



Severn River Basin District Consultation on the draft Flood Risk Management Plan

October 2014

This is a joint draft plan prepared by the Environment Agency, Natural Resources Wales and Lead Local Flood Authorities who protect and improve the environment and make it a better place for people and wildlife.

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Severn River Basin District

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September 2014

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Foreword

The winter 2013/14 storms and flooding had significant impact on communities, businesses, infrastructure and the environment in a number of areas in the UK. There could be more extremes in the weather with a changing climate leading to more frequent and severe flooding.

Through our investment in flood risk management infrastructure we not only reduce the risks of flooding to communities but also support growth by helping to create new jobs and by bringing confidence to areas previously affected by floods. Through our flood risk management works we also take opportunities to restore and create new habitats.

We are committed to producing Flood Risk Management Plans (FRMPs) required by the EU Floods Directive by December 2015. This draft FRMP is an important part of meeting that objective and will also meet the objectives of the English and Welsh National Flood and Coastal Erosion Risk Management Strategies.

This draft FRMP sets out the proposed measures and objectives to manage flood risk in the **Severn River Basin District (RBD)** from 2015 to 2021 and beyond. We have also set out how these measures support the objectives of River Basin Management Plans (RBMPs) and specifically the update to the Severn RBMP that the Environment Agency and Natural Resources Wales are consulting on in parallel with this FRMP.

Flood risk management planning is not new and we have been able to draw on the experience of partners and earlier plans. This FRMP brings together for the first time all sources of flooding.

Risk Management Authorities (RMAs) include the Environment Agency, Natural Resources Wales, lead local flood authorities (LLFAs), district councils (where there are no unitary authorities), internal drainage boards, water companies and highway authorities. These RMAs work in partnership with communities to reduce the risk of flooding.

This document has been produced in consultation with our partners and we would like to thank the following for their contributions to this draft FRMP:

Environment Agency, Natural Resources Wales, Bristol City Council, Bath & North East Somerset Council, North Somerset Council, South Gloucestershire Council, Somerset County Council, City of Wolverhampton, Sandwell Metropolitan Borough Council, Dudley Metropolitan Borough Council, Northamptonshire County Council.

This draft plan should be read in conjunction with the draft FRMP for local sources of flooding. This has been produced by the councils included in Table 1.2 of this plan. It should also be read with local Flood Risk Management Strategies, listed under Annex 4 at the end of the plan.

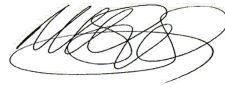
People in England and Wales face many challenges in the future with ageing flood risk management assets, a growing population and a changing climate. The FRMP will provide the evidence to support decision making. It will help promote a greater awareness and understanding of the risks of flooding, particularly in those communities at high risk, and encourage and enable householders, businesses and communities to take action to manage the risks.

There are choices in how to manage flood risk and we value your views on the new proposals within this plan. The majority of the measures and objectives come from previously agreed plans such as the Catchment Flood Management Plans (CFMPs), the Shoreline Management Plan 2 (SMP2) and local plans and strategies. We have already consulted and sought your views on these plans but welcome feedback on the additional proposed measures that are new in this plan.

We want your views on this draft plan by 31 January 2015. We will publish the final FRMP by 21 December 2015. To respond to this consultation, please visit the GOV.UK website
You can also register to receive information about other consultations at this link.



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PART A - The draft plan and how we developed it

1. What is a Flood Risk Management Plan?

Flood risk management plans (FRMPs) highlight the hazards and risks from rivers, the sea, surface water, groundwater and reservoirs and set out how risk management authorities (RMAs) will work together with communities to manage flood risk.

What is the FRMP for?

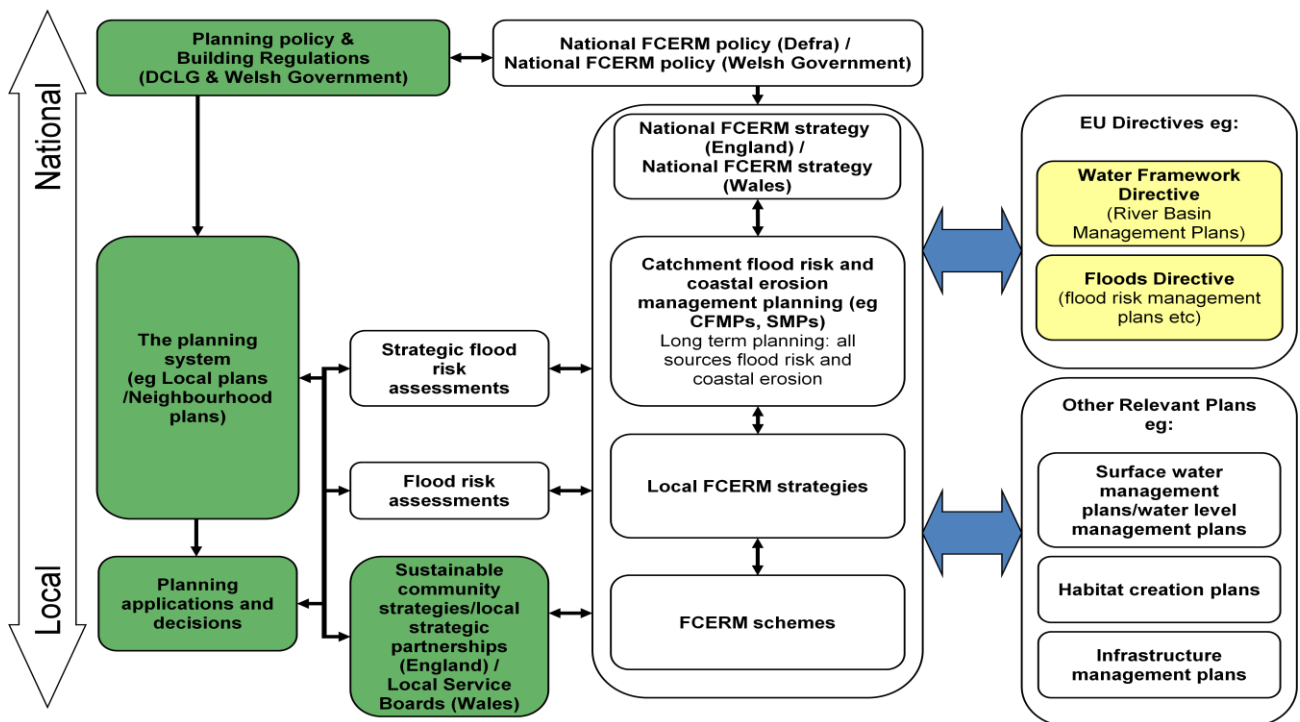
FRMPs set out where and how to manage flood risk to provide most benefit to communities and the environment. It is integral to the way RMAs work and the European legislation has formalised this.

Why are FRMPs being prepared?

This is the first cycle of implementing the Flood Risk Regulations 2009. As a result of this legislation, lead local flood authorities must prepare FRMPs in Flood Risk Areas, where the risk of flooding from local flood risks is significant (for instance from surface water, groundwater and ordinary watercourses). The Environment Agency and Natural Resources Wales are required to prepare FRMPs for all of England and Wales covering flooding from main rivers, the sea and reservoirs. This is described in Government guidance.

The Environment Agency, Natural Resources Wales and lead local flood authorities are developing FRMPs by drawing existing information together, building on and supplementing the existing planning process (see Figure 1.1).

