and Dean District Council, Housing Associations, Business Associations, Thames Water	Medium to long

Ba3	**Surface water drainage** Assist in the development of a Surface Water Management Plan for those areas of Basingstoke that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change	SWMP SFRA	SWMP progress	Basingstoke and Deane District Council, Thames Water, Highways Agency	Medium
Ba4	**Maintaining conveyance** Review of System Asset Management Plans (SAMP) to ensure consistency with the CFMP, including the identification of opportunities to open up the watercourse	SAMP	SAMP review	Landowners	Medium

Table 7.13 Upper and Middle Blackwater policy unit action plan

The **Upper and Middle Blackwater** policy unit is characterised by planned urban expansion close to floodplain. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for the Upper and Middle Blackwater: ***P4*** *- accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Bl1	**Land Use Planning – Short-term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Blackwater are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) Documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policy in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Surrey Heath, Rushmoor, Harts, Waverley, Guildford, Bracknell, Forest, Wokingham, Parish Councils	Short to medium
Bl2	**Land Use Planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain in the Blackwater, linked to the redevelopment of these areas are: • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. There is a need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk (see example below).	SFRA LDF RSS Planning applications Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Surrey Heath, Rushmoor, Harts, Waverley, Guildford, West Berskshire, Housing Associations, Business Associations	Medium to long

Bl3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas in the Blackwater catchment that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SWMP SFRA	SWMP progress	District Councils of Surrey Heath, Rushmoor, Harts, Waverley, Guildford, West Berskshire, Thames Water	Medium
Bl4	**Maintaining conveyance and current standards of defence** • Maintain the Cove Brook Flood Storage Area (FSA).	SAMP	Standard of protection offered by Cove Brook FSA is maintained	Landowners	Medium
Bl5	**Flood Proofing and flood resilience to existing properties** We will encourage individual flood protection and flood resilience measures. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls). Note: Taking forward this objective will depend to a large extent on the outcome of Defra pilot studies into resilience and resistance. Pending the outcome of this work, there may be merit in starting to understand the potential for retro-fitting resistance or resilience measures. For example; • Map the distribution of the age of premises (will they be redeveloped, or could retro-fitting be part of managing risk). • Map their proximity to the watercourse (width of buffer between rivers and developed areas). • Map their proximity to other water compatible land uses (to identify potential land swaps).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Bl6	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with parish councils to produce community flood plans that will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authorities Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

BL7	**Water Level Management** Progress FRM related actions within Water Level Management Plans as part of the Biodiversity Outcome Measure Programme to improve the condition of water dependent SSSIs	WLMP	WLMP Actions	NE	Medium

Examples	
Bl2	The aerial photograph below shows the upper part of the River Blackwater in Blackwater. As these types of area are redeveloped in the very long-term there will be opportunities to achieve some of the outcomes identified in Action Bl2 e.g. restoration of river corridors, greater resilience to flooding, naturalising watercourses so that there is a reduced risk of blockages. The Environment Agency and the Local Authority need to decide what will be the most effective and practical way of achieving these outcomes and the wider objectives for the area. To start to take forward the spatial planning actions identified we could for example: • Map those areas of potential regeneration over a fifty year time period. • Develop a vision on what the features of these sites could be when they are ultimately redeveloped. The focus here is likely to be on layout to achieve more of a river corridor and making the river part of the urban fabric • Gain some sort of recognition for this vision with the Local Planning Authority. Even if the site is not due for redevelopment within the current plan period, such opportunities should be highlighted to the Local Authority for future action? • Align our asset replacement to the vision rather than today's conditions to impact upon whether we replace certain assets, either at all, or like for like.


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Table 7.14 Addlestone Bourne, Cut and Emm Brook policy unit action plan

The **Addlestone Bourne, Cut and Emm Brook** policy unit is characterised by planned urban expansion close to floodplain. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for this policy unit: ***P6*** *- take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
AC1	**Land use planning – Location of new development and the management of run-off** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Addlestone Bourne, Emm Brook and Cut are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) Documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Surrey Heath, Woking, Wokingham, Runnymede, Royal Borough of Windsor and Maidenhead, Bracknell Forest, Regional Planning Body	Short to medium
AC2	**Land use planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these areas in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow (linked to action AC4).	SFRA LDF RSS Planning applications River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils of Surrey Heath, Wokingham, Runnymede, Royal Borough of Windsor and Maidenhead	Medium to long

	• Naturalising watercourses so there is a reduced risk of blockages. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. There is a need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk (see example below).	Water Framework Directive	BAP Habitat		
AC3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas that are most vulnerable to this source of flooding, including Bagshot, Lightwater, and Bracknell. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SWMP Surrey Flooding Wetspots SFRA	SWMP progress	Local authorities Flood Forum Flood Task Group, Thames Water	Medium
AC4	**Maintaining conveyance and where practical increase its efficiency** • Continue to remove blockages on the heavily modified watercourses through Bracknell. These watercourses are prone to blockage from the build up of debris as very low (or even no flow) is normal. • Continue to maintain conveyance through an annual programme of bank and weed clearance on the larger Emm Brook and Addlestone Bourne. • Investigate improving the efficiency of these watercourses. Both of these types of watercourse have restrictions to flow. On the larger watercourses they tend to be from bridge abutments and on the smaller modified urban watercourses from culverts. There are two main different kinds of river system in this policy unit. In their different ways they all provide a moderate standard of protection (estimated to be able to provide protection against a 10% to 2% AEP flood), providing their capacity to convey flow is maintained.	SAMP	Performance specifications reviewed and conveyance optimised	landowners	Short to medium
AC5	**Flood proofing and flood resilience to existing properties** We will encourage individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities Developers, Housing Associations, Business Associations	Medium to long
AC6	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way. These include Flood storage in the upper reaches of the Emm Brook, upstream of Wokingham, attenuation on the Addlestone Bourne, and removal of restrictions to flow on the Cut through Bracknell. However, it is uncertain at the moment whether they can be developed. At this stage we should: • Assess their viability. • Develop those that are most likely to be viable and are located in areas where little redevelopment is expected. • Safeguard land. • Ensure that all measures do not cause harm to the internationally designated site in the policy unit, Thursley, Ash, Pirbright and Chobham (SAC). If there is potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail. LDF	Locations chosen and options taken forward LDF policies in place	Local authorities, Highways Agency, Natural England	Medium to long

Table 7.15 Rural Wey policy unit action plan

The **Rural Wey** policy unit is characterised by extensive and predominantly undeveloped floodplain. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Rural Wey*: **P2** - accept the risk – both current and future increases in risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
RW1	**Land use planning** • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences.	PPS25 SFRA LDF RSS Local Area Agreement Planning applications Developer contributions	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Woking, Guildford, Waverley, East Hampshire, Mole Valley, Parish Councils, Regional Planning Body, Developers, Housing Associations, Business Associations	Short to medium
RW2	**Land use planning – Long-term adaptation of the urban environment to be more flood resilient** Establish and agree (between the Local Planning Authority and Environment Agency) a long-term vision for the adaptation of urban floodplain and river corridors, linked to redevelopment. There is a need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. For example: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. Remove restrictions to flow, particularly in Cranleigh Waters. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. • Ensure that all measures do not cause harm to the internationally designated sites in the policy unit, Thursley and Ockley Bogs (RAMSAR / SPA), Thursley, Hankley and Frensham Common (Wealden Heaths Phase 1) (SPA), Wealden Heaths Phase II (SPA), Shortheath Common (SAC) and Thursley, Ash Pirbright and Chobham (SAC). If there is a potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	SFRA LDF RSS Planning applications Developer contributions River Restoration Action Plan Water Framework Directive	LDF policies in place Planning decisions BAP habitat	Local Authorities, Natural England, RSPB	Medium to long
RW3	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.	Multi-Agency Emergency Response Plans Community Flood Plans Communication plan	Appropriate level of flood warning service Flood Warning provision reviewed	Local Resilience Forums, Local Authority Emergency	Short to medium

	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• 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 river level monitoring.
	
	• Encourage communities to work together with parish councils to produce community flood plans. The plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
				Planners, Parish Councils, Category 1 responders, Media, Community Groups	

RW4	**Flood Proofing and flood resilience to existing properties** In the Rural Wey policy unit it is unlikely that flood defences can be provided for the majority of homes at risk of flooding. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Table 7.16 Guildford policy unit action plan

The **Guildford** policy unit is characterised by an extensive developed floodplain with no built flood defences, for which the main messages are set out below.

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk.
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option.
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable.

This approach will deliver our policy for Guildford: ***P5*** *– reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Gu1	**Short-term planning actions – adaptation of the urban environment to be more flood resilient** A large capital flood risk management scheme is unlikely to proceed in this area. Therefore influencing land use planning and redevelopments are vital to reduce flood risk. The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to reduce flood risk in Guildford are: • Agree the scale at which we are aiming for flood risk reduction through planning e.g. the town as a whole so that there is greater flexibility in being able to achieve both planning and flood risk management objectives. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. • Influence the Local Authority to adopt and apply Local Development Framework (LDF) policies that ensure that all new development in the 0.1% AEP floodplain is resistant and resilient to flooding. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses, such as the meadows upstream of the city centre.	PPS25 SFRA LDF RSS Planning Applications Developer contributions Local Area Agreement Joint initiatives with partners	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Guildford District Council, Regional Planning Body, Developers, Housing Associations, Business Associations	Short to medium
Gu2	**Flood proofing and flood resilience to existing properties**	Resilience and resistance projects	Damage to properties reduced	Guildford District	Medium to long

	We will encourage flood proofing and flood resilience as in the Guildford unit it is unlikely that flood defences can be provided for the majority of homes at risk of flooding. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Joint initiatives with partners		Council, Developers, Housing Associations, Business Associations	
Gu3	**Maintain existing conveyance** Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction to reduce the impacts from low order flood events (up to approximately 5% AEP).	SAMP	Conveyance maintained	landowners	Short to medium

Gu4	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• 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 river level monitoring.
	
	• Encourage communities to work together with parish councils to produce community flood plans. The plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Table 7.17 Hoe Stream policy unit action plan

The **Hoe Stream** is a mixed policy unit. Towards the headwaters of the catchment. The Hoe Stream flows through largely open countryside. Downstream, in Woking there are approximately 200 properties at risk from flooding and there is also continuing development pressure. Our key messages for these kinds of areas are:

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk.
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option.
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable.

This approach will deliver our policy for the Hoe Stream: ***P5*** *– reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
HS1	**Land use planning** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Hoe Stream are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding.	PPS25 SFRA LDF RSS Planning applications	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils of Woking, and Guildford, Parish Councils, Regional Planning Body	Short to medium

	• Encourage the local authority to safeguard any land required for the implementation of the finalised Hoe Stream Flood Risk Management Strategy.	Developer contributions Local Area Agreement	Percentage of agreed actions undertaken as part of Local Area Agreements		

HS2	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with parish councils to produce community flood plans. The plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Evolution of the FIM Day Job.
		
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
			Appropriate level of flood warning service	District Councils of Woking and Guildford, Parish Councils, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

HS3	**Hoe Stream Flood Risk Management Strategy** Progress the Hoe Flood Risk Management Scheme with the Local Authority, determining who will maintain and manage the structure, and ongoing maintenance of landscaping. Ensure that all measures do not cause harm to the internationally designated sites in the policy unit, Thames Basin Heaths (SPA) and Thursley, Ash Pirbright and Chobham (SAC). If there is potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	Hoe FRM Scheme	Scheme agreed	Local authorities, landowners, Natural England	Short to medium

Table 7.18 Byfleet and Weybridge policy unit action plan

The **Byfleet and Weybridge** policy unit is characterised by an extensive developed floodplain with no built flood defences, for which the main messages are set out below.

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk.
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option.
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable.

This approach will deliver our policy for Byfleet and Weybridge: ***P5*** *– reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
BW1	**Land use planning** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in Byfleet and Weybridge are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding.	PPS25 SFRA LDF RSS Planning applications Developer contributions	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of	District Councils of Runnymede, Elmbridge, Guildford and Woking, Developers, Housing Associations, Business Associations	Short to medium

		Local Area Agreement Joint initiatives with our partners	agreed actions undertaken as part of Local Area Agreements		
BW2	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners. • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service. • 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. This should include further modelling and investigation of the catchment around Byfleet village as current understanding is poor.	Evolution of the FIM Day Job. Multi-Agency Emergency Response Plans Community Flood Plans Communication plan	Appropriate level of flood warning service Flood Warning provision reviewed	District Councils of Runnymede, Elmbridge, Guildford and Woking, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium
BW3	**Wey Flood Risk Management Strategy – Safeguard future opportunities to reduce the probability of flooding in the future** The Wey strategy has identified 5 locations in Byfleet and Weybridge where it may be possible to reduce the probability of flooding. It is uncertain at the moment whether they can be developed. Actions include: • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land where appropriate.	Wey strategy and further detailed work to reduce uncertainty and assess where to progress any options in more detail.	Locations chosen and options taken forward	District Councils of Runnymede, Elmbridge and Woking, Landowners	Medium to long
BW4	**Maintain existing conveyance** Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction to reduce the impacts from low order flood events (up to approximately 5% AEP).	SAMP	Conveyance maintained	landowners	Short to medium

Table 7.19 Windsor and Maidenhead policy unit action plan

The **Windsor and Maidenhead** policy unit is characterised by the River Thames, its floodplain and the Maidenhead, Windsor and Eton Flood Alleviation Scheme (MWEFAS). Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation. Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for Windsor and Maidenhead: ***P3*** *– accept the risk – our current scale of actions is sufficient to manage the current risk and future increases will be acceptable*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
WM1	**Maintain existing defences** Continue to maintain the Maidenhead Windsor and Eton Flood Alleviation Scheme (MWEFAS).	System Asset Management Plan Performance Specifications	Standard of protection provided by the MWEFAS is maintained	Landowners	Short to Medium
WM2	**Land use planning**	PPS25	CFMP informs SFRA	District Councils of South	Short to medium

	The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Maidenhead and Windsor policy unit are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. Further investigations and analysis should be undertaken to identify risks associated with surface water flooding and groundwater flooding.	SFRA LDF RSS Planning applications Local Area Agreements	SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Buckinghamshire, Slough Borough, Royal Borough of Windsor and Maidenhead, Developers, Thames Water	

WM3	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• 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.
	