Figure 1.1: Flood Risk Management Plans and their relationship to other planning initiatives (adapted from the National Flood and Coastal Risk Management Strategy for England)



What the plan does

This FRMP aims to deliver the aims of the Environment Agency's National Flood and Coastal Erosion Risk Management Strategy in England and the Welsh Government's National Flood and Coastal Erosion Risk Management Strategy in Wales by setting out the measures to manage flood risk now and in the future. The FRMP will:

- help develop and promote a better understanding of flood and coastal erosion risk
- provide information about the environmental benefits to inform decision makers
- assist in identifying communities with the highest risk of flooding in collaboration with other available data so that investment can be targeted at those in most need

What types of flood risk are included in the FRMP?

The draft FRMP covers the flood risks that the RMAs are responsible for.

Within the Severn River Basin District (RBD), the seven LLFAs in England with Flood Risk Areas have chosen to prepare a FRMP jointly with the Environment Agency. In addition, two LLFAs that do not have a Flood Risk Area have chosen to contribute to the joint FRMP, on a voluntary basis. All the LLFAs in Wales that fall within the Severn RBD have made the commitment to produce a separate FRMP. Six of these LLFAs have Flood Risk Areas so will be producing the FRMP to meet the requirements of the Flood Risk Regulations.

The RMAs who have contributed to this FRMP are listed below in Table 1.1.

Table 1.1: Flood Risk Areas in Severn RBD and LLFAs contributing to this FRMP

Flood Risk Area and voluntary information	Lead Local Flood Authorities
Bristol Flood Risk Area Includes voluntary information from outside Flood Risk Area from all councils	Bristol City Council North Somerset Council Bath and North East Somerset South Gloucestershire Council
West Midlands	The following LLFA's bordering the Severn FRMP have fed into the Humber FRMP: Wolverhampton City Council Dudley Metropolitan Borough Council Sandwell metropolitan Borough Council

Some LLFAs have prepared FRMPs separately from this plan, and these are listed in Table 1.2.

Table 1.2: LLFAs and Flood Risk Areas in separate draft FRMPs

Flood Risk Area	Lead Local Flood Authorities
South Wales Flood Risk Areas	Blaenau Gwent County Borough Council (statutory) Cardiff City Council (statutory) Caerphilly County Borough Council (statutory) Rhondda Cynon Taff County Borough Council (statutory) Merthyr Tydfil County Borough Council (statutory) Torfaen County Borough Council (statutory) Newport County Borough Council (voluntary) Monmouth County Council (voluntary) Powys County Council (voluntary) Vale of Glamorgan County Borough Council (voluntary)

The FRMP draws from relevant information, in particular, flood hazard and flood risk maps published under the Flood Risk Regulations.

It summarises the risk of flooding from rivers, the sea, reservoirs, as well as from local sources of flooding. (See areas identified in Figure 1.2).

The FRMP draws relevant conclusions from the flood and hazard risk maps about risks and opportunities. It sets out and prioritises what needs to be done to manage those risks. The FRMP shows how flood risk management measures co-ordinate with measures outlined through river basin management planning under the WFD.

Other RMAs have contributed information, on a voluntary basis, during the development of this draft FRMP, and objectives and measures included on this basis are identified in each of the "measures tables".

Find out more about flood risk management:

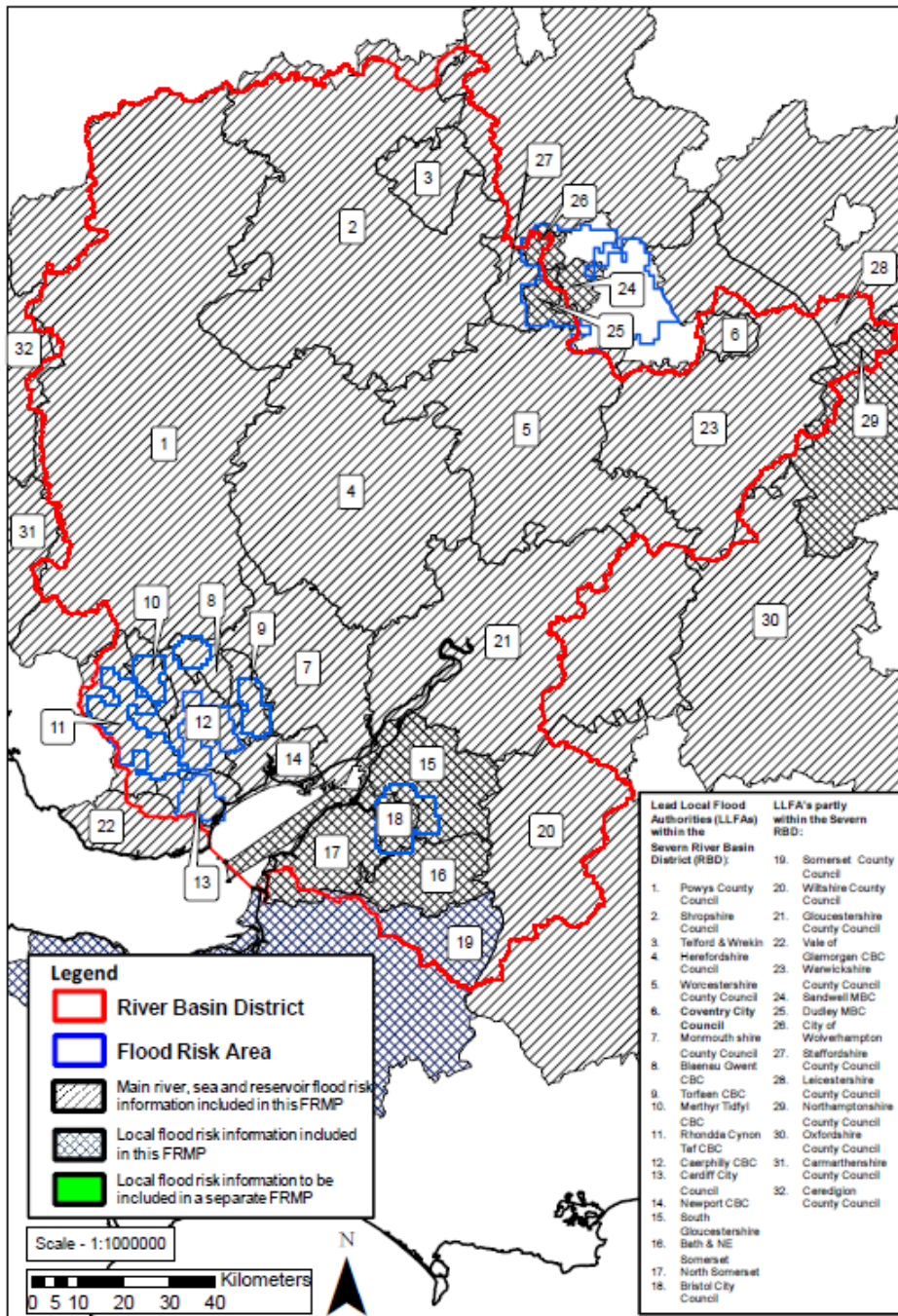
FRMP guidance in England on the GOV.UK website

FRMP guidance in Wales on the Natural Resources Wales website

National Flood and Coastal Erosion Risk Management Strategy for England on GOV.UK website

National Flood and Coastal Erosion Risk Management Strategy for Wales on Wales.gov.uk website

Figure 1.2: Sources of flood risk information included in this draft FRMP



2. Your views count

This draft FRMP outlines how RMAs propose to work with communities to manage flood risk. This consultation is an important step in shaping the management of flood risk throughout England and Wales and gives you the chance to influence the approach and contribute ideas.

This is a public consultation and, as RMAs working in partnership, we welcome everyone's views.

We would like to hear your views on the following aspects:

1. Do you agree this draft plan sets out the most significant flood risk issues for your area? (yes / no)
 - a. If not, please explain what you think is missing.
2. What do you consider to be the highest priorities for managing the risk of flooding in your area?

It is important to have the right objectives for managing the risk of flooding, taking account of the impacts of flooding on people, property and the environment.

3. Do you understand the objectives as described in the draft plan? (yes / no)
 - a. If not, what would help you understand them better?
4. Is the balance right between the 'social', 'economic' and 'environmental' objectives, as explained in the draft plan? (yes / no)
 - a. If not, what would you change and why?
5. Are there other flood risk management objectives that should be included? (yes / no)
 - a. If so, please explain what they are and why they should be included?

This draft plan proposes new 'measures' to manage flood risk, alongside measures which are already 'agreed' and 'ongoing'.

6. Do you understand the difference between on-going, agreed and proposed measures, as explained in the draft plan? (yes / no)
 - a. If not, what would help you understand them better?

Across all proposed, agreed and ongoing measures, the plan describes 'prevention', 'preparation', 'protection' and 'recovery and review' approaches.

7. Is the balance right between these different types of approach, as explained in the draft plan? (yes / no)
 - a. If not, which proposed measures would you change, and why?
8. Are there other proposed measures that should be included? (yes / no)
 - a. If yes, please explain what they are and why they should be included.
9. How can you support the work set out in the draft flood risk management plan to reduce flood risk?

As well as draft flood risk management plans, the Environment Agency and Natural Resources Wales are consulting on draft updates to river basin management plans, which set out measures to improve water in rivers, lakes, estuaries, coasts and in groundwater.

10. Are there things you think should be done to improve co-ordination of river basin and flood risk management planning?

We have proposed a change to the boundary between the Severn and South West river basin districts.

11. Do you agree this proposed change should be adopted in the final plan? (yes / no)
 - a. If not, please explain why.

This consultation

This consultation runs from 10th October 2014 - 31st January 2015. To view the consultation on the draft Flood FRMP, please visit the [GOV.UK](#) website. We will let you know what people have said in April 2015. We will summarise the comments received, explain how we have taken them into account and what changes will be made before we publish the final FRMP by 21 December 2015.

We have undertaken a strategic environmental assessment (SEA) to consider the wider context of the draft FRMP. The Environmental Report sets out the results of the SEA and your comments are welcome on our website.

3. The layout of this document

The plan is divided into 2 parts

Part A sets the scene for the FRMPs - what they are, what they are for and how we have developed them.

Part B goes on to describe the RBD, the flood and coastal erosion risk and the proposed approach to managing that risk.

How the plan was developed

Section 4 describes how in partnership the Environment Agency, Natural Resources Wales and the councils have prepared this draft FRMP.

How to manage risk

Section 5 describes some of the terminology we are using, such as 'conclusions', 'objectives' and 'measures', and how they relate to flood and coastal erosion risk management in this context.

The River Basin District

Section 6 of the plan introduces the Severn RBD. The flood and coastal erosion risks are set out for the RBD in section seven. It also introduces the 'sub-areas' that divide the RBD further.

The sub-areas

Section 8 introduces each of the sub-areas in turn. This section outlines the catchments based on Water Framework Directive (WFD) management catchments, which make up the RBD, then the Flood Risk Areas (identified through the Preliminary Flood Risk Assessment) and other strategic areas across the RBD.

The risk conclusions, management objectives and measures

Sections 9 to 13 set out the risk conclusions, objectives and measures for the RBD, Management Catchments, Flood Risk Areas and other strategic areas respectively.

Implementing the plan, monitoring and reporting

Section 14 sets out the proposals for implementing the plan, including co-ordination with the implementation of the RBMPs prepared under the WFD. Section 15 concludes with how the measures will be monitored and reported.

Find out more

Throughout this document you will be directed to more detailed sources of information using 'find out more' boxes.

4. How we have developed the plan

The approach to developing FRMPs

In 2013 the Government agreed that the preferred approach to developing FRMPs would be for the Environment Agency and Natural Resources Wales to work in partnership with other RMAs, in particular LLFAs, to pool information to develop an overall plan for managing all sources of flood risk and coastal erosion. For the first cycle of production of FRMPs, joint FRMPs are not being pursued in Wales. In preparing this draft FRMP, RMAs have built on relevant information from existing work (see Figure 1.2 and Table 4.1). The Local Flood Risk Management Strategies developed by all LLFAs are particularly important. In drawing measures together, RMAs have revisited priorities and ensured that there is a shared understanding of the risks and how best they can be managed.

The Environment Agency and Natural Resources Wales are co-ordinating the development of this FRMP with the proposed updates to the RBMP so that there is an integrated approach to overall water management for the benefit of people, the environment and the economy.

Find out more

- [Interactive Flood Maps on the Environment Agency website](#)
- [River Basin District maps on the Environment Agency website](#)

Table 4.1: Sources of FRMP information according to flood risk

Flood risk	Existing plans and FRMP information
Flooding from main rivers	Catchment Flood Management Plans: Eastern Valleys, Wye and Usk, Severn Tidal Tributaries, River Severn, Bristol Avon, Taff & Ely, North & Mid Somerset Fluvial Severn Flood Risk Management Strategy
Flooding from the sea	Shoreline Management Plans: Anchor Head to Lavernock Point
Flooding along estuaries	Estuary Management Plans Severn Estuary Flood Risk Management Plan
Flooding from surface water, groundwater and ordinary watercourses	Local Flood Risk Management Strategies: Bristol City Council, North Somerset Council, Bath & North East Somerset, South Gloucestershire Council

Flood risk information

The Severn FRMP discusses flood risk from Rivers and the Sea, Reservoirs and Surface Water (Flood Risk Areas only). The following section outlines flood risk classifications for the various sources.

Flooding from rivers and the sea

NaFRA (National Flood Risk Assessment) is an assessment of flood risk for England and Wales produced using local data and expertise. It shows the chance of flooding from rivers and the sea (both along the open coast and tidal estuaries). The data is presented in flood risk likelihood categories, which indicate the chance of flooding in any given year.

- **High** - Greater than or equal to 1 in 30 (3.3%) chance in any given year
- **Medium** - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
- **Low** - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
- **Very Low** - Less than 1 in 1,000 (0.1%) chance in any given year

The computer model used to produce NaFRA results estimates the likelihood of flooding from rivers and the sea, taking into account defences and the chance that they can fail or be overtopped. The results, which are presented in maps, databases and excel spreadsheets, can be used in conjunction with receptor data (number and type of properties and infrastructure) to estimate the consequences and economic damage associated with flooding from rivers and the sea.

Flooding from reservoirs

Reservoir flood risk maps show the area that could be flooded if a large reservoir were to fail and release the water it holds. A large reservoir is one that holds over 25,000 cubic metres. Since this is a worst case scenario, it's unlikely that any actual flood would be this large.

Flooding from surface water

The Flood Risk Areas contain maps and statistics relating to surface water flooding. These are based on the Updated Flood Map for Surface water published in December 2013. The updated Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- **High** - 1 in 30 (3.3%)
- **Medium** - 1 in 100 (1%)
- **Low** - 1 in 1000 (0.1%)

Consultation and engagement

Your input to this plan will help improve, inform and shape the final plan.

To develop and finalise the FRMP, we will engage a wide range of stakeholders. We will inform people of the process and the opportunity they have to comment on the draft plans. We will work with partners to deliver the actions in these plans in the future. We also recognise that some of the stakeholders we engage will be interested in both flood risk management planning and river basin management planning. We need to make it easy for people to be involved in both, where appropriate.

The final FRMP will include a record of consultation undertaken on this draft FRMP.

Blaenau Gwent County Borough Council, Cardiff City Council, Caerphilly County Borough Council, Rhondda Cynon Taff County Borough Council, Merthyr Tydfil County Borough Council and Torfaen County Borough Council also have a legal responsibility to consult on the draft FRMP they are producing and are doing so separately.