	• Encourage communities to work together with parish councils to produce community flood plans that will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
		
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communication plan
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

WM4	**Flood Proofing and flood resilience to existing properties** We will encourage individual flood protection and flood resilience measures. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Table 7.20 Lower Thames policy unit action plan

The **Lower Thames** policy unit is characterised by development across an extensive floodplain. Our flood risk management approach for this type of floodplain is outlined below.

Generally urban areas with no major river flood defences

- Where we can, we will progress options to reduce flood risk that are most effective and sustainable in the long-term. There are technically feasible defence options in most of these places, but they are generally very expensive to implement.
- These are often constrained historic towns and cities. It is vital that there is a shared vision for land use so that we can focus on the most effective way of managing flood risk. In some places it will be through adaptation of the urban environment to make it more resilient to flooding and in others it will be about locating new development in areas of lowest risk.
- These areas are located on large rivers where it is not generally possible to increase the capacity of the river to convey more flow. Within the urban floodplains we are seeking long-term adaptation to increase the resilience of what is at risk. In some cases re-locating areas of development may become an option.
- Managing the consequences of flooding will be very important, particularly those areas where redevelopment rates are low and flood defences are not viable.

This approach will deliver our policy for Lower Thames: ***P5*** *– reduce the risk – lower the probability of exposure to flooding and/or the magnitude of the consequences of a flood and hence the risk*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Lt1	**Lower Thames Flood Risk Management Strategy** Complete the Lower Thames Flood Risk Management Strategy to identify in detail the most effective and sustainable options for managing flood risk.	FRM Strategy	Options assessed and the most appropriate taken	Local authorities, landowners,	Short to medium

	Ensure that all measures do not cause harm to the internationally designated site in the policy unit, South West London Water Bodies (RAMSAR / SPA). If there is a potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.		forward	Natural England, RSPB	
Lt2	**Shorter-term land use planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Lower Thames are: • Encourage safeguarding of land needed to implement the finalised Lower Thames Flood Risk Management Strategy. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authorities and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Identify which aspects of PPS25 (location, layout or design) will be the focus for managing flood risk when considered alongside the finalised option for the Lower Thames Flood Risk Management Strategy. • Influence the Local Authority to adopt and apply Local Development Framework policies to ensure that all new development in the 0.1% AEP floodplain is resistant and resilient to flooding. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding.	PPS25 SFRA LDF RSS Waste and Minerals Development Framework Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Spellthorne, Runnymede, Elmbridge, Kingston upon Thames, Richmond upon Thames, Windsor and Maidenhead, Slough	Short to medium
Lt3	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of the urban floodplain linked to redevelopment in the Lower Thames are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. These priorities are likely to be most applicable in those areas where redevelopment is more likely in the foreseeable future. This redevelopment will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. In the longer-term consider: • A broad assessment of the residual life of buildings at risk from flooding to establish over what timescale the cycle of redevelopment would lead to a significant reduction in flood risk.	SFRA LDF RSS Planning applications River Restoration Action Plan Waste and Minerals Development Framework	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	District Councils of West Berkshire, Spellthorne, Runnymede, Elmbridge, Kingston upon Thames, Richmond upon Thames, Developers Housing Associations, Business Associations	Medium to long
Lt4	**Flood Warning, Awareness and Emergency Planning** • Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners. Hazard and vulnerability mapping may be required to target this work most effectively. • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness. This should focus on getting the people 'at risk' to take appropriate action through involvement with local parish councils and other Category 1 responders in developing community flood plans to aid response to flooding. • Encourage communities to work together with parish councils to produce community flood plans that will: ◦ Identify the flood risks to the community and take action to reduce them. ◦ Identify vulnerable people in the community and develop plans to assist/protect them. ◦ Identify resources in the community available to assist during an emergency. ◦ Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.	FIM Day Job. Multi-Agency Emergency Response Plans Community Flood Plans Communication plan	Appropriate level of flood warning service	Local Resilience Forums, Local Authority (Emergency Planners) Local Authority Emergency Planners, Category 1 responders, Parish Councils, Media, Community Groups	Short to medium

Lt5	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Table 7.21 Lower Mole policy unit action plan

Within the Mole catchment we have defined three policy units; Upper, Middle and Lower Mole. Each of these has very different floodplain characteristics and flood risk management approaches. The Upper and **Lower Mole** are characterised by areas of urban development whereas the Middle Mole contains fairly extensive natural floodplain. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Lower Mole: ***P3*** *- accept the risk – our current scale of actions is sufficient to manage the current risk and future increases will be acceptable*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Lm1	**Maintain existing defences** • Continue to maintain the Lower Mole Flood Alleviation Scheme. • Identify and implement opportunities to naturalise this flood alleviation structure, making space for water and enhancing biodiversity.	System Asset Management Plan Performance Specifications River Restoration Action Plan	Standard of protection provided by the Mole FAS is maintained	Landowners, Local Authorities,	Short to medium
Lm2	**Land use planning to reduce our long-term dependency on existing flood defences** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Lower Mole policy unit are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences.	PPS25 SFRA LDF RSS Planning Applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Elmbridge District Council, GLA	Short to medium
Lm3	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners. • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Public Awareness should focus on getting the people ‘at risk’ to take appropriate action through involvement with local parish councils and other Category 1 responders in developing community flood plans to aid response to flooding. Hazard and vulnerability mapping may be required to target this work more effectively.	Multi-Agency Emergency Response Plans Evolution of the FIM Day Job. Communications Plans Community Flood Plans	Appropriate level of flood warning service	Local Authority Emergency Planners, Parish Councils, Category 1 responders, Community Groups, Media	Short to medium

Table 7.22 Middle Mole policy unit action plan

Within the Mole catchment we have defined three policy units; Upper, Middle and Lower Mole. Each of these has very different floodplain characteristics and flood risk management approaches. The Upper and Lower Mole are characterised by areas of urban development whereas the **Middle Mole** contains fairly extensive natural floodplain. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Middle Mole*: **P3** - accept the risk – our current scale of actions is sufficient to manage the current risk and future increases will be acceptable*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
MM1	**Land use planning** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Middle Mole policy unit are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because large proportions of properties at risk are dispersed and cannot be protected by flood defences. • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. Future revisions of the SFRA should identify areas subject to other sources of flooding, and the consequences. If appropriate, consideration should be given to classify the areas at most risk as Critical Drainage Areas in accordance with PPS25.	PPS25 SFRA LDF RSS Planning applications Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Elmbridge District Council, Reigate and Banstead District Council, Mole Valley District, Guildford, GLA Regional Planning Body	Short to medium
MM2	**Efficient and effective targeting of maintenance** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP with a focus on Dorking, Leatherhead and Cobham. • Reduce maintenance outside of towns and villages. • Review the overall effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood as maintenance costs in this policy unit are relatively high in the context of Thames region.	Performance Specifications System Asset Management Plan	Performance specification reviewed and appropriate action taken	Local Authorities, Landowners	Short to medium

MM3	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	• 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. river level monitoring.
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	• Encourage communities to work together with parish councils to produce community flood plans. The Plans will:
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
		Multi-agency Emergency Response Plans
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
		
		Community Plans
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

	• Identify resources in the community available to assist during an emergency. • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.				
MM4	**Flood proofing and flood resilience to existing properties** We will encourage individual flood protection and flood resilience measures. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Table 7.23 Upper Mole policy unit action plan

Within the Mole catchment we have defined three policy units; Upper, Middle and Lower Mole. Each of these has very different floodplain characteristics and flood risk management approaches. The **Upper** and Lower Mole are characterised by areas of urban development whereas the Middle Mole contains fairly extensive natural floodplain. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for the Upper Mole: ***P6*** *- take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
UM1	**Land use planning – Location and design of new development and the management of run-off** The short-term priority actions relating to the siting of major development in the Upper Mole, including the potential expansion of Gatwick Airport, Crawley and the 'Gatwick Diamond', are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to influence the location of future development, and the layout and design of development to minimise flood risk. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature.	PPS25 SFRA LDF RSS Planning Applications Upper Mole working group Gatwick Airport Masterplan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils of Reigate and Banstead, Tandridge, Mid Sussex, Mole Valley, Crawley, Horsham, Regional Planning Body, Developers, BAA	Short, medium, to long
UM2	**Land use planning – Short-term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk and contribute to risk reduction in the Upper Mole policy unit are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature.	PPS25 SFRA LDF RSS Planning applications Upper Mole working group	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils of Reigate and Banstead, Tandridge, Mid Sussex, Mole Valley, Crawley, Horsham, Regional Planning Body, Developers, Landowners	Short to medium

	• Safeguard land required for future flood storage areas as identified in the Mole Flood Risk Management Strategy.				
UM3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan (SWMP) for those areas in the Upper Mole that are most vulnerable to these sources of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SWMP SFRA	SWMP progress	Local authorities	Medium
UM4	**Progress approved options to improve the current standards of defence** • Progress flood storage options identified in the Mole Flood Risk Management Strategy at Worth Farm, Rusper Road and Clays Lake.	System Asset Management Plan	Flood storage options taken forward	landowners	Short to medium
UM5	**Flood Proofing and flood resilience to existing properties** We will encourage individual flood protection and flood resilience measures. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Table 7.24 Colne tributaries and Wye policy unit action plan

The **Colne tributaries and Wye** policy unit is characterised by narrow floodplains and mixed land use. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for the Colne tributaries and Wye policy unit: ***P3*** *- accept the risk – our current scale of actions is sufficient to manage the current risk and future increases will be acceptable*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
CT1	**Land use planning – Short-term land use planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk and contribute to risk reduction in the Colne tributaries policy unit are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Wycombe, Chiltern, Dacorum, St Albans, Watford, Three Rivers, South Buckinghamshire, South Bedfordshire, Regional Planning Body, Developers, Housing Associations, Business Associations	Short to medium
CT2	**Land use planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identifying opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts, open up culverts and set development back, allowing space for water, habitat, wildlife and recreation, particularly in Berkhampstead, Hemel Hempstead, Chesham and High Wycombe.	SFRA LDF RSS Planning applications River Corridor Improvement Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils of Wycombe, Chiltern, Dacorum, St Albans, Watford, Three Rivers, South Buckinghamshire, South Bedfordshire, Developers,	Medium to long

	• Removing obstructions to flow including long sections of culvert in Berkhampstead. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk (see example below).		BAP Habitat	Housing Associations, Business Associations	
CT3	**Efficient and effective targeting of maintenance** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Reduce maintenance outside of towns and villages. • Review the overall effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood as maintenance costs in this policy unit are relatively high in the context of Thames region. • Review maintenance close to SSSIs that require winter flooding.	Performance Specifications SAMP	Performance specifications reviewed and appropriate action taken	Landowners	Short to medium

CT4	**Flood Warning, Flood Awareness and Emergency Planning**
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	• 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. groundwater and river level monitoring.
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	• Encourage communities to work together with parish councils to produce community flood plans. We have provided templates to help in other parts of the region (Upper Thames and Ock). The Plans will:
	  • Identify the flood risks to the community and take action to reduce them
	  • Identify vulnerable people in the community and develop plans to assist/protect them
	  • Identify resources in the community available to assist during an emergency
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Projects to install gauging at key locations.
		Multi-Agency Response Plans
		Community Flood Plans
		Communications Plan
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			Flood Warning provision reviewed
				Local Resilience Forums
				Local Authority (Emergency Planners)
				Parish Councils
				Category 1 Responders
				Media
				Community Groups
					Short to medium

CT5	**Flood Proofing and flood resilience to existing properties** We will encourage flood resilience in the Colne tributaries and Wye policy unit as it is unlikely that flood defences can be provided for the majority of homes at risk of flooding. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to property reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long
CT6	**Surface Water Run-off** Investigate the vulnerability to rapid surface water run-off in those towns that have developed on the steep slopes of the Chilterns; for example, High Wycombe and Hemel Hempstead.	SWMP	SWMP progress	Local Authorities	Medium

Table 7.25 Colne policy unit action plan

The **Colne** policy unit is characterised by fairly extensive partially developed floodplain. In the more rural areas our messages relating to natural floodplain are most appropriate. In the urban areas such as Watford, our messages relating to developed floodplain with no major defences apply. These are:

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

These approaches will deliver our policy for the Colne: ***P4*** *– accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Co1	**Maintain the Lower Colne defences** Continue to maintain the Lower Colne defences.	System Asset Management Plan	Standard of protection provided by the Lower Colne defences is maintained	Local Authorities, Landowners	Short to medium
Co2	**Efficient and effective targeting of maintenance** There are a significant number/value of Third Party Owned assets in this policy unit. Attention should be given to the Environment Agency policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition. • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Review the effectiveness of maintenance across the policy unit as a whole. • Seek to reduce maintenance costs within the Colne policy unit as they are high in the context of Thames region. • Review maintenance close to SSSIs that require winter flooding.	Performance Specifications System Asset Management Plan	Performance specification reviewed and appropriate action taken	Local Authorities, Asset owners, Landowners	Short to medium
Co3	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • 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. river level monitoring. • Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service. • Encourage communities to work together with parish councils to produce community flood plans. The Plans will: ◦ Identify the flood risks to the community and take action to reduce them. ◦ Identify vulnerable people in the community and develop plans to assist/protect them. ◦ Identify resources in the community available to assist during an emergency. ◦ Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.	Projects to install gauging at key locations. Evolution of the FIM Day Job. Community Flood Plans	Appropriate level of flood warning service sign-up Flood Warning provision reviewed	Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 responders, Media	Short to medium

Co4	**Land use planning – Short-term land use planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk and contribute to risk reduction in the Colne policy unit are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Encourage the Local Authority to adopt policies to ensure that all new development in the floodplain is resistant and resilient to flooding. This is vital in those locations where there is no prospect of flood defences in the foreseeable future.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Welwyn Hatfield, Hertsmere, Watford, St Albans, Three Rivers, South Buckinghamshire, Spelthorne, Royal Borough of Windsor and Maidenhead, Slough Borough, London Borough of Hillingdon	Short to medium
Co5	**Land use planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors through different site layouts, particularly in Watford. • Remove obstructions to flow. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS Planning applications River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	District Councils of Welwyn Hatfield, Hertsmere, Watford, St Albans, Three Rivers, South Buckinghamshire, Wokingham, Spelthorne, Royal Borough of Windsor and Maidenhead, Slough Borough, London Borough of Hillingdon	Medium to long
Co6	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way. These locations include London Colney, Mimshall Brook and Watford. It is uncertain at the moment whether they can be developed. Priority actions are; • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land where appropriate.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Locations chosen and options taken forward LDF policies in place	Landowners, Local Authorities	Short, medium to long

Table 7.26 Pinn policy unit action plan

The **Pinn** policy unit is urban in character and in places has some of the characteristics of the developed floodplain with concrete river channels. However, for the most part the river is quite natural in character. Many of the messages that apply to urban rivers do apply to the Pinn, but there is also far more emphasis on maintaining some of the existing features – notably the natural channel and open space adjacent to the river. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

The policy for the Pinn is*: **P6** - take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Pi1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Pinn policy unit are: • Agree the Strategic Flood Risk Assessment (including subsequent revisions) with the Local Authority and use the information to influence the location of future development (taking account of current and future flood risk) and maintain the SFRA as a living document. • Encourage safeguarding of existing areas of open space in the floodplain. The presence of these open spaces will enable a wider range of options to manage flood risk to be considered when the existing assets need to be renewed (see example below). • Encourage Local Authorities to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	London Boroughs of Harrow and Hillingdon, GLA, developers	Short to medium
Pi2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation, particularly in Pinner. • Removing obstructions to flow, particularly in the upstream reaches through Pinner. • Naturalising watercourses so there is a reduced risk of blockages. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS Planning applications River Corridor Improvement Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	London Boroughs of Harrow and Hillingdon, GLA, Developers, Housing associations, Building associations	Medium to long
Pi3	**Surface water drainage** Consider other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Pinn that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP Drain London SFRA	SWMP progress	Local Authorities, landowners, Thames Water	Medium
Pi4	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on maintenance of existing assets, and there are more sustainable options available that may become justified when large scale replacement of the existing assets is needed. The outcomes that we are seeking through this action are:	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy System Asset Management Plan	Performance specification reviewed and appropriate action taken	Landowners, Community Groups	Short to medium

	• Conveyance maintained where necessary. • Greater attenuation in the catchment. • An enhanced river corridor. • Reduced future legacy costs by identification of redundant asset structures. • Maintain conveyance by working with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action.	Performance Specs for the management of the watercourse in the intervening period. Fly tipping protocol			
Pi5	**Short-term management of assets** Linked to Pi4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Pi2 and Pi4) – particularly in the Pinner area.	System Asset Management Plan	Conveyance maintained and targeted review of performance specifications in key locations. Opportunities for solutions through the planning process are recognised.	Landowners,	Short to medium

Examples

Pi1

These two aerial photographs are typical of a large part of the Pinn catchment downstream of Pinner

- there are properties at risk from flooding, particularly towards the edge of the floodplain
- there is a green river corridor with flood compatible land use such as playing fields
- the river is modified, but retains some natural characteristics

In contrast to some other urban catchments in and around London such as the Rom and Ravensbourne, the existing characteristics of this catchment do mean there is the potential to manage flood risk in a sustainable way. The Wandle catchment in South London is similar in this respect. For example, there is a river corridor, it may be possible to attenuate water in areas of open space whilst maintaining conveyance through built up areas and there is not an over dependence upon structures that are difficult and expensive to maintain.

At present, it may not be a priority to achieve a more effective balance of attenuation and conveyance as this would require some form of structural intervention. However, unlike some other policy units it would be possible to do as the risks increase with climate change. The priority actions here are;

- Safeguarding the open space
- Reducing the consequences of flooding through redevelopment (recognising that in this location it could be a very long-term process)
- Flood Warning, flood awareness and encouraging appropriate action.

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Table 7.27 Luton policy unit action plan

The **Luton** policy unit is characterised by a developed floodplain with typically concrete river channels. Our flood risk management approach for this type of catchment is outlined below.

Highly developed floodplains with little open space and modified river channels

- We need long-term adaptation of the urban environment. There are massive opportunities to reduce flood risk through redevelopment. In most areas we need to change the character of the urban area in the floodplain through re-development. It must be resilient and resistant to flooding and result in a layout that re-creates river corridors.
- We are seeking to re-create river corridors through redevelopment so that there is space for the river to flow more naturally and space in the floodplain where water can be attenuated.
- We will be seeking to build flood defences as redevelopment occurs and as part of an overall catchment plan. This is because more attenuation and more space in the river corridors are needed for defences to be sustainable. This is more complex but represents better value for society in the long-run even if it is more costly for the Environment Agency today.
- These areas are very susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for Luton: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Lu1	**Land use planning – Short-term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in Luton are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Encourage safeguarding of areas needed for flood risk management as identified in the finalised Luton Strategy. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications River Restoration Action Plan Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements BAP Habitat	Luton Council, South Bedfordshire District Council Regional Planning Body Developers, Highways Agency	Short to medium
Lu2	**Land use planning – Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban river corridors in Luton, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Increasing the available storage within the river corridor. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF Planning applications Luton FRM Strategy River Corridor Improvement Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	Local authorities, Developers, Housing Associations, Business Associations	Medium to long
Lu3	**Flood Risk Management Strategy** Complete the Luton Flood Risk Management Strategy to identify in detail the most effective and sustainable options for managing flood risk.	FRM Strategy	Strategy completed	Local Authorities, landowners	Short
Lu4	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan (or within the Luton strategy) for those	SWMP Luton FRM strategy	SWMP progress	Local Authorities, Three Valleys	Medium

	areas of Luton that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SFRA		Water	
Lu5	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision (action Lu2) The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment. • Reestablishment and enhancement of river corridors. • Reduced future legacy costs by identification of redundant asset structures. The Luton strategy will assess the viability of attenuation options.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy System Asset Management Plan Performance Specs for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken	Local Authorities, Landowners	Short and Medium
Lu6	**Short-term management of assets** The approach for the short-term management of assets is: • Maintain the existing level of conveyance through the town by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Lu2).	System Asset Management Plan	Conveyance maintained and opportunities for solutions through the planning process are recognised	Local Authorities, Landowners	Short to medium

Lu7	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	• Identify those places where an adequate flood warning is not currently provided. Investigate whether this situation can be improved and where possible do so e.g. through the installation of river level monitoring.
	• Encourage communities to work together with parish councils to produce community flood plans that will:
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communications Plan
			Appropriate level of flood warning provided	Local Resilience Forums, Local Authority Emergency Planners, Parish Councils, Category 1 Responders, Media, Community Groups	Short to medium

Examples	
Lu1, Lu2, Lu5	Through Luton, the River Lee is heavily constrained by existing development and is highly modified through concrete channels and culverts. This photograph illustrates how little space there is between existing development and the river, and the difficulties and risks in maintaining such channels. In some areas, houses are located on top of condemned culverts. Reprofiling of such a steep channel would require significant land take which may limit opportunities for redevelopment and render a site unviable for redevelopment. In the long term we should be seeking opportunities for land swapping, so that space

	can be made for water through the town. Appropriate development setback from the watercourse, along with appropriate landscaping and open space that provides social, environmental and recreational value would contribute towards the river being seen as an asset rather than a constraint to development. 

Table 7.28 Upper Lee policy unit action plan

The **Upper Lee** policy unit is characterised by narrow floodplains and mixed land use. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Upper Lee: ***P3*** *– accept the risk – our current scale of actions is sufficient to manage the current risk and future increases will be acceptable*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
UL1	**Land use planning** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Upper Lee are; • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences.	PPS25 SFRA LDF RSS Planning applications	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	District Councils of East Hertfordshire, North Hertfordshire, St Albans, Welwyn Hatfield,	Short to medium

		Developer contributions Local Area Agreements Joint initiatives with partners	Percentage of agreed actions undertaken as part of Local Area Agreements	Stevenage, South Bedfordshire, Hertfordshire County Council	
UL2	**Conveyance in urban locations** • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP. • Seek to make the conveyance in urban areas more efficient where practical (for example, where there are restrictions to flow from undersized culverts or bridges e.g. Wheathampstead). Identify those locations where relatively minor alterations will increase the efficiency of the river channel. Ensure that these are widely understood by Planning teams so that any opportunities to remove them through redevelopment (action UL1) can be taken. • Maintain conveyance by working with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action.	Performance Specifications System Asset Management Plan Fly tipping protocol	Performance specifications reviewed where necessary and appropriate action taken	Local Authorities, Landowners, Parish Councils, Community Groups	Short to medium

UL3	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• 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.
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with parish councils to produce community flood plans. The Plans will:
	
	  • Identify the flood risks to the community and take action to reduce them
	  • Identify vulnerable people in the community and develop plans to assist/protect them
	  • Identify resources in the community available to assist during an emergency
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Response Plans
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
		
		Community Flood Plans
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Category 1 responders, Parish Councils, Media, Community Groups	Short to medium

UL4	**Flood Proofing and flood resilience to existing properties** In the Upper Lee policy unit it is unlikely that flood defences can be provided for the majority of homes at risk of flooding. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties is reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long
UL5	**Water Level Management** Progress FRM related actions within Water Level Management Plans as part of the Biodiversity Outcome Measure Programme to improve the condition of water dependent SSSIs	WLMP	WLMP Actions	NE	Medium

Table 7.29 Middle Lee and Stort policy unit action plan

The **Middle Lee and Stort** policy unit is characterised by fairly extensive floodplains, but with some clusters of development. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Middle Lee and Stort*: **P6** - take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
ML1	**Making Space for Water** Reduce the uncertainty associated with increased attenuation in the Upper Middle Lee and Stort by carrying out some simple investigations in the short to medium-term so that the most effective way of implementing any potential options can be decided. This could comprise: 1. Identify areas of floodplain where the natural characteristics of the floodplain (geology, topography, slope etc) suggest that the capacity to retain water could be enhanced. 2. Identify which of these areas are upstream of settlements at risk of flooding and carry out a very broad assessment of the potential benefits. Assess also the potential environmental benefits e.g. potential expansion of floodplain BAP habitat. 3. Estimate in broad terms the potential impact of different scales of intervention. For example from changes in the operating regime (likely to be a very small effect) to engineered flood storage (large effect). 4. Look at the outcomes of 1-3 and decide whether any implementation is likely to be (a) through a series of small projects with local impacts, or whether (b) there is a possibility that the local impacts combine to have a more strategic catchment impact. There are areas where the attenuation of water could have local social and economic benefits (by reducing flood risk) and environmental benefits (by increasing the frequency of inundation). Making Space for Water proposes such approaches, but there is still uncertainty as to how it could be best applied in the Middle Lee and Stort. Ensure that measures do not cause harm to the internationally designated site in the Middle Lee and Stort policy unit (Lee Valley SPA/Ramsar). If there is a potential for damage to occur then further study to review the mitigation options must be carried out. This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	In the short-term, this is a Reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail. In time, depending upon the outcome of this initial action, this could be progressed to either a Strategy, a series of Delivery Plans or individual projects.	Possible attenuation sites identified BAP Habitat	District Councils of Uttlesford, East Hertfordshire, Epping Forest, Harlow, Welwyn Hatfield, St Albans, Broxbourne, Natural England, RSPB	Medium
ML2	**Efficient and effective targeting of maintenance** There are a significant number/value of Third Party Owned assets in this policy unit. Attention should be given to the Environment Agencies policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition. • Maintain the existing conveyance in urban areas to reduce the risk of flooding from low order flooding, typically from a 5% to 10% AEP with a focus on Bishops Stortford, Sawbridgeworth, Hertford and Ware. • Reduce maintenance outside of towns and villages. • Review the overall effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood as maintenance costs in this policy unit are relatively high in the context of Thames region. • Review maintenance close to SSSIs that require winter flooding.	Performance Specifications System Asset Management Plan	Performance specifications reviewed where necessary and appropriate action taken	Local Authorities, Landowners, Asset owners	Short to medium
ML3	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:	Projects to install gauging at key locations.	Appropriate level of flood warning service	Local Resilience Forums,	Short to medium

	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	• 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.
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	• Encourage communities to work together with parish councils to produce community flood plans. The Plans will:
	  • Identify the flood risks to the community and take action to reduce them
	  • Identify vulnerable people in the community and develop plans to assist/protect them
	  • Identify resources in the community available to assist during an emergency
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Evolution of the FIM Day Job.
			Flood Warning provision reviewed	Local Authority Emergency Planners, Category 1 responders, Parish Councils, Media, Community Groups	

ML4	**Short-term land Use Planning** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Middle Lee and Stort floodplain are: • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Encourage the Local Authorities to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policy in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	District Councils of Uttlesford, East Hertfordshire, Epping Forest, Harlow, Welwyn Hatfield, St Albans, Broxbourne, Regional Planning Body, GLA, Developers, British Waterways	Short to medium
ML5	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban areas within the Middle Lee and Stort floodplain, linked to the redevelopment of these areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS Planning applications River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policy in place BAP Habitat Planning decisions	District Councils of Uttlesford, East Hertfordshire, Epping Forest, Harlow, Welwyn Hatfield, St Albans, Broxbourne, Regional Planning Body, GLA, Developers, British Waterways	Medium to long
ML6	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way, including Hertford. However, it is uncertain at the moment whether they can be developed. The priority actions are: • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land as appropriate.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Locations chosen and options taken forward LDF policies in place	Local authorities	Short, medium to long.
ML7	**Water Level Management** Progress FRM related actions within Water Level Management Plans as part of the Biodiversity Outcome Measure Programme to improve the condition of water dependent SSSIs	WLMP	WLMP Actions	NE	Medium

Table 7.30 Lower Lee policy unit action plan

The **Lower Lee** policy unit is a complex river system comprising the River Lee, Lee Navigation, and Lee Flood Relief Channel with the associated sluice gates, radial gates and weirs which control water levels in the system. Together these flood defences reduce the risk of flooding to about a 1.5% to 2% AEP generally, reducing to about 3% in the most vulnerable locations.

Developed floodplain with major built flood defences

- At present it is still effective to maintain these flood defences.
- Climate change will mean that these defences will become less effective in the future. We therefore need to make sure that:
  - any re-development reduces the residual risk in the areas benefiting from these defences using the measures set out in PPS25.
  - the natural floodplain retains its potential to accommodate floodwater.