How we plan and set objectives

This draft plan covers areas in England where the Environment Agency is the responsible authority for flood risk management (with regard to main rivers, the sea and reservoirs) and areas in Wales where Natural Resources Wales is the responsible authority for flood risk management (with regard to main rivers, sea and reservoirs). Where the draft plan crosses the national boundary, agreements and arrangements are in place to enable both organisations to develop the draft plan jointly and ensure that impacts either side of the boundary are understood and agreed by the each authority.

Management of flood and coastal erosion risk in England and Wales is driven by the National Strategies for Flood and Coastal Erosion Risk Management for England and Wales, respectively. These strategies provide the framework for flood and coastal erosion risk management work in the RBD. The overarching principles of the strategies were used to determine objectives for the RBD that consider people, the environment and economic activity.

The Severn RBD FRMP catchment objectives are based on those set in the Catchment Flood Management Plans (CFMPs) and the Shoreline Management Plans (SMP2s) previously developed for the whole of England and Wales in partnership with other RMAs, and Local Flood Risk Management Strategies prepared by LLFAs to meet the requirements of the Flood & Water Management Act 2010.

Where objectives are specific to only England or Wales, they are captured in the England or Wales only sections.

How each authority delivers against their FRMP objectives differs in England and Wales.

Wales

In order to deliver measures to meet the FRMP objectives, Natural Resources Wales takes a risk based community approach to prioritise where to best direct investment. This is informed by the strategic framework provided by CFMPs and SMPs. The strategic framework set by these plans

enable Natural Resources Wales to make short term decisions to manage present day risk whilst also considering the longer term prediction of risk (for further information on CFMPs and SMPs please refer to Annex 3). The risk based community approach of present day risk is done through the Natural Resources Wales Communities at Risk Register. This is a tool that considers a number of factors to give an indication of where the most vulnerable communities at risk of flooding from main rivers and the sea are located across Wales. This is then used to plan and prioritise the Natural Resources Wales investment programme to target investment in the most at risk communities. Prioritisation is then done at a Wales-wide level and takes into account the risk calculation from the Communities at Risk Register but also considers other factors such as the Benefit:Cost appraisal, level of investment to date and other aspects such as the potential for external funding opportunities. There is also a facet of Natural Resources Wales work which is reactive to severe weather events, where severe damage may have occurred, leading to the need for emergency works.

All major flood alleviation schemes in Wales undergo appraisal work to assess options and to understand the costs and benefits of progressing work. This is done in accordance with Treasury guidance.

England

Measures to meet the objectives include actions taken forward from the SMP2 (except in the small number of locations where these now differ following development of more up to date strategies), incomplete actions from the CFMP where still relevant, and from existing flood risk management strategies. This first plan includes a number of ongoing, agreed and newly proposed actions at the community level. Over time, we shall be considering further community level actions within the RDB. The aspiration is to add these in future cycles of the plan.

Funding to RMAs to manage flood risk is mainly provided by Defra as flood and coastal erosion risk management grant in aid (FCRM GiA). Regional Flood and Coastal Committees can also raise local levy to fund local priority projects and works in partnership with others.

Government promotes nationally consistent approaches to assessing and managing flood and coastal erosion risk and RMAs prioritise public investment in flood and coastal risk management works according to Treasury and Defra guidance. Taking a risk-based management approach, we target resources to ensure that public money is spent on the works that provide the greatest benefits to society, and that this money is spent efficiently and effectively.

Under Defra's partnership funding approach, government funding towards schemes is based on the numbers of households protected, the damages being prevented and other benefits that would be delivered. For schemes to proceed where they are not fully funded by government either the costs would need to be reduced or the remainder of the funding provided through local contributions. The approach encourages cost savings and the use of other sources of funding to supplement money from government.

Strategic Environmental Assessment and Habitats Regulations

A strategic environmental assessment (SEA) was undertaken to consider the significant environmental effects of the draft flood risk management plan. We consulted Natural England, English Heritage and the Marine Management Organisation on the scope of the proposed assessment in December 2013, and the environmental report sets out the results of the SEA. The report describes the environmental effects that are significant within the RBD and identifies measures to mitigate any adverse effects. Opportunities to improve the environment are also considered.

A habitats regulations assessment will be carried out on the draft flood risk management plan following this consultation to consider in more detail any potential effects on sites with international designations (special areas of conservation, special protection areas and Ramsar sites). Initial screening suggests that significant effects resulting from any new actions are not likely.

How FRMPs have been co-ordinated with river basin management planning (RBMP)

The Severn FRMP has been developed alongside the RBMP so that opportunities for flood risk improvements can integrate with water and biodiversity objectives wherever possible. Both plans have been developed by the Environment Agency and Natural Resources Wales in a co-ordinated approach and will also be linked through the consultation process.

Co-ordinating with RBMP

- Severn RBMP on the Environment Agency and Natural Resources Wales websites

5. How to manage risk

Involving communities leads to more effective flood and coastal erosion management. RMAs will continue to work with communities and other stakeholders to manage risk by:

- assessing the sources of flood risk and drawing conclusions about the risks;
- setting out what RMAs are trying to achieve and establishing risk management objectives
- determining the best approach to achieving the objectives: by identifying the right measures and prioritising them

The conclusions, objectives and proposed measures are set out for consultation within this draft FRMP. Following feedback from the consultation RMAs will work with interested parties to finalise the FRMP and:

- seek to secure the necessary funding
- implement the measures, with clarity on which each organisation is accountable for
- monitor and review how the plan works

RMAs will monitor, and report annually, on progress in implementing the measures set out in the final FRMP published in December 2015. As RMAs, we will continue to work in partnership, ensuring that we can maintain a forward look of prioritised proposals for managing flood risk. Our next review of the FRMP under the Flood Risk Regulations will be completed by 2021.

Measures for managing risk

There are different approaches to managing flood and coastal erosion risk – these are known as measures and are described below:

Preventing: by avoiding putting people or the environment at risk of flooding, for example, one way of preventing risks arising would be by not building homes in areas that can be flooded

Preparing: by taking actions that prepare people for flooding, for example, by improving awareness of flood risk, or by providing warning and forecasting for floods so that people can take precautions to safeguard their valuables

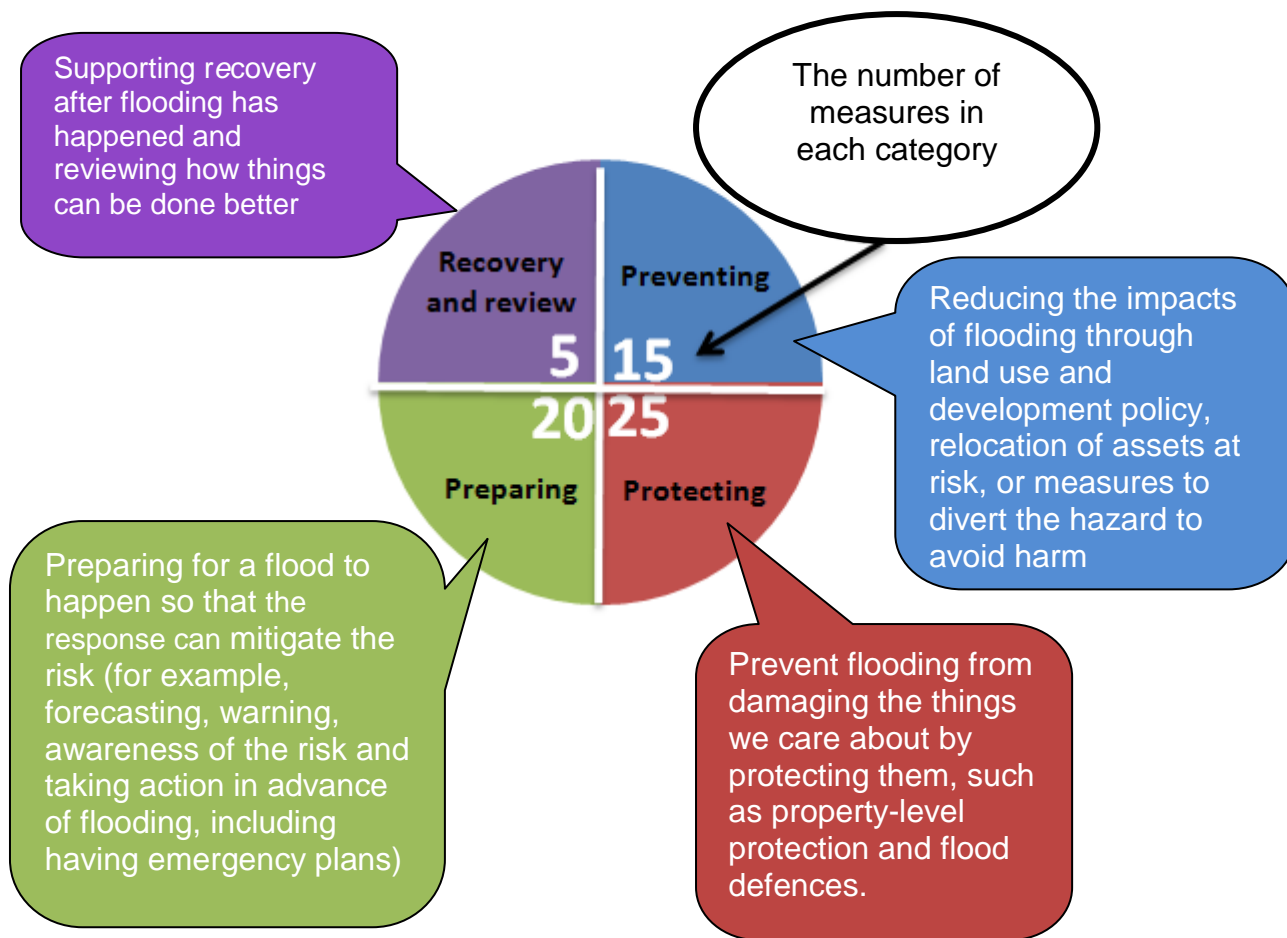
Protecting: by protecting people from the risk of flooding. For example, by the maintenance or refurbishment of existing defences or using waterproof boards over doors and airbricks, people can protect their properties from the damage caused by flood water.

Recovery and review: by learning from when flooding happens and how to recover from it, for example, by improving the availability of recovery services such as providing temporary accommodation, after flooding has occurred

Flood and coastal erosion risk management may require a combination of measures outlined above.

Figure 5.1 sets out how measures are displayed in this document. The number of measures is presented simply to enable the measures to be recorded and monitored. The absolute number is not important since measures will vary in complexity.

Figure 5.1: The types of measures for managing risk



We want your views on the measures to manage risk. This draft FRMP sets out ‘proposed’, ‘ongoing’ and ‘agreed’ measures to manage flood risk (see figure 5.2).

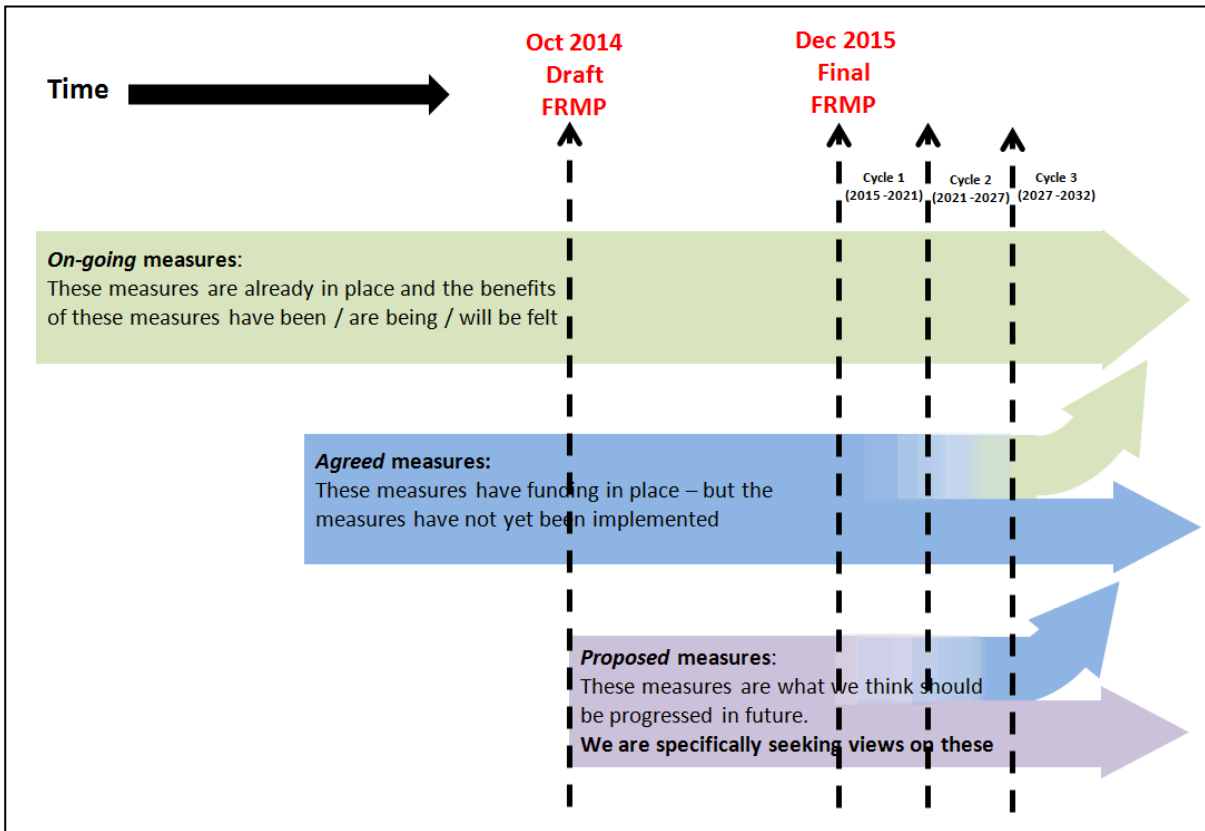
We want your view on the ‘**proposed**’ measures: those that we think should be progressed from 2015 onwards. These have not been consulted on previously as part of an existing plan (e.g. a Local Flood Risk Management Strategy, or a CFMP).

There are already many measures being implemented to manage flood and coastal erosion risk. These are ‘**ongoing**’ measures. An example of this type of measure would be existing planning policies. We set out these measures for context, but we are not specifically seeking views on these. In the future some on-going measures may need to change, for example because new technology offers opportunities to do things differently. We will work with communities and other interested parties to develop new and innovative ways of managing risk and propose changes or new measures when appropriate.

Some measures have already been provisionally agreed. These are called ‘**agreed**’ measures and are already set out in plans that have been consulted on, such as Local Flood Risk Management Strategies. These measures are already agreed and we are not specifically seeking views on them during this consultation.

We are not specifically seeking views on the ongoing and agreed measures because they are already in place or likely to be implemented. However, we would welcome your feedback if you think that modifications to ongoing and agreed measures should be considered in the context of the proposed measures.