This approach will deliver our policy for the Lower Lee **P5:** *Take further action to reduce of flood risk.*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
LL1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Lower Lee floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Local Area Agreement Regional Spatial Strategy (Blue Ribbon Network) River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of LAA	London Boroughs of Newham, Tower Hamlets, Hackney, Waltham Forest, Haringey, Enfield, District Councils of Epping Forest and Broxbourne	Short to medium
LL2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors within the Lower Lee, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identifying opportunities to recreate river corridors through different site layouts. • Removing obstructions to flow and naturalising watercourses where appropriate. • Increasing the available storage within the river corridor. • Consideration of opportunities to exchange proposed development within the flood plain with public open spaces outside the flood plain recreating natural water courses with public access and lower flood risk to property (land swapping) The action recognises that there is a need to adapt and be flexible in terms of our approach to flood risk management in the future. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. Some areas will be redeveloped in the current plan period. In other areas, redevelopment will be further into the future but it is important that the tools are in place (whether it is policy or otherwise) to achieve a net reduction in flood risk from future redevelopment.	SFRA RSS LDF Planning applications Spatial Delivery Plan River Corridor Improvement Plan Regional Spatial Strategy (Blue Ribbon Network)	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions The number of properties made resilient BAP Habitat	London Boroughs of Newham, Tower Hamlets, Hackney, Waltham Forest, Haringey, Enfield, District Councils of Epping Forest and Broxbourne, Housing Associations, Business Associations, Community Groups, Landowners	Medium to long
LL3	**Lower Lee Flood Risk Management Strategy** The Lower Lee FRM Strategy should be completed and programmes developed to deliver its recommendations in line with the policies of the CFMP. The Strategy should define the approach that we are going to take in terms of: • Management of assets and reduction of on-going legacy costs (especially those assets that might not have FRM benefit).	Lower Lee Flood Risk Management Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.		Local Authority, Natural England, RSPB,	Short to medium

	• The refurbishment and renewal of structures that are part of the Lee Flood Relief Channel. • Promote initiatives to reduce flood risk through appropriate redevelopment. • Ensure that measures do not cause harm to the internationally designated sites in the Lower Lee policy unit (Lee Valley RAMSAR / SPA). If there is a potential for damage to occur then further study to review the mitigation options must be carried out. This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.				

LL4	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to plan for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place for before, during and in the recovery phase of a flooding incident.
	
	• Identify those places where an adequate flood warning is not currently provided.
	
	• Investigate whether this situation can be improved and where possible do so e.g. through the installation of river level monitoring.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with Local Community Groups to produce community flood plans that will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
	
	• There are a significant number of Third Party Owned flood defence assets in this policy unit. Co-operation of Third Parties to operate their assets for the reduction of flood risk should be sought. Attention should be given to the policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition.
	
	• Identify critical infrastructure affected by flooding and work with owners to improve resilience (notably rail and water supply infrastructure).
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communications Plan
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums
				
				Local Authority Emergency Planners
				
				Media
				
				Category 1 responders
				
				Community Groups
					Short to medium

LL5	**Flood proofing and flood resilience to existing properties** We will encourage flood proofing and flood resilience measures for properties at risk of flooding. It is unlikely that flood defences can be provided for all of the homes at risk of flooding in the future. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects Joint initiatives with partners	Damage to properties is reduced	Local authority Community Groups, Housing Associations, Business Associations	Medium to long
LL6	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Table 7.31 Lower Lee Tributaries policy unit action plan

The policy selected for the **Lower Lee tributaries** is different from that adopted for other comparable rivers in London. The risk of flooding has generally been reduced to a 2% to 10% AEP through alterations to river channels and the construction of flood defences. The following characteristics determine policy;

• **Interconnectivity -** The combination of manmade surfaces, steep catchments and clay soils means watercourses in the Lower Lee respond rapidly to rainfall and are liable to sudden flooding after storms. This has particularly adverse consequences for areas at the confluence of the Lower Lee tributaries with the River Lee. The interconnectivity between the Lower Lee tributaries and the Lower Lee itself is a key factor in establishing future policy.

• **Potential to attenuate flows -** There is the potential for engineered flood storage schemes to reduce the current risk of flooding to some of the key tributaries on the Lower Lee (Salmons Brook and Cobbins Brook). There is further potential for engineered flood storage schemes to reduce the future risk of flooding on other tributaries.

• **Potential for flood defences –** There is the potential for engineered flood defence solutions to reduce the future risk of flooding on some of the tributaries.

Our flood risk management approach for this type catchment is outlined below:

Largely developed floodplain with some flood defences

• These are urban catchments with many of the associated flood risk issues (rapid run-off, large-scale encroachment onto the floodplain and modified watercourses). However, they do have sufficient features (river corridors, open space and natural watercourses) that provide the potential to adopt a more sustainable management of flood risk in the future.

• A priority in these catchments is to maintain river corridors and safeguard existing open space so that the potential to reduce the probability of flooding in the future remains.

• There is still a high level of flood risk from a variety of sources in these catchments. Regeneration and re-development of some areas offers an opportunity to reduce the risk; for example through the layout and design of new development.

This approach will deliver our policy for the Lower Lee Tributaries: **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)*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
LLT1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Lower Lee Tributaries are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. Encourage safeguarding of existing areas of open space in the floodplain, particularly those areas that offer the potential for future flood storage and compensatory storage. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Local Area Agreement Regional Spatial Strategy (Blue Ribbon Network)	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of LAA	District Councils of Broxbourne, Welwyn Hatfield, Epping Forest, London Boroughs of Enfield, Barnet, Waltham Forest	Short to medium
LLT2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Lower Lee Tributaries are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses where appropriate. • Safeguarding existing open space so that the opportunity to attenuate water is maintained for future use. The action recognises that there is not a single flood defence solution along most of the Lower Lee Tributaries and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	PPS25 SFRA LDF RSS Planning applications River Corridor Improvement Plan Regional Spatial Strategy (Blue Ribbon Network)	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat Number of properties made resilient	District Councils of Broxbourne, Welwyn Hatfield, Epping Forest, London Boroughs of Enfield, Barnet, Waltham Forest, Community Groups, Housing Associations, Business Associations	Medium to long
LL3	**Lower Lee Flood Risk Management Strategy and options to reduce flood risk** The Lower Lee FRM Strategy should be completed and programmes developed to deliver its recommendations in line with the policy decision of the CFMP. The Strategy should define the approach that we are going to take in terms of: Management of assets and reduction of on-going legacy costs (especially those assets that might not have FRM benefit). • Progressing options to reduce the flood risk through flood storage and attenuation measures (for example Cobbins and Salmons Brook) • Safeguarding opportunities on other tributaries for flood storage and compensatory storage (for example Nazeing, Pymmes, Ching, Turnford and Woollens Brooks) • Ensure that measures do not cause harm to the internationally designated site in the Lower Lee tributaries policy unit (Epping Forest SAC). If there is a potential for damage to occur then further study to review the mitigation options must be carried out. This may include further appropriate assessment under the Habitats Regulations where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.	Lower Lee Flood Risk Management Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.	Strategy progress SAMP progress	Local Authorities, Landowners	Medium to long
LLT4	**Surface water drainage** We need to get a clearer understanding of the surface water and drainage related flooding issues so that improvements made address all aspects of flood risk (e.g. Edmonton).	SWMP or IUDP	Progress towards SWMP or IUDP	Local Authorities, Thames Water, Landowners	Medium

	A Surface Water Management Plan (SWMP) or and Integrated Urban Drainage Plan (IUDP) should be completed to define the approach for the future.				
LLT5	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and the limits of this approach will be reached as flood risk increases in the future. • We need to link the management of current assets to a more sustainable vision. The outcomes that we are seeking through this action are: • Conveyance maintained, but in a more natural state where practical. • Greater attenuation in the catchment. • Re-establishment and enhancement of river corridors. • Reduced future legacy costs.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken BAP Habitat	Local Authorities, Landowners	Short and Medium

LLT6	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to plan for and to address the consequences of flooding. The priority actions are:
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place for before, during and in the recovery phase of a flooding incident.
	
	• Identify those places where an adequate flood warning is not currently provided.
	
	• Investigate whether this situation can be improved and where possible do so e.g. through the installation of river level monitoring (eg. Nazeing, Ching).
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Encourage communities to work together with Local Community Groups to produce community flood plans that will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
	
	• There are a significant number of Third Party Owned flood defence assets in this policy unit. Co-operation of Third Parties to operate their assets for the reduction of flood risk should be sought. Attention should be given to the policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition.
	
	• Identify critical infrastructure affected by flooding and work with owners to improve resilience (notably A406 and M25).
		Multi-Agency Emergency Response Plans
		
		Community Flood Plans
		
		Communications plan
		
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
			Appropriate level of flood warning
			
			Flood Warning provision reviewed
				Local Resilience Forums
				
				Local Authority Emergency Planners
				
				British Waterways
				
				Thames Water
				
				Category 1 responders
				
				Media
				
				Community Groups
					Short to medium

LLT7	**Promoting the river as a Community Asset** The Lower Lee Tributaries currently suffer from very high levels of fly-tipping. • We should continue to remove debris from the channel where necessary and take enforcement action where appropriate. • We should work to raise peoples awareness and understanding of the river and its environment to promote that the river be seen as a community asset thus resulting in a reduction in fly-tipping and a general enhancement of the local environment.	Community awareness programmes Enforcement action Fly tipping protocol	Number of days spent clearing the rivers. Number of successful enforcement actions taken.	Local Authorities, Community groups	Short to medium

Table 7.32 Lower and Middle Roding policy units action plan

Within the Roding catchment we have defined three policy units; Upper, Middle and Lower Roding. The **Lower and Middle Roding** are characterised by planned urban expansion close to floodplain. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Lower and Middle Roding: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
LR1	**Short-term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Lower Roding floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage safeguarding of land needed for flood risk management purposes as determined in the final Roding Flood Risk Management Strategy. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policy in place RSS policy in place Planning applications Percentage of agreed actions undertaken as part of Local Area Agreements	London Boroughs of Newham, Barking and Dagenham and Redbridge, GLA, Developers	Short to medium
LR2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Lower and Middle Roding, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA RSS LDF River Restoration Action Plan Planning applications Developer contributions TE2100	CFMP informs SFRA SFRA informs LDF LDF policy in place Planning decisions BAP Habitat	London Boroughs of Newham, Barking and Dagenham and Redbridge, GLA, Developers, Housing Associations, Business Associations	Medium to long
LR3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan (SWMP) for those areas of the Lower Roding that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SWMP Drain London SFRA	SWMP progress	Local Authorities, Three Valleys Water, Landowners	Medium
LR4	**Roding Flood Risk Management Strategy** • Conclude the Roding Flood Risk Management Strategy to determine whether flood storage is viable option at locations including Shonk Mill. • Implement actions as appropriate including safeguarding of land.	FRM Strategy	Agree if flood storage is viable or not and progress solution	Landowners	Short to medium
LR5	**Short-term management of assets**	Performance specifications	Conveyance	Landowners,	Short to

	Linked to LR4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in LR2).	SAMP	maintained. Review of performance specifications. Opportunities for solutions through the planning process are recognised	Local Authorities	medium
LR6	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Examples

Examples of river enhancements which served to reduce flood risk (improve standard of protection and increase storage capacity), reduce legacy costs (removal of hard flood defences and creation of 'soft' defences), improve amenity and public access (footpaths, viewing areas) and improve habitat for wildlife (creation of intertidal zone, natural bank design, etc).

Before and After photographs of enhancements to the Lower Roding near the A13

Before and after photographs of enhancements to the Lower Roding near Creekmouth

Table 7.33 Upper Roding policy unit action plan

The **Upper Roding** policy unit is predominantly a rural part of the region with villages and small towns and characterised by extensive natural floodplains. Our flood risk management approach for this type of catchment is outlined below.

Mainly natural floodplain, with market towns and villages

- The floodplain is our most important asset in managing flood risk.
- We are seeking to maintain the capacity of the natural floodplain to retain water and maintain the conveyance of watercourses in the towns and villages. Together this reduces the impacts of the more frequently experienced floods and has benefits for the natural environment.
- Redevelopment rates are often quite low. We want to safeguard the natural floodplain from inappropriate development. Refurbishment of buildings and redevelopment of industrial areas in the floodplain offers the opportunity to increase the resilience of these areas.
- Flood storage schemes will be complementary to wider objectives. However, the scale of intervention is likely to be moderate so other types of scheme can be progressed. There are some places where we will be able to reduce risk, but this will not be possible everywhere because of technical and economic constraints.
- Individual action will play an increasingly important role in these areas.

This approach will deliver our policy for the Upper Roding*: **P6** - take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
UR1	**Maintain existing flood storage areas and the associated urban conveyance** Continue to maintain existing flood storage areas that are complementary to the overall policy objective. These locations include Crispey Brook and Loughton Brook. Encourage partners to maintain their own flood defences including the flood storage area at Staples Road managed by the Local Authority. Ensure that all measures do not cause harm to the internationally designated site in the policy unit, Epping Forest (SAC). If there is any potential for damage to occur then further study to review the mitigation options must be carried out . This may include further appropriate assessment under the Habitats Regulations	Performance specifications System Asset Management Plan	Standard of protection provided by flood storage areas is maintained	Local Authorities	Short to medium

	where necessary. We should also identify any feasible opportunities to enhance and protect environmental features.				
UR2	**Making Space for Water** Reduce the uncertainty associated with increased attenuation in the Upper Roding by carrying out some simple investigations in the short- to medium-term so that the most effective way of implementing any potential options can be decided. Actions include: 1. Identify areas of floodplain where the natural characteristics of the floodplain (geology, topography, slope etc) suggest that the capacity to retain water could be enhanced. 2. Identify which of these areas are upstream of settlements at risk of flooding and carry out a very broad assessment of the potential benefits. Assess also the potential environmental benefits e.g. potential expansion of floodplain BAP habitat. 3. Estimate in broad terms the potential impact of different scales of intervention. For example from changes in the operating regime (likely to be a very small effect) to engineered flood storage (large effect). 4. Look at the outcomes of 1-3 decide whether any implementation is likely to be (a) through a series of small projects with local impacts, or whether (b) there is a possibility that the local impacts combine to have a more strategic catchment impact. There are areas where the attenuation of water could have local social and economic benefits (by reducing flood risk) and environmental benefits (by increasing the frequency of inundation). 'Making Space for Water' proposes such approaches, but there is still uncertainty as to how it could be best applied in the Upper Roding.	In the short-term, this is a Reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail. In time, depending upon the outcome of this initial action, this could progress to either a series of Delivery Plans or individual projects. Waste and Minerals Development Framework	Possible attenuation sites identified	Landowners, Local Authorities, Parish Councils, Regional Planning Body, Natural England, RSPB	Medium
UR3	**Review the effectiveness of maintenance** • Review the level of maintenance in the Upper Roding and on the Loughton Brook. • Review the effectiveness of maintenance in reducing the risk of flooding up to a 5% AEP flood throughout the policy unit. • Stop maintenance outside urban areas.	Performance Specifications System Asset Management Plan	Performance specifications reviewed and appropriate action taken	Landowners	Short

UR4	**Flood warning, flood awareness and emergency planning**
	
	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are:
	
	• Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action.
	
	• 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 the installation of river level monitoring.
	
	• Participation in Local Resilience Forums and the development of Multi-Agency Emergency Response Plans with our partners.
	
	• Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident.
	
	• Increase public awareness including encouraging people to sign-up for the free Flood Line Warnings Direct service.
	
	• Communities should work together with parish councils to produce community flood plans. The Plans will:
	
	  • Identify the flood risks to the community and take action to reduce them.
	  • Identify vulnerable people in the community and develop plans to assist/protect them.
	  • Identify resources in the community available to assist during an emergency.
	  • Provide key contact details for the Emergency Management Team, key community recourses, the emergency services and local authorities.
		Projects to install gauging at key locations.
		
		Evolution of the FIM Day Job.
		
		Multi-Agency Response Plans
		
		Community Plans
		
		Communications Plan
			Appropriate level of flood warning service
			
			Flood Warning provision reviewed
				Local Resilience Forums, Local Authority Emergency Planners, Category 1 responders, Parish Councils, Media, Community Groups	Short to medium

UR5	**Land use planning** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Upper Roding floodplain are: • Encourage safeguarding of the natural floodplain through the appropriate application of the sequential test. • Encourage safeguarding of land that may be needed to implement future options to manage flood risk (e.g. Shonks Mill). • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. This is because a large proportion of the properties at risk are dispersed across the policy unit and cannot be protected by flood defences. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF Planning applications Developer contributions Local Area Agreements	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part	District Councils of Uttlesford, Epping Forest, Brentwood, London Borough of Redbridge	Short to medium

			of Local Area Agreements		
UR6	**Flood proofing and flood resilience to existing properties** We will encourage flood proofing and flood resilience in the Upper Roding policy unit as it is unlikely that flood defences can be provided for the majority of homes at risk of flooding. Individual flood protection and flood resilience measures are recommended. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long
UR7	**Surface water drainage** Consider other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Upper Roding that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP SFRA	SWMP progress	Local Authorities, landowners, Thames Water, Three Valleys Water	Medium
UR8	**Water Level Management** Progress FRM related actions within Water Level Management Plans as part of the Biodiversity Outcome Measure Programme to improve the condition of water dependent SSSIs	WLMP	WLMP Actions	NE	Medium

Table 7.34 Beam policy unit action plan

The **Beam** policy unit is characterised by planned urban expansion close to floodplain. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Beam: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Bm1	**Land use planning - Short-term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Beam floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. This should include Rainham and Wennington Marshes. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	London Boroughs of Barking and Dagenham, Havering, Epping Forest, GLA, Developers	Short to medium
Bm2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Beam, linked to the redevelopment of urban areas are: • Encourage redeveloped buildings to be resilient and / or resistant to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation.	SFRA LDF RSS Planning applications	CFMP informs SFRA SFRA informs LDF LDF policies in place	London Boroughs of Barking and Dagenham, Havering, Epping Forest, GLA, Developers,	Medium to long

	• Remove obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Increase the available storage within the river corridor. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. The action recognises that there is not a single flood defence solution along most of the Beam and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	River Corridor Improvement Plan Joint initiatives with partners TE2100	Planning decisions BAP Habitat	Housing Associations, Business Associations	
Bm3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan (SWMP) for those areas of the Beam that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP Drain London SFRA	SWMP progress	Local Authorities, Landowners	Medium
Bm4	**Optimising attenuation and conveyance within the catchment in the long-term** It shall be a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision (action Bm5). The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment. • Reestablishment and enhancement of river corridors. • Reduced future legacy costs by identification of redundant asset structures. The example below indicates how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specifications for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken	Local Authorities, Landowners	Short and Medium
Bm5	**Short-term management of assets** Linked to Bm4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Bm2 and Bm4).	Performance specifications SAMP	Conveyance maintained. Review of performance specifications. Opportunities for solutions through the planning process are recognised	Local Authorities, Landowners	Short to medium
Bm6	**Maintain the Washlands Flood Storage area** Continue to maintain the Washlands Flood Storage Area. In the long term use the findings of the TE2100 to guide investment and maintenance.	Performance specifications SAMP TE2100	Review of performance specifications	Local Authorities, landowners	Short, medium to long
Bm7	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Examples	
Bm2	These photos of Romford in North East London (within the Beam policy unit) shows the River Rom flowing through the middle of the picture with semi-industrial sites to the left and a mixture of residential and commercial buildings to the right. The channel has been straightened and artificially modified. At these sites there will be the potential to achieve wider planning objectives and flood risk management objectives highlighted below: • Redeveloped buildings resilient and / or resistant to flooding • Identifying opportunities to recreate river corridors through different site layouts

- Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages
- Increasing the natural storage within the river corridor
- Consideration of future land swapping opportunities

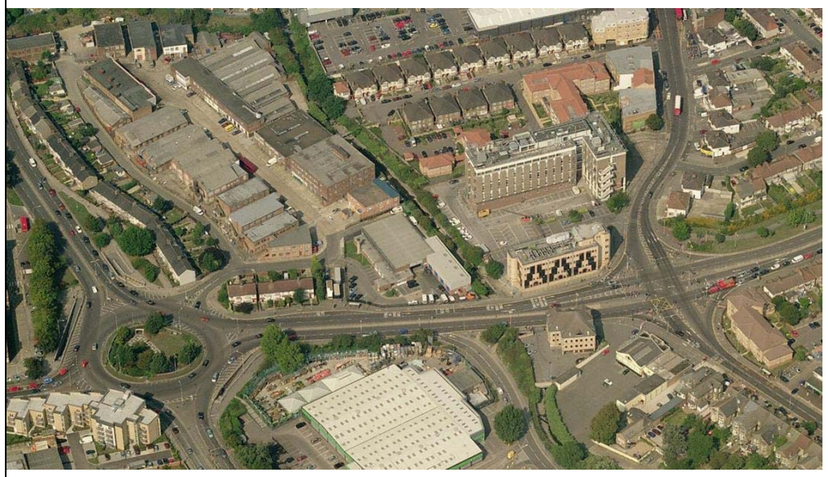

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Table 7.35 Ingrebourne policy unit action plan

The **Ingrebourne** policy unit is characterised by planned urban expansion close to floodplains. Our flood risk management approach for this type of catchment is outlined below.

Newer and expanding urban areas often towards the headwaters of river catchments

- The location, layout and design of developments – in that order – are the most vital factors in managing future flood risk so that past mistakes are not repeated. Regeneration and re-development of some areas offers an opportunity to reduce flood risk; for example re-establishing river corridors and more effective management of run-off.
- We want the rivers to be part of the urban landscape in these areas – at present they are often culverted and hidden away. Previous modifications to these watercourses now cause some flooding. We want to learn from previous decisions.
- Flooding in these locations tends to arise from a number of sources and can be quite localised. Engineering interventions will tend to rely on opportunity; either to increase the conveyance of the watercourses by modifying or removing obstructions to flow or attenuating water at a local scale.
- These areas are susceptible to rapid flooding from thunderstorms.

This approach will deliver our policy for the Ingrebourne: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
In1	**Short to medium term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Ingrebourne floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage safeguarding of areas identified for flood storage upstream of Rainham as identified in the finalised TE2100 study. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	London Borough of Havering, Thurrock Council, Brentwood District Council, Regional Planning Body, GLA	Short to medium
In2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors, notably in Brentwood and Hornchurch, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	London Borough of Havering Thurrock Council, Brentwood District Council, Regional Planning Body, GLA, Housing Associations, Business Associations	Medium to long
In3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Ingrebourne that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change.	SWMP Drain London SFRA	SWMP progress	Local Authorities, Landowners	Medium
In4	**Maintain current levels of defence** Continue to maintain the current level of protection by keeping channels clear and free from obstruction.	Performance specifications SAMP	Current standard of protection maintained	Landowners	Short to medium
In5	**Tidal / fluvial overlaps** Agree a way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all	TE2100 SAMP	SAMP progress	Local Authorities, Landowners	Short to medium

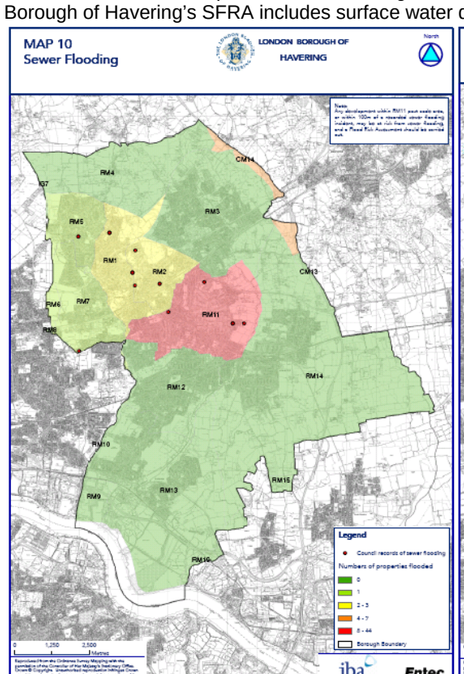
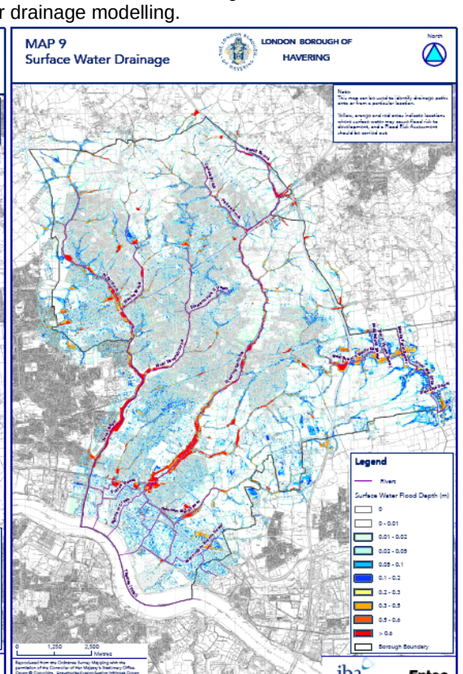
	sources of flood risk.	Communications Plan			
Examples					
In3	Information and understanding about the risks, consequences and locations of surface water flooding are emerging. Data, modelling and recommendations from Surface Water Management Plans should be reflected in Strategic Flood Risk Assessments and the impact considered alongside all other sources of flooding. This should then inform planning policy, planning decisions and emergency planning and assist in identifying locations where action needs to be undertaken. The London Borough of Havering's SFRA includes surface water drainage modelling.   London Borough of Havering and JBA-ENTEC, 2007				

Table 7.36 Ravensbourne policy unit action plan

A large part of the **Ravensbourne** policy unit is characterised by a developed floodplain with typically concrete river channels. The risk of flooding in these areas is relatively high and it is likely that this will increase in the future. Flooding caused by overflowing drainage systems – and the systems themselves – are the responsibility of several organisations. This makes the understanding and management of flooding even more complex. Our flood risk management approach for this type of catchment is outlined below.

Highly developed floodplains with little open space and modified river channels

- We need long-term adaptation of the urban environment. There are massive opportunities to reduce flood risk through redevelopment. In most areas we need to change the character of the urban area in the floodplain through re-development. It must be resilient and resistant to flooding and result in a layout that re-creates river corridors.
- We are seeking to re-create river corridors through redevelopment so that there is space for the river to flow more naturally and space in the floodplain where water can be attenuated.
- We will be seeking to build flood defences as redevelopment occurs and as part of an overall catchment plan. This is because more attenuation and more space in the river corridors are needed for defences to be sustainable. This is more complex but represents better value for society in the long-run even if it is more costly for the EA today.
- These areas are very susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Ravensbourne: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ra1	**Short-term planning actions** The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Ravensbourne floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans.	PPS25 SFRA LDF RSS	CFMP informs SFRA SFRA informs LDF LDF policies in place	London Boroughs of Greenwich, Lewisham, Croydon, Bromley, GLA, Regional Planning	Short to medium

	• Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage partners to develop policies, strategies and initiatives that seek to increase the resistance and resilience of existing development at risk of flooding. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Seek greenfield runoff discharge rates, and a reduction in runoff volumes, in new greenfield and brownfield development, and encourage initiatives to reduce run-off rates and volumes for existing development as the catchment reacts quickly to rainfall events due to its 'flashy' nature	Planning applications Developer contributions Local Area Agreement River Corridor Improvement Plan Joint initiatives with partners	Percentage of agreed actions undertaken as part of Local Area Agreements Planning decisions	Body, Developers	
Ra2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Ravensbourne, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages. • Increasing the available storage within the river corridor. • Encourage partners to assess the viability of future land swapping opportunities in those areas where there is a risk of flooding. The action recognises that there is not a single flood defence solution along most of the Ravensbourne and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk. Some areas will be redeveloped in the current LDF plan period (e.g. large parts of Lewisham). In other areas, redevelopment will be further into the future but it is important that the tools are in place (whether it is policy or otherwise) to achieve a net reduction in flood risk from future redevelopment.	SFRA LDF RSS Planning applications Developer contributions River Corridor Improvement Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	London Boroughs of Greenwich, Lewisham, Croydon, Bromley, GLA, Regional Planning Body, Developers, Housing Associations, Business Associations	Medium to long
Ra3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Ravensbourne that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example below).	SWMP Drain London SFRA	SWMP progress	Local Authorities, Thames Water	Medium
Ra4	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision (action Ra5) The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment. • A re-established and enhanced river corridor. • Reduce future legacy costs by identification of redundant asset structures. The example below indicates how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken	Landowners	Short to Medium
Ra5	**Short-term management of assets** Linked to Ra4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction.	Performance specifications SAMP	Conveyance maintained. Review of performance specifications. Opportunities for solutions through	Local Authorities, Landowners, Asset owners	Short to medium

	• Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Ra2 and Ra4). There are also significant number/value of Third Party Owned assets in this policy unit. Attention should be given to the Environment Agency policy guidance on dealing with third party flood defence assets (Policy Number 185_07) which describes actions of notification followed by enforcement for assets not being maintained to their target condition.		the planning process are recognised		
Ra6	**Flood Alleviation Schemes** Progress the Deptford Flood Alleviation Scheme (FAS). The scheme will reduce flood risk and achieve set back from the watercourse.	ASM day job	Deptford FAS completed	Local Authorities, Landowners	Medium to long
Ra7	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness. This is particularly important as we are going to be changing areas of flood warnings that are issued here.	Multi-Agency Emergency Response Plans Community Flood Plans Communications plan Evolution of the FIM day job	Community Flood Plans	Local Authorities Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Examples

Ra4 and Ra2

Optimising attenuation and conveyance within the catchment in the long-term

In the longer-term, we are seeking to achieve the right balance between conveyance and attenuation within the Ravensbourne. There are areas of open space in the catchment (which we are seeking to safeguard); at some time in the future these areas may have a role in managing flood risk (for example, for water storage).