Figure 5.2: The series of measures for managing flood and coastal erosion risk



PART B - Managing flood risk in the Severn River Basin District

6. Getting to know the Severn River Basin District

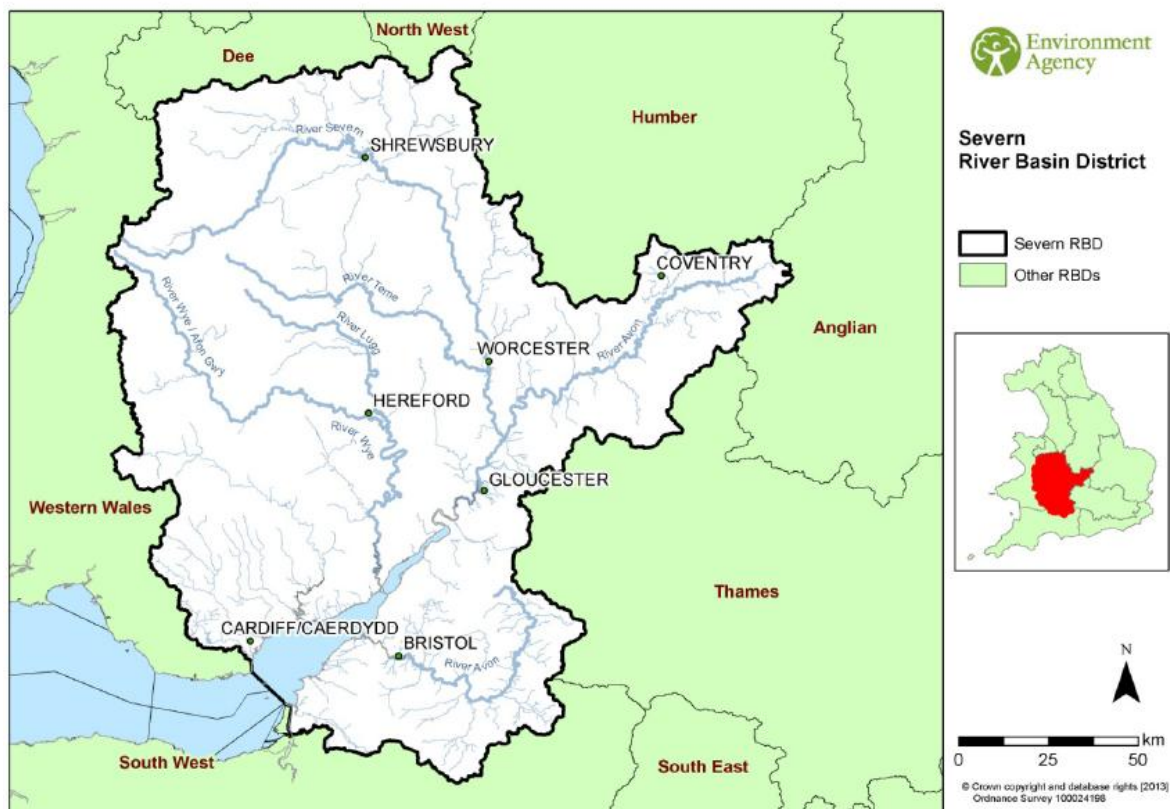
Introduction

The Severn River Basin District (RBD), shown in Figure 6.1, covers an area of just over 21,500 km². The River Severn is the longest river in Britain, stretching 350km from its source to the mouth of the Bristol Channel. It has a varied landscape from the uplands of Wales, down through valleys and rolling hills through central England, to the lowlands and the Severn Estuary. As well as the River Severn and its main tributaries, the Warwickshire Avon and the Teme, the district includes the rivers of South East Wales, including the Wye, Usk and Taff, and those of the South West, including the Bristol Avon, that drain directly into the Severn Estuary.

The area is home to more than 5.75 million people, and includes the major urban centres of Bristol, Cardiff and Coventry. The water bodies of the Severn RBD are made up of 7,512 km of river, 76 lakes, 36 canals, 40 areas of groundwater and 545 km² of estuary. The sheer size of the RBD gives rise to the huge variety of land uses, geology, topography and other descriptive factors. The catchment comprises a mosaic of habitats: uplands, valleys, floodplains, urban and agricultural areas.

The river has a variety of flooding issues along its length and given the complicated nature and volume of tributaries there is a need to take a catchment-wide view to all changes within the RBD. Activities must seek to avoid passing risk on to others within the catchment without prior agreement.

Figure 6.1: The Severn River Basin District



Society and health

Over 5.75 million people live and work in small or medium sized towns and cities within the RBD. Over 33,000 are at high risk from flooding, with a further 63,000 at medium risk. There is a wide variety of community types within the area, from those in heavily urbanised areas to rural farms. Health and poverty are inextricably linked and access to resources is a key part of improving these factors. The nature of the Severn RBD being so large means that it is a microcosm of the wider issues facing the country as a whole. From a flooding perspective, communities within this basin district are vulnerable from a variety of issues and different flooding sources. Flooding can have a social and health effect on the population as was seen in and following the July 2007 flood.

Land use

The RBD is very varied in its land use types with the predominant category being that of rural. Much of the RBD is rural in character, with land managed for agriculture and forestry. This includes improved grassland for extensive beef and sheep farming, large dairy farms, and some arable and specialist horticulture such as orchards and fruit. This has led to physical changes to the water environment and pollution from agricultural runoff. The major woodland use types are coniferous and deciduous woodland, being scattered throughout the catchment, for example around Ironbridge Gorge, Breiddon Forest (Lake Vyrnwy) and the Wye Forest, (much of which is ancient woodland).

The catchment is also characterised by urban centres that are built along the Severn and its tributaries. These population centres vary from small to medium in the upper catchments to large urban and sub-urban areas in the lower flatter floodplains. The coastal areas around the Severn Estuary have a very particular challenge with much of the land being reclaimed and heavily reliant on ancient systems of drainage ditches and lying at or near sea level.

Economic activity

The key sectors of economic activity within the RBD relate to business, transport, health and industry. The agricultural sector makes up a small part of the economy, with the catchment containing a mix of livestock (beef and sheep) and arable farms along with horticultural production. The post-industrial economy has seen clusters of small businesses flourish in the form of small industrial estates.

Recent decades have seen a major transformation in the economy and profile of the area. The traditional industrial base of the towns and cities have continued to decline, allowing significant areas of former industrial and dock land to be released for new housing and employment opportunities. Outside the major cities the catchment comprises a mixture of urban, semi-urban and rural communities. In these areas a growth corridor has emerged along the M5, M4, with secondary growth areas along the larger A-road network.

Recreation and tourism

The natural environment of the district is valued for its navigational and recreation uses and is an attraction for the people who live and work there, plus the many tourists who visit.

The whole catchment, including its rivers and reservoirs, is very popular with walkers, anglers, naturalists, canoeists and boat users.

Numerous nature reserves and country parks across the catchment also contribute to the tourist economy. Much of the recreation and tourism in the study area is focused around the landscape and outdoor pursuits. Activity holidays centred on hiking, cycling, mountain biking, horse riding, golf and water sports are popular and numerous.

The area provides a variety of recreational activities, for example, parts of the River Stour and its tributaries are located within the Cotswolds, which is popular with walkers, the Arrow catchment, which is important for anglers and water sports, and Stratford on Avon, a major tourist centre.

Infrastructure

Much of the Infrastructure in the RBD may be affected by flooding as demonstrated in the 2007 floods which affected many of the main roads, railways, power and water provision sites. Some of the infrastructure at risk includes the main London to South Wales railway line, power lines, the Severn Tunnel and associated structures and also the M4, M5, M48 and M50 motorways. Several trunk road routes cross the catchment, mainly radiating out from Shrewsbury, Hereford, Worcester, Cardiff and Bristol linked by a network of A and B roads.