Our assessment is that interventions to engineer large storage areas in the open space available in the catchment can not be justified at present. However our judgement is also that this option is likely to be much more favourable when the choice is either to do this or replace all of the existing structures and channel lining. We need to carry out some work to test this judgement. We have carried out some broad scale modelling and from this we have determined that the opportunities to store water are real (there is a significant impact on flow). What we have not done is establish which areas of open space would have the most beneficial impact on social, economic and environmental indicators. This analysis is needed to confirm that this is our long-term strategy for managing the risk.

The outcomes from these investigations could comprise:

<u>In the short-term</u>

- Map areas where we will seek to maintain (or even improve) conveyance. Typically these will be areas where little land use change is anticipated.
- Manage these assets. SAMPs and Performance Specs need to reflect this aim (see Ra5).
- Determine (at a broad scale) which areas of open space offer the most potential for <u>future</u> flood storage. For example through simple high-level appraisal.
- Try and get some sense of when we may be looking to do this. Is it, for example, when many of the existing assets reach the end of their life in 20 to 30 years time. Would it all be at the same time, or phased?
- Safeguard these areas.
- Understand how much could potentially be achieved in partnership through redevelopment and how much will require direct intervention from the Environment Agency.

<u>In the longer-term</u>

At the optimum time, carry out a more detailed appraisal so that the approaches described can be implemented. The implications are;

- Conveyance maintained where we have to, but in a more natural state
- Greater attenuation in the catchment
- A re-established and enhanced river corridor
- Reduced future legacy costs by identification of redundant asset structures.

In the first photograph the river can be seen in the top right, flowing in a concrete lined channel between residential and semi-industrial areas and then to the right of a park towards the bottom left. It is likely that some redevelopment of the industrial areas will take place – this should impact on our decisions on the maintenance of the channel. There may also be an opportunity to attenuate water in the park towards the bottom of the picture (and

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	other similar areas in the catchment). In the second photograph the river flows in a concrete lined channel from the bottom of the picture in an arc to the top left. Here, redevelopment may be less likely and we may need to adopt a different approach to the management of the assets. In the Ravensbourne, anywhere where redevelopment occurs along the river we would like to have LDF policies in place to ensure that there is set back from the river and opening up of culverts. At a CFMP level we do not know which culverts to remove - but the presumption is they will be unless there is a good reason not to. This is why we have an action that will lead to adaptation of the urban environment. We would like to achieve a more effective balance of conveyance and storage; we can set out how we could do it in broad terms and safeguard the land through SFRA recommendations and LDF policy. So there may be two possible routes to achieving a more sustainable management of the risk: Option (a): long-term through redevelopment results in greater resilience and a river corridor that can accommodate water and convey with a reduced dependency on asset maintenance. Option (b): A quicker way which includes option (a) but can be speeded up through the use of open space for attenuation. Clearly (b) is quicker, but we know we can do (a) because it is not dependent upon funding. So we follow option (a) and understand what option (b) could look like and keep the opportunity to do (b) open, without depending upon it.
Ra3	**Surface water drainage** Our understanding of the flood risk shows that a significant proportion is attributed to urban drainage problems. Ideas within 'Making Space for Water' could be applied in parts of the policy unit. At present, the delivery of many of these responses is outside of the Environment Agency remit, but this is an area where we will be looking for opportunities and partnerships to understand the problem more clearly. Priorities should include: • Investigation of those areas most prone to surface water flooding. • Assessment of the impact of allowable discharge rates from new development in the Ravensbourne. This could mean zoning catchments so that the control of surface water is targeted to best reduce flood risk considering the sites position and the response of that section of river to rainfall. This could lead to much better surface water control justifying stronger SuDS policies and the targeted use of attenuation and long term storage to both improve the current river regime and minimise flood risk. • Identification of those parts of the catchment where it would be most effective to reduce runoff from brownfield sites to better represent the conditions For the most part there is no quick fix for these existing problems. This is because drainage systems and their discharge into modified fluvial systems have tended to evolve in a piecemeal way. These problems are now recognised and in the longer-term the situation can be improved. A Surface Water Management Plan (SWMP) could identify the main problems and locations associated with surface water flooding and consider whether there is any potential and realistic short-term or long-term alleviation measures.

Table 7.37 Wandle policy unit action plan

The **Wandle** policy unit is urban in character and in places has some of the characteristics of the developed floodplain with concrete river channels. However, for the most part the river is quite natural in character. Many of the messages that apply to urban rivers do apply to the Wandle, but there is also far more emphasis on maintaining some of the existing features – notably the natural channel and open space adjacent to the river. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

Our policy for the Wandle is: ***P4*** *– accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Wa1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Wandle floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to	PPS25 SFRA LDF RSS Planning applications Developer contributions	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions	London Boroughs of Wandsworth, Merton, Sutton, Croydon, Tandridge, District Council, Regional Planning Body, GLA,	Short to medium

	flooding.	River Restoration Action Plan Local Area Agreement	undertaken as part of Local Area Agreements	Critical Infrastructure managers	
Wa2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Wandle, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Remove obstructions to flow. • Naturalise watercourses so there is a reduced risk of blockages. The action recognises that there is not a single flood defence solution along most of the Wandle and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS River Restoration Action Plan Joint initiatives with partners	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	London Boroughs of Wandsworth, Merton, Sutton, Croydon, Tandridge, District Council, Regional Planning Body, , Housing Associations, Business Associations, developers	Medium to long
Wa3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Wandle that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP Drain London SFRA	SWMP progress	Local Authorities, Thames Water	Medium
Wa4	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision (action Wa5). The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment. • Re-established and enhanced river corridors. • Reduced future legacy costs by identification of redundant asset structures. The example Ra2 and Ra4 within the Ravensbourne action plan shows how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period. River Restoration Action Plan	Performance specifications reviewed and appropriate action taken	Local Authorities, landowners	Short and Medium
Wa5	**Short-term management of flood risk management assets** Linked to Wa4 above, the approach for the short-term management of assets is: • Maintain conveyance by working with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Wa2 and Wa4).	Performance specifications System Asset Management Plan Fly tipping protocol	Conveyance maintained. Review of performance specifications. Opportunities for solutions through the planning process are recognised	Local Authorities, Landowners, Community Groups	Short to medium
Wa6	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action, including Wimbledon Substation. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness. This is particularly important as we are going to be changing areas of flood warnings that are issued here.	Multi-Agency Emergency Response Plans Community Flood Plans Communications plan Evolution of the FIM day job	Community Flood Plans	Local Authorities Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

Wa7	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Table 7.38 Graveney policy unit action plan

The **Graveney** policy unit is characterised by a developed floodplain with typically concrete river channels. Our flood risk management approach for this type of catchment is outlined below.

Highly developed floodplains with little open space and modified river channels

- We need long-term adaptation of the urban environment. There are massive opportunities to reduce flood risk through redevelopment. In most areas we need to change the character of the urban area in the floodplain through re-development. It must be resilient and resistant to flooding and result in a layout that re-creates river corridors.
- We are seeking to re-create river corridors through redevelopment so that there is space for the river to flow more naturally and space in the floodplain where water can be attenuated.
- We will be seeking to build flood defences as redevelopment occurs and as part of an overall catchment plan. This is because more attenuation and more space in the river corridors are needed for defences to be sustainable. This is more complex but represents better value for society in the long-run even if it is more costly for the EA today.
- These areas are very susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

Our policy for the Graveney is: ***P4*** *– accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Gr1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Graveney floodplain are; • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses, including recognition of potential flood storage and attenuation at Norbury Park. • Encourage Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding. • Remove restrictions to flow and open up culverts as part of redevelopment.	PPS25 SFRA LDF RSS Planning applications FRM flood storage and attenuation plan Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	London Boroughs of Wandsworth, Merton, Lambeth, Croydon GLA, Developers	Short to medium
Gr2	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan (SWMP) for those areas of the Graveney that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP Drain London SFRA	SWMP progress	Landowners, Local Authorities, Thames Water	Medium
Gr3	**Maintaining conveyance and where practical increase its efficiency** Channels shall continue to be maintained so that they are free from obstruction. In the Graveney, the current management of flood risk is highly dependent upon maintaining conveyance. • Identify those locations where relatively minor alterations will increase the efficiency of the river channel. Ensure that these are widely understood by Environment Agency Planning teams so that any opportunities to remove them through redevelopment (action Gr1) can be taken. • work with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action.	Performance specifications System Asset Management Plan Joint initiatives with partners to address fly tipping Fly tipping protocol	Performance specifications reviewed and appropriate action taken	Local Authorities, landowners	Short to medium
Gr4	**Flood Proofing and flood resilience to existing properties** We will encourage flood proofing and resilience. Possible measures include; raised finished floor levels, raised cupboards & electrical circuits, water resistant door frames, non-return valves on drainage pipes, water resistant plaster, air brick covers, tanking (waterproofing internal walls).	Resilience and resistance projects	Damage to properties reduced	Local Authorities, Developers, Housing Associations, Business Associations	Medium to long

Gr5	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness. This is particularly important as we are going to be changing areas of flood warnings that are issued here.	Multi-Agency Emergency Response Plans Community Flood Plans Communications plan Evolution of the FIM day job	Community Flood Plans	Local Authorities Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium

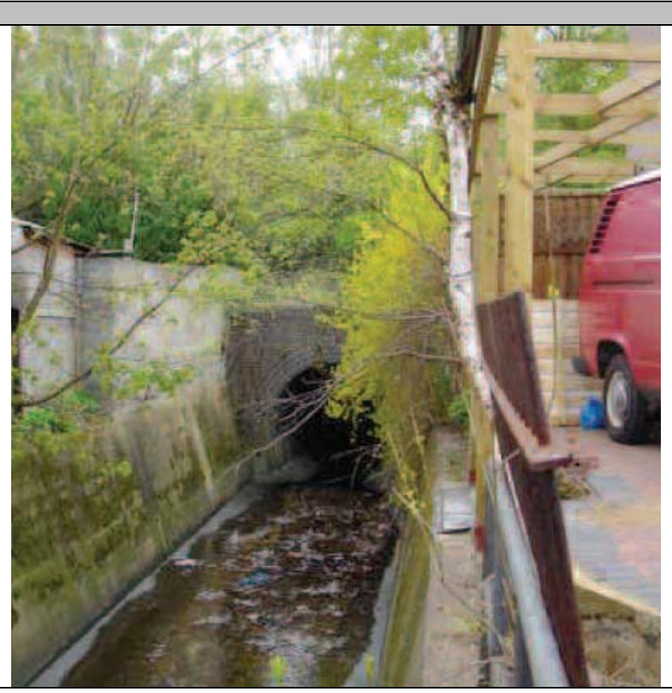
Examples		
Gr3		This photograph shows a typical section of the Graveney. Development has taken place right up to the edge of the watercourse so we are now very restricted in how we can manage the flood risk. The priority activity here is to keep the channel clear of obstructions so that the water can flow efficiently. This is not very sustainable, but at present there is little alternative.

Table 7.39 Beverley Brook policy unit action plan

The **Beverley Brook** policy unit is characterised by a developed floodplain with typically concrete river channels. The risk of flooding in these areas is relatively high, comes from a combination of sources, and is likely to increase in the future. This makes understanding and managing the flood risk even more complex. Our flood risk management approach for this type of catchment is outlined below.

Highly developed floodplains with little open space and modified river channels

- We need long-term adaptation of the urban environment. There are massive opportunities to reduce flood risk through redevelopment. In most areas we need to change the character of the urban area in the floodplain through re-development. It must be resilient and resistant to flooding and result in a layout that re-creates river corridors.
- We are seeking to re-create river corridors through redevelopment so that there is space for the river to flow more naturally and space in the floodplain where water can be attenuated.
- We will be seeking to build flood defences as redevelopment occurs and as part of an overall catchment plan. This is because more attenuation and more space in the river corridors are needed for defences to be sustainable. This is more complex but represents better value for society in the long-run even if it is more costly for the Environment Agency today.
- These areas are very susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Beverley Brook ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
BB1	**Short-term planning actions**	PPS25	CFMP informs	London	Short to

	The short to medium-term priority actions in line with Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the Beverley Brook floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage Local Authorities to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	SFRA LDF RSS Planning applications Local Area Agreement	SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Boroughs of Wandsworth, Merton, Sutton, Richmond upon Thames, Kingston upon Thames, Regional Planning Body, Developers	medium
BB2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Beverley Brook, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Remove obstructions to flow. • Naturalise watercourses so there is a reduced risk of blockages. The action recognises that there is not a single flood defence solution along most of the Beverley Brook and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS Planning applications River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	London Boroughs of Wandsworth, Merton, Sutton, Richmond upon Thames, Kingston upon Thames, Regional Planning Body, Developers, Housing Associations, Business Associations	Medium to long
BB3	**Tidal / fluvial overlaps** Agree a way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk. It is likely that the flood risk assets at Ashlone Wharf will need to be replaced within the next 15 years.	TE 2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short, medium to long
BB4	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Beverley Brook that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP Drain London SFRA	SWMP progress	Local Authorities, Thames Water	Medium
BB5	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision. The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment, particularly within Worcester Park where there are potential flood storage opportunities. • Re-establish and enhance river corridors. • Reduced future legacy costs by identification of redundant asset structures. The example Ra2 and Ra4 within the Ravensbourne action plan shows how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken	Landowners, Local Authorities	Short and Medium
BB6	**Flood warning, flood awareness and emergency planning**	Multi-Agency Emergency	Appropriate level of	Local	Short to

	An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Improve understanding of flood risk in Beverley Brook through improved modeling and monitoring of the risks. Increase public awareness of areas at most risk. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness. This is particularly important as we are going to be changing areas of flood warnings that are issued here.	Response Plans Community Flood Plans Communications plan Evolution of the FIM day job	flood warning service	Authorities Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	medium

Table 7.40 Hogsmill policy unit action plan

The **Hogsmill** policy unit is characterised by a developed floodplain with typically concrete river channels. The risk of flooding in these areas is relatively high and it is likely that this will increase in the future. Flooding caused by surface water, overflowing drainage systems, and the systems themselves, are the responsibility of several organisations. This makes the understanding and management of flooding even more complex. Our flood risk management approach for this type of catchment is outlined below.