Due to the nature of the Severn RBD it also houses some significant reservoirs that provide water resources to the Midlands and North West of England as well as providing other abstraction uses. These reservoirs lie in the upper reaches of the Severn, Taff and Usk. There is a barrage in Cardiff which may provide additional assistance with any tidal issues and help alleviate some flooding in the Cardiff area from fluvial issues.

Landscape

The catchment comprises a mosaic of habitats: uplands, valleys, floodplains, rivers, urban areas and agricultural areas. Many of these are internationally or nationally protected and targeted for enhancement in local and UK Biodiversity Action Plans (BAP). Some key examples are outlined below.

Brecon Beacons National Park, the Wye Valley Area of Outstanding Natural Beauty (AONB), and two Environmentally Sensitive Areas (ESAs) in the Upper Wye. Both the River Usk and River Wye are internationally designated as Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSIs).

The Berwyn Mountains is a SAC, designated for one of the largest areas of upland European dry heath in Wales and as an extensive tract of near-natural blanket bog. The Stiperstones and the Hollies SAC in the Shropshire Hills is also designated for the presence of European dry heath

habitat. The River Clun is designated as a SAC for the presence of freshwater pearl mussel. Fourteen separate Ramsar sites exist within the Midlands Meres and Mosses complex which include the 'Fenns, Whixall, Bettisfield, Wem and Cadney Mosses' complex near Wem – one of the largest blocks of lowland raised bog in England. There are 450 SSSIs within the catchment, of which around 200 are designated for their water-interest, such as the River Teme and Avon Valley. Coniferous and deciduous woodland is scattered throughout the catchment, for example around Ironbridge Gorge, Breiddon Forest (Lake Vyrnwy) and the Wyre Forest, (much of which is ancient woodland).

Biodiversity

The RBD includes many important habitat and wildlife areas of national and international importance. For example, the Severn Estuary and its surrounding area are protected for their bird populations, habitats and migratory fish species. The Severn Estuary is a designated Ramsar Site, an SPA and a candidate Special Area of Conservation (cSAC), and is therefore of international significance.

The area is ecologically rich and contains part of the West Midlands Meres and Moses, a series of lakes and peatland formed back in the Ice Age, which are internationally recognised for the importance of their unique natural habitat. The River Teme, upper River Severn and River Vyrnwy provide particularly good aquatic habitat. Protected species such as otter, Atlantic salmon, marsh warbler, raft spider, club tailed dragonfly, caddisfly and white-clawed crayfish are known to exist in these areas. Around the Severn-Vyrnwy confluence and the Severn and Avon Vale there is a wide range of wetland habitats, for example wet woodland, reedbed and fen.

There are two SPAs and fifteen SACs in the CFMP area including the Elenydd-Mallaen SPA, Severn Estuary SPA and cSAC, River Wye SAC, River Usk SAC, Llangorse Lake SAC, Wye Valley Woodlands SAC and Elan Valley woodlands SAC. The Wye 7 Usk CFMP also contains 291 SSSIs. These sites are protected nationally by the Wildlife and Countryside Act 1981 (as amended). In addition, there are also sites of national importance including sixteen National Nature Reserves (NNR).

Cultural heritage

The catchment includes a wide variety of archaeological sites. These range from burial chambers of the prehistoric period to military installations dating from the Second World War. There are also a number of important archaeological and ancient agricultural features such as those associated with the communications network, field patterns, hedgerows, ancient woodland and water management systems. There are a number of Romano-British villa and settlements in the area, including monument types that are rare in Wales. Important medieval features, with probable monastic origins also survive in a recognisable form. Expansion of coal mining and wider industrialisation of the area in the 18th century followed by the subsequent 20th century industrial decline has also left an impact on the historic character of many areas within the catchment.

There are Roman towns, including Glevum (Gloucester) and Viriconium (Wroxeter) and Roman roads such as the Fosse Way and Watling Street. Numerous Anglo-Saxon earthworks and defensive works were built in the Montgomery Valley and other parts of the Welsh Marches region. Offa's Dyke is one key example.

Medieval towns were established for example at Shrewsbury and Worcester, where half-timbered buildings, city walls and medieval street patterns still exist

Geology

The Severn RBD exhibits a varied geology. Sandstone outcrops, such as the Malvern Hills, form prominent features. Glacial and post-glacial sands, alluvium and river terrace gravels overlie much of the bedrock. Towards the lower catchment mudstones and Lias dominate. The Wye and Usk area is dominated by Old Red Sandstone rock, which has limited permeability. The Upper Wye catchment has a varied geology characterised by mudstones, siltstones and Sandstones, these old hard rocks are fine-grained and largely impermeable. The coastal tributaries are characterised by

permeable limestone overlain with relatively impermeable mudstones. Similarly to the mudstone in the Upper Wye catchment, the Triassic Mudstones are also classed as 'non-aquifers'.

The uplands of the South Wales catchments comprise Devonian Old Red Sandstone and Carboniferous Limestone. The steep topography resulting from these resistant rocks gives rise to rapid runoff.

The lower catchments of the Warwickshire Avon and the Severn Vale are both dominated by mudstone with areas of sandstone. The Avon, Bristol and North Somerset catchments are predominantly mudstone with Limestone sections, leading to rapid runoff.

Soil

The soils of the RBD are dominated by loam in the upper reaches and a more clay based soil as the Severn approaches the Severn Estuary. Around the Severn Estuary the soil becomes heavily clay dominated as a result of historic inundation. Soils in the mid to lower river basin are dominated by deep, well-drained and fertile Brown Soils, with scatterings of Surface Water Gleys and Groundwater Gleys. Brown soils occur in different forms from slowly permeable soils to less permeable loams and clayey soils. The subsurface layers are highly valued for agricultural purposes but the low permeability of the underlying geology means that during heavy rainfall the soil becomes quickly saturated. The reduced capacity of the soil will lead to increased surface runoff and an increase in the catchment response to rainfall.

Water

The main reason water is abstracted in the Severn RBD is to supply water for the general public. The headwaters of many of the rivers have been modified by dams to form reservoirs that ultimately supply drinking water. Water released from these reservoirs affects river flow and can limit river life (including the migration of fish) if there is insufficient flow variation. Water companies need to take action to make sure that adequate compensation flows are in place. Agriculture and horticulture also rely heavily on abstractions. While the amount of water abstracted for agriculture is relatively low compared to other uses, it usually takes place when flows are naturally at their lowest.

Reducing abstraction is often difficult as an alternative source of water will usually need to be found. These options may be costly and can bring new environmental issues. Other solutions to tackle unsustainable abstraction are likely to include channel modifications to increase water depths and flow velocities at low flows, Water Level Management Plans or flow augmentation arrangements linked to abstraction.

Pressure on rivers and underground water stores is likely to grow due to climate change and increases in population. Actions to manage the demand for water and encourage people to use water more efficiently will be particularly important where there are acute pressures on water resources. This will involve working with water companies through Water Resource Management Plans and working with farmers and industry groups via initiatives such as on-farm reservoirs (although these may be expensive and require planning) and water audits to build resilience around water supplies. Installing water efficiency measures in the home is also an important area of activity.

Climate

There is clear scientific evidence that global climate change is happening now. Over the past century we have seen sea level rise around England and more of our winter rain falling in intense wet spells. Climate changes can affect flood risk in several ways and the impacts will vary depending on local conditions and vulnerability. This should reinforce the approach we take as risk management authorities to consider climate change within the development of all our plans.

Wetter winters and more intense rainfall may increase river flooding and cause more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the extreme events. Rising sea or river levels may also increase local

flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses. Even small rises in sea level could add to very high tides so as to affect places a long way inland.