Highly developed floodplains with little open space and modified river channels

- We need long-term adaptation of the urban environment. There are massive opportunities to reduce flood risk through redevelopment. In most areas we need to change the character of the urban area in the floodplain through re-development. It must be resilient and resistant to flooding and result in a layout that re-creates river corridors.
- We are seeking to re-create river corridors through redevelopment so that there is space for the river to flow more naturally and space in the floodplain where water can be attenuated.
- We will be seeking to build flood defences as redevelopment occurs and as part of an overall catchment plan. This is because more attenuation and more space in the river corridors are needed for defences to be sustainable. This is more complex but represents better value for society in the long-run even if it is more costly for the EA today.
- These areas are very susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Hogsmill: ***P6*** *- take action to increase the frequency of flooding to deliver benefits locally and/or reduce the risk elsewhere*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Ho1	**Short-term planning actions** The short to medium-term requirement to apply Planning Policy Statement 25 (PPS25) to create safe and sustainable development that positively reduces flood risk in the floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses, particularly those areas upstream of Kingston in Epsom and Ewell. • Influence the Local Authority to adopt and apply Local Development Framework policies that ensure that all new development in the 0.1% AEP floodplain is resistant and resilient to flooding, including the redevelopment of Kingston Town Centre.	PPS25 SFRA LDF RSS Planning applications River Restoration Action Plan Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	Kingston upon Thames, Epsom and Ewell District Council, GLA Developers	Short to medium
Ho2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Hogsmill, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow. • Naturalising watercourses so there is a reduced risk of blockages. The action recognises that there is not a single flood defence solution along most of the Beverley Brook and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS Planning applications River Corridor Improvement Plan Joint initiatives with partners	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	Kingston upon Thames, Epsom and Ewell District Council, GLA Developers, Housing Associations, Business Associations	Medium to long
Ho3	**Surface water drainage**	Surface Water Management	SWMP progress	Local	Short to

	• Assist in the development of a Surface Water Management Plan or similar investigation that identifies combined risk and consequences from other sources of flooding. This is particularly applicable in some areas of Epsom and Ewell. • Complete and implement the Integrated Urban Drainage Plan (IUDP) that has been developed for the Hogsmill. Share lessons learned from this project and encourage replication of tool in other areas if appropriate.	Plan Drain London IUDP SFRA		Authorities, Thames Water, GLA	medium
Ho4	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision. The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment. • Re-create and enhance river corridors. • Reduced future legacy costs by identification of redundant asset structures. The example Ra2 and Ra4 within the Ravensbourne action plan shows how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken		Short and Medium
Ho5	**Short-term management of assets** Linked to Ho4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Ho2 and Ho4).	Performance specifications System Asset Management Plan	Conveyance maintained. Review of performance specifications. Opportunities for solutions through the planning process are recognised	Landowners	Short
Ho6	**Flood warning, flood awareness and emergency planning** An important element of flood risk management is to prepare for and to address the consequences of flooding. The priority actions are: • Work with partners to identify critical infrastructure at risk of flooding and encourage appropriate action. • Work with partners, including the media, to ensure that effective communication plans are in place before, during and in the recovery phase of a flooding incident. • Increase public awareness. This is particularly important as we are going to be changing areas of flood warnings that are issued here.	Multi-Agency Emergency Response Plans Community Flood Plans Communications plan Evolution of the FIM day job	Appropriate level of flood warning service	Local Authorities Emergency Planners, Parish Councils, Category 1 responders, Media, Community Groups	Short to medium
Ho7	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Table 7.41 Crane policy unit action plan

The upper reaches of the **Crane** policy unit are characterised by a developed floodplain with typically concrete river channels. Our flood risk management approach for this type of catchment is outlined below.

Generally urban areas with some river flood defences

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.

- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

These approaches will deliver our policy for the Crane: ***P4*** *– accept the risk – but in the longer term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Cr1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Crane floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Framework (LDF) documents, Regional Spatial Strategies (RSS), planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses, notably through the middle reaches of the catchment. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA LDF RSS Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	London Boroughs of Harrow, Hillingdon, Ealing, Hounslow, Richmond upon Thames, GLA, Developers	Short to medium
Cr2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Crane, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow. • Naturalising watercourses so there is a reduced risk of blockages. The action recognises that there is not a single flood defence solution along most of the Crane and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.	SFRA LDF RSS River Restoration Action Plan Planning applications	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions BAP Habitat	London Boroughs of Harrow, Hillingdon, Ealing, Hounslow, Richmond upon Thames, GLA, Developers	Medium to long
Cr3	**Surface water drainage** Consider the impact of other sources of flooding by assisting in the development of a Surface Water Management Plan for those areas of the Crane that are most vulnerable to this source of flooding. This plan should investigate risk from surface water and sewer flooding. This plan should consider increased risk to the drainage system from future development and climate change (see example Ra3 within the Ravensbourne action plan).	SWMP Drain London SFRA	SWMP progress	Local Authorities, Landowners	Medium
Cr4	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision (action Cr5). The outcomes that we are seeking through this action are: • Conveyance maintained where we have to (urban areas), but in a more natural state. • Greater attenuation in the catchment. • Re-establish and enhance river corridors. • Reduced future legacy costs by identification of redundant asset structures. The example Ra2 and Ra4 within the Ravensbourne action plan shows how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period.	Performance specifications reviewed and appropriate action taken	Landowners, Local Authorities	Short and medium
Cr5	**Short-term management of assets**	Performance specifications	Conveyance	Landowners,	Short to

	Linked to Cr4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Cr2 and Cr4). • Continue to maintain those assets that provide effective flood risk reduction for example, Sharvill Lane Flood Storage Area, Hayes Flood Relief Channel, and Gutteridge Wood.	System Asset Management Plan	maintained. Review of performance specifications. Opportunities for solutions through the planning process are recognised	Local Authorities	medium
Cr6	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

Table 7.42 Brent policy unit action plan

The **Brent** policy unit is characterised by a developed floodplain typically with concrete river channels. Our flood risk management approach for this type of catchment is outlined below.

Highly developed floodplains with little open space and modified river channels

- We need long-term adaptation of the urban environment. There are massive opportunities to reduce flood risk through redevelopment. In most areas we need to change the character of the urban area in the floodplain through re-development. It must be resilient and resistant to flooding and result in a layout that re-creates river corridors.
- We are seeking to re-create river corridors through redevelopment so that there is space for the river to flow more naturally and space in the floodplain where water can be attenuated.
- We will be seeking to build flood defences as redevelopment occurs and as part of an overall catchment plan. This is because more attenuation and more space in the river corridors are needed for defences to be sustainable. This is more complex but represents better value for society in the long-run even if it is more costly for the EA today.
- These areas are very susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

This approach will deliver our policy for the Brent: ***P4*** *– accept the risk – but in the long term take action to ensure that risk does not increase from current level*

Action	Proposed Initial Action	Mechanism	Indicator	Partners	Timescale
Bt1	**Short-term planning actions** The short to medium-term priority actions in line with PPS25 to create safe and sustainable development that positively reduces flood risk in the Brent floodplain are: • Agree the Strategic Flood Risk Assessment (SFRA) (including subsequent revisions) with the Local Authority and use the information to reduce flood risk, influence Local Development Documents, regional planning documents, planning applications and emergency and evacuation plans. • Seek commitments in land use planning documents to retain the remaining floodplain for flood risk management compatible uses. • Encourage the Local Authority to adopt and apply policies that ensure that all new properties built in the floodplain are resistant and resilient to flooding.	PPS25 SFRA RSS LDF Planning applications Developer contributions Local Area Agreement	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions Percentage of agreed actions undertaken as part of Local Area Agreements	London Boroughs of Barnet, Harrow, Brent, Ealing, Hounslow, GLA, developers	Short to medium
Bt2	**Long-term adaptation of the urban environment to be more flood resilient** The priority actions to achieve long-term adaptation of urban floodplain river corridors along the Brent, linked to the redevelopment of urban areas are: • Encourage refurbishment of existing buildings that increases resilience and resistance to flooding. • Identify opportunities to recreate river corridors and wetland habitats in urban areas. Encourage new development and any redevelopment of these areas to acknowledge these opportunities in their site layouts and set development back, allowing space for water, habitat, wildlife and recreation. • Removing obstructions to flow and naturalising watercourses so there is a reduced risk of blockages.	LDF RSS Planning applications River Restoration Action Plan	CFMP informs SFRA SFRA informs LDF LDF policies in place Planning decisions	London Boroughs of Barnet, Harrow, Brent, Ealing, Hounslow, GLA, Developers, Housing Associations,	Medium to long

	The action recognises that there is not a single flood defence solution along most of the Brent and that there is a need to adapt. This will need to recognise both flood risk management objectives and the wider objectives of the Planning Authority and seek a net reduction in flood risk.		BAP Habitat	Business Associations	
Bt3	**Surface water drainage** Work with partners to complete Surface Water Management Plan (SWMP) for the Brent catchment, taking into account the findings of the Integrated Urban Drainage Plan (IUDP) that has been developed for the Wealdstone Brook.	SWMP Drain London IUDP SFRA	SWMP progress UDP progress	Local Authorities, Thames Water	Short to medium
Bt4	**Optimising attenuation and conveyance within the catchment in the long-term** It is a priority to set out a clear vision for the future management of the flow of water in the catchment. This is necessary because: • Our current management relies heavily on conveyance and this is not sustainable. • We need to link the management of current assets to a more sustainable vision (action Bt2) The outcomes that we are seeking through this action are: • Conveyance maintained where we have to, but in a more natural state. • Greater attenuation in the catchment. • Re-establish and enhance river corridors. • Reduced future legacy costs by identification of redundant asset structures. The example Ra2 and Ra4 within the Ravensbourne action plan shows how this action could be taken forward.	The short-term investigations can be carried out through a Delivery Plan. Implementation in the longer-term is more likely to require a more detailed appraisal and may need a Strategy SAMPs and Performance Specs for the management of the watercourse in the intervening period. River Restoration Action Plan	Performance specifications reviewed and appropriate action taken	Local Authorities, Landowners	Short and Medium
Bt5	**Short-term management of assets** Linked to Bt4 above, the approach for the short-term management of assets is: • Maintain the existing level of conveyance by keeping the existing channels clear and free from obstruction. • Where regeneration is likely in the foreseeable future (including beyond the current Plan period), manage those assets so that we avoid the need to replace the assets until the regeneration occurs and we have a better opportunity to replace them with something which supports our overall vision for the catchment (set out in Bt2 and Bt4). • Maintain conveyance by working with partners to address fly tipping and prevent general blockages in watercourses through maintenance. Encourage communities to self regulate and support enforcement action.	Performance specifications SAMP Fly tipping protocol	Conveyance maintained. Review of performance specifications. Opportunities for solutions through the planning process are recognised	Landowners, Local Authorities, Community Groups	Short to medium
Br6	**Safeguard future opportunities to reduce the probability of flooding in the future** There are some locations where it may be possible to reduce the probability of flooding in a more sustainable way. Locations for potential attenuation include Dollis Brook, Edgeware Brook, Deans Brook and Wealdstone Brook. It is uncertain at the moment whether they can be developed. The priority actions are: • Complete the Brent Flood Risk Management Strategy • Assess their viability. • Develop those that are most likely to be viable and are in areas where little redevelopment is expected. • Safeguard land where appropriate.	In the short-term, this is a reconnaissance action to reduce uncertainty and to assess where to progress any options in more detail.	Locations chosen and options taken forward	Local Authorities, Landowners	Short to medium
Br7	**Tidal / fluvial overlaps** Agree way forward for areas affected by both tidal and fluvial flood risk and ensure communications with partners are complementary and representative of all sources of flood risk.	TE2100 SAMP Communications Plan	SAMP progress	Local Authorities, Landowners	Short to medium

7.2 Consequences of our policies

In this section we first demonstrate how implementation of the policies and approaches proposed in this CFMP will impact on receptors at a regional scale.

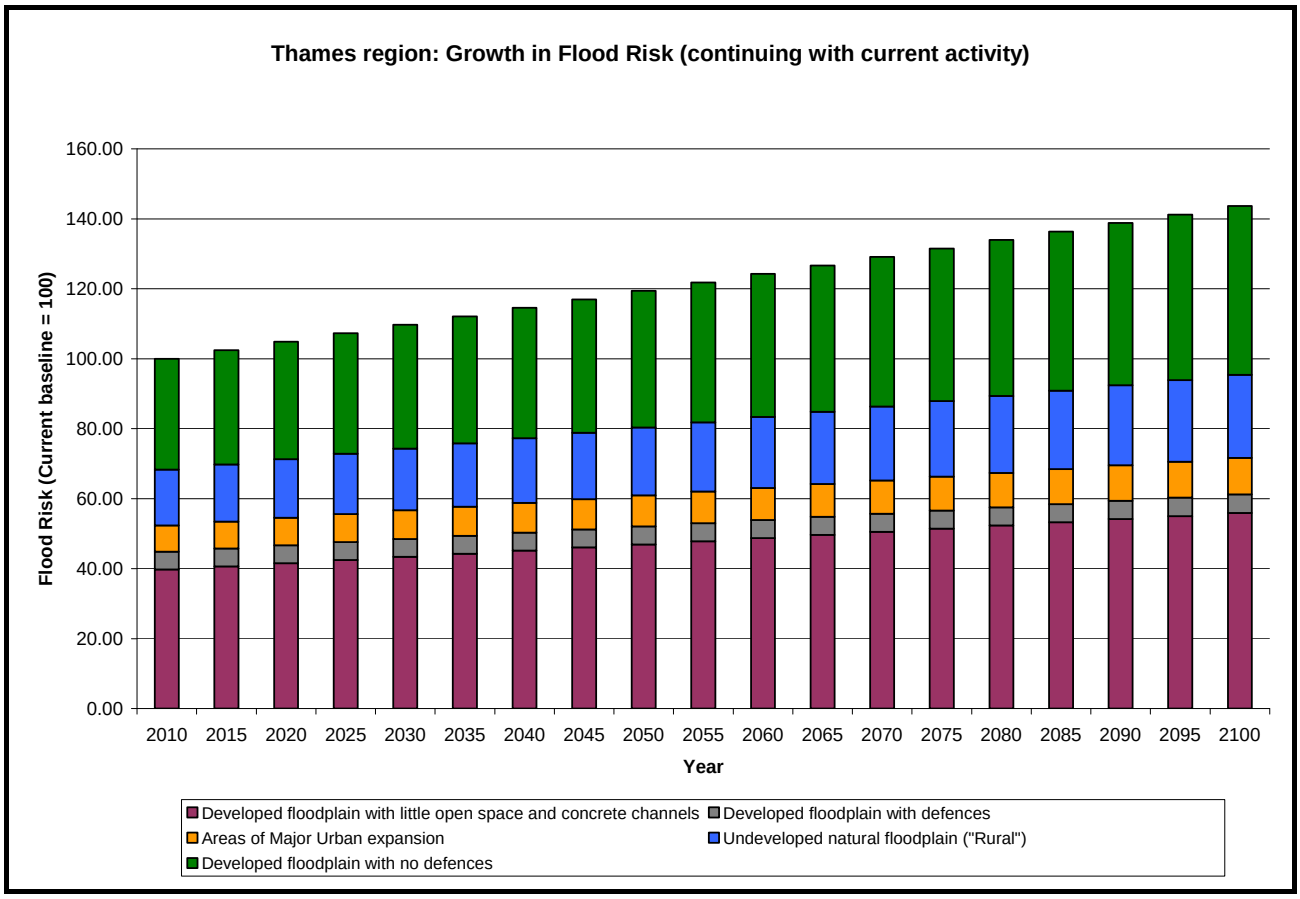


Figure 7.1 Increase in fluvial flood risk across Thames region

The graph above illustrates how fluvial flood risk will increase in Thames region. The increases reflect the social and economic impacts of climate change on different catchment types within the region. The possible impacts of increased urbanisation are not included. This is because a rudimentary application of PPS25 will ensure that increases in flood risk from urbanisation are managed at least to today's levels.

Risk as expressed on this graph has been set at a baseline of 100. Over time, this index increases to 143 by 2100 (i.e. a 43% increase in risk to social and economic receptors). The largest proportion of the increase in flood risk is in developed areas of floodplain with no major defences (typical of areas such as the Lower Thames and Oxford), areas of predominantly natural floodplain (for example, the Middle Lee and Stort, Upper Thames, Kennett and Loddon catchments) and in areas of developed floodplain with little open space and concrete river channels (for example, catchments in South London). The increase in overall flood risk is probably underestimated in London catchments. This is because the

increase in risk from other sources, particularly surface water flooding and combined tidal and fluvial flooding, could be more significant than the increase to fluvial risks.

This graph is broadly representative of the change in level and distribution of risk across Thames region based on our current regime for managing the risk. The purpose of a CFMP is to determine whether there is a more effective way of managing the risk in the long-term.

The graph below shows the increase in fluvial flood risk if we can achieve our aim of getting redevelopment in floodplains to be compatible with their location in a floodplain. From a baseline of 100, the increase in risk is limited to 118 by 2100 (a reduction of 25% against continuing with our current regime of managing risk).

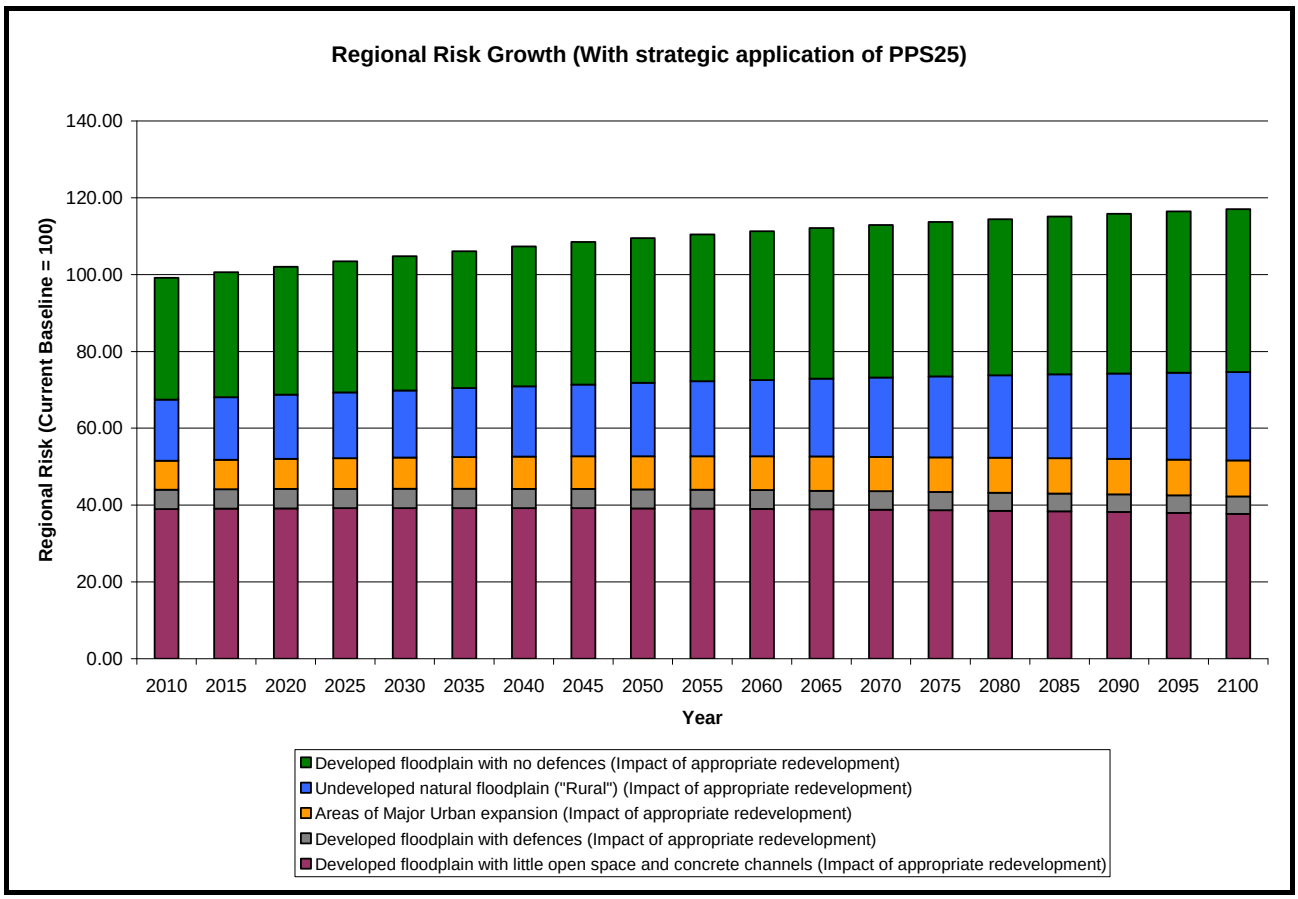


Figure 7.2 Increase in fluvial risk in Thames region with strategic application of PPS25

The biggest impacts are shown to in London and to a lesser extent in areas where there is developed floodplain with no major flood defences. The impacts on those areas of predominantly natural floodplain are less, reflecting the lower levels of redevelopment in the established villages and market towns that account for most of the risk in those areas.

The figures are based on the following kinds of assumption;

- That the rate of redevelopment within fluvial floodplains in London continues at current rates (typically between 5 and 10% of the floodplain being redeveloped every 20 years).
- That the rate of redevelopment in urban areas outside London continues at the current, relatively low rate (2 to 5% every 20 years), but accelerates after 2040 with more extensive redevelopment of the large stock of 1930's housing.
- That redevelopment of floodplains in more rural areas continues at low rates (1 to 5% every 20 years)

The presumption that this redevelopment provides us with an opportunity to address 25% of the flood risk across the region has been a key factor in shaping policy. The opportunity is so important because this could be achieved with relatively modest investment. It will require significant evolution of the way we manage flood risk through Spatial Planning.

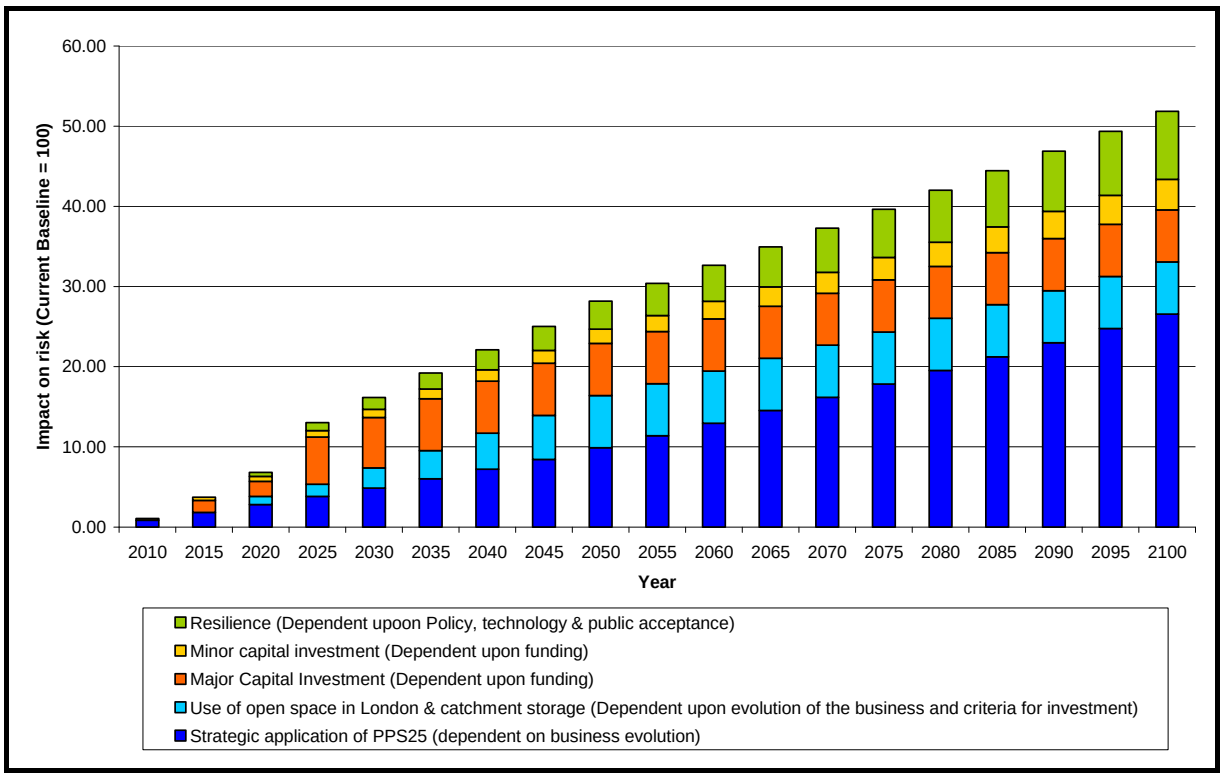


Figure 7.3 Representation of the impact and dependencies of approaches to managing risk

Figure 7.3 illustrates how implementation of the approaches and policies proposed in the Thames CFMP can combine to offset the impacts of climate change.

As discussed, getting redevelopment right could address about 25% of the current risk. This will be dependent upon evolution of our approaches. Catchment attenuation using both the natural floodplain and open space in London could address a further 7% of the current risk. This will be dependent upon progress in the adoption of principles being developed under the Making Space for Water programme, evolution of the business and to some extent funding. Capital improvements, both to maintain existing defences and build new ones, are an important part of the implementation of this plan. However, the

plan cannot be dependent upon this as defences can only ever address a small proportion of the overall problem. Subject to funding flood defences could help address up to 10% of the current day risk. Finally there are a broad suite of approaches to manage the consequences of flooding such as flood resilience, responding more effectively to flood warning and emergency planning.

7.3 Monitoring, review and evaluation

The Environment Agency will be jointly responsible, along with our professional partners and parties drawn from the Consultation Group, for the implementation of the CFMP. A process of ongoing review and monitoring is required to assist with the following:

- Management of CFMP implementation process;
- Surveillance to check that the CFMP is being implemented as proposed;
- Checks on the performance in delivering policy and actions of CFMP.

It is envisaged that the Regional Flood Defence Committee will own and establish a time frame for the implementation of the CFMP actions. This will be in consultation with the Environment Agency and professional partners. Ideally, the Regional Flood Defence Manager will oversee the implementation process and involvement of both internal and external parties. This process will be assisted by an implementation group or similar body which will convene on a regular basis (bi-annually) to guide, review and act on the monitoring process.

Progress and performance will be formally recorded. Experience in applying the CFMP policies should be evaluated and CFMP datasets updated and expanded to incorporate the most up to date catchment information. Consideration should be given to the availability of new planning and modelling tools, the effects of recent significant flood events, catchment development and advanced understanding of climate change or changes in national policy guidance.

The CFMP will remain a ‘living document’ that evolves with improvements in our description and understanding of flood risk through emerging information from the CFMP Action Plans.

Checks on the performance of the CFMP and its actions will be monitored in terms of readily quantifiable indicators or outcomes (Table 7.1 to 7.42). The level of indicators will form the basis of periodic progress reports on the implementation process.

A formal review will take place after five years or at such time as to reflect significant changes in flood risk or to inform or influence other plans, such as the Water Framework Directive River Basin Management Plans.