Sea level along the English Channel has already risen during the 20th century due to ocean warming and melting of glaciers. With the warming resulting from past emissions over the next few decades, a further overall 11-16cm of sea level rise is very likely by 2030, relative to 1990.

The UN's 2013 Inter-governmental Panel on Climate Change reported that the global surface temperature was 0.78°C warmer in 2003-2012 than in 1850-1900. It is likely that 1983 to 2012 was the warmest 30-year period of the last 1400 years. Increased temperatures are likely to cause higher winter rainfall in future, as well as increasing intense heavy rainstorm events.

It is too early to say whether the floods of 2013 to 2014 were caused by climate change, but the atmospheric phenomena that produced them are consistent with the expected impacts of global warming on the jet stream and winter storms. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

There is more uncertainty at a local scale, but we have enough confidence in large scale climate models to say that we must plan for change. By the 2080s, the latest UK climate projections (UKCP09) are that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is quite plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance, or rarer) could increase locally by 40%.

UK Government's Flood Foresight (2014) re-endorses the findings of the 2008 foresight work, stating that in general terms climate change is likely to increase river flood risks by 2080 by between 2 and 4 times, and coastal flood risk by 4 to 10 times. Government's Climate Change Risk Assessment 2012 found that flood risk is projected to increase significantly across the UK. Increases in the frequency of flooding would affect people's homes and wellbeing, especially for vulnerable groups.

According to UKCIP (UK Climate Impacts Programme), by the 2020s temperatures across the RBD could rise by up to 3°C under a low or high emissions scenario (50% probability level). Summer rainfall may decrease by up to 20% and winter rainfall may increase by up to 20% under either scenario. These extremes impact on water related issues such as decreased water availability and an increase in people and properties at risk from the affects of flooding. The increased frequency and intensity of rainfall events in combination with fast responding catchments will be the greatest threat to the upper areas where a relatively large number of small to medium sized communities are distributed over a wide area. The greatest threat to the lower catchment is from sea level rise which could increase flood risk significantly along the Severn Estuary and surrounding low-lying areas, and potentially change the character of a significant amount of agricultural land and valuable habitat.

Flood risk management systems and drainage

There is a wide variation in the characteristics of rivers and subsequently the nature of flooding throughout the district.

The majority of the district is of a rural nature with much of this comprising of agricultural land use; hence it is considered that in most areas the biggest impact on the natural flood regime comes from the management of the land for these purposes.

The upland areas within the RBD that are dominated by the Welsh Mountains and Brecon Beacons have many watercourses which respond rapidly to high levels of rainfall as a result of the steep topography. Annual rainfall totals of up to 2500mm are experienced in these areas. Examples can be found within the south east valleys of Wales, such as the Rivers Taff, Rhymney, Esk and Ebbw and the upper reaches of the Rivers Usk, Wye and Severn in Wales. Similar conditions can also occur in other parts of the RBD where rainfall totals are similar to the national average of 700mm per annum but where the topography is steeper such as along the Cotswold escarpment, in the Forest of Dean and Mendip Hills.

Longer more sustained flooding is experienced over a significant area of the district in the middle to lower lengths of the larger watercourses such as the Rivers Wye, Severn, Warwickshire Avon and Bristol Avon. Here the topography is much flatter and the geology comprises of mudstones and clays that have low permeability and thus can become easily saturated. It is in these areas where many of the medium to smaller sized communities at high flood risk can be found. In addition the groundwater table in these areas is also normally high contributing to the level of flood risk.

The Rivers Severn, Wye, Bristol Avon, Usk and most of the Southern Welsh watercourses enter the Bristol Channel/Severn Estuary resulting in a risk to these confluence areas from tidal flooding. This is most prevalent along the coastlines of Wales and North Somerset, extending up the River Severn as far as Gloucester. Areas adjacent to the coast are relatively flat with very little elevation. This means that tidal inundation can affect large areas with brackish water. Many of the areas adjacent to the coast are provided with a level of protection by defences.

Surface water/sewer flooding is also common in many of the larger urban areas; these include Cardiff and the South East Valleys of Wales, Bristol, the Black Country and Coventry. Such issues are also present in some smaller conurbations throughout the catchment. The rivers originating or running through such areas may also respond rapidly to rainfall due to water running off the increased area of impermeable surfaces.

Within the RBD there are many examples of flood defences which reduce the risk of flooding to major urban areas, local communities, essential infrastructure and agricultural land. These defences take the form of earth embankments, flood walls, outfall structures, barrage, attenuation areas, engineered channels and individual property level protection.

7. Key flood risk issues in the Severn River Basin District

Key message

The FRMP has been produced to identify and understand the risk from flooding within the Severn River Basin District (RBD). Its objective is to help all Flood Risk Authorities involved set out objectives and measures for managing that risk. In so doing, it is intended to provide a basis to better inform prioritisation, decision making and work programming for all sources of flooding.

The plan should be used in conjunction with the Severn RBD River Basin Management Plan (RBMP). This has been produced to identify the state of, and pressures on, the water environment. It considers the technical and economic viability of beneficial actions, set objectives and coordinate/monitor delivery of agreed actions. In so doing it sets direction to maintain and improve the quality of all surface, ground water and coastal waters.

The FRMP should also be used to identify objectives and measures at all scales that complement the aims of the Water Framework Directive by providing environmental benefits as part of and in addition to any flood risk management benefits.

Flood risk issues within the River Basin District

The Severn RBD covers approximately 21,500 km² with a total population of just over 5.66 million people. Approximately 100,000 people, just under 2% of the population, are at medium to high risk of flooding from rivers and the sea. Other sources of flooding include that from reservoirs where 260,000 people, 4.5% of the total population in the RBD, are at risk of flooding. Approximately 120,000 people, just over 2% of the total population within the RBD, are at medium to high risk of flooding from surface water sources. Sewer flooding is also prevalent mainly in the many urban centres located within the district.

In some circumstances people could be at risk of flooding from a combination of sources and therefore may be included in more than one of the above categories.

Due to its size, RBD wide events are extremely rare, though large parts have been affected during individual incidents. More detail is given in the catchment summaries set out in section 12 of the Plan.

The most recent major events that have impacted on large areas of the RBD include those of 1947, 1968, 1998, 2000 and 2007. Other smaller more localised events, such as those experienced in 2014, though not resulting in significant numbers of property flooding can be very disruptive to communities within the area affected. Flooding events have been recorded throughout the RBD since the thirteenth century.

There is a wide variation in the characteristics of rivers and subsequently the nature of flooding throughout the district.

Hence given the complex nature of flooding, there is a need to take a catchment-wide view of all changes within the basin district. Activities must seek to avoid passing risk on to others within the catchment without prior agreement.

Flood risk is influenced by a range of factors including climate change, changes in land use (particularly further urban development within the floodplain, but potentially also development elsewhere within the catchment), and changes in land management practices. A driver is the change in the factor affecting flood risk, not the factor itself as set out below:

- Urban development, both within the catchment and river corridor. An increase in urban areas can lead to increased surface water run-off and a more rapid rise in peak flows as the area of impermeable surface increases.

- Land use/land management. Any change in land management practices (e.g. an agricultural intensification, afforestation) can lead to changes in surface water flows and field run-off.
- Climate change. Milder wetter winters and increases in intensive rainfall events could increase flows in rivers on a more frequent basis and increase demands on our urban drainage networks. Sea level rise will increase tidal flood risk in the Severn and Wye Estuaries.

As part of our Flood and Coastal Risk Management work and in partnership with other RMAs we can monitor and adapt to future changes in the RBD by undertaking the following activities:

- flood risk management investigations
- hydraulic and hydrological modelling
- flood forecasting and warning
- incident management planning
- engaging with local communities
- flood improvement works
- development planning and control
- maintenance work
- enforcement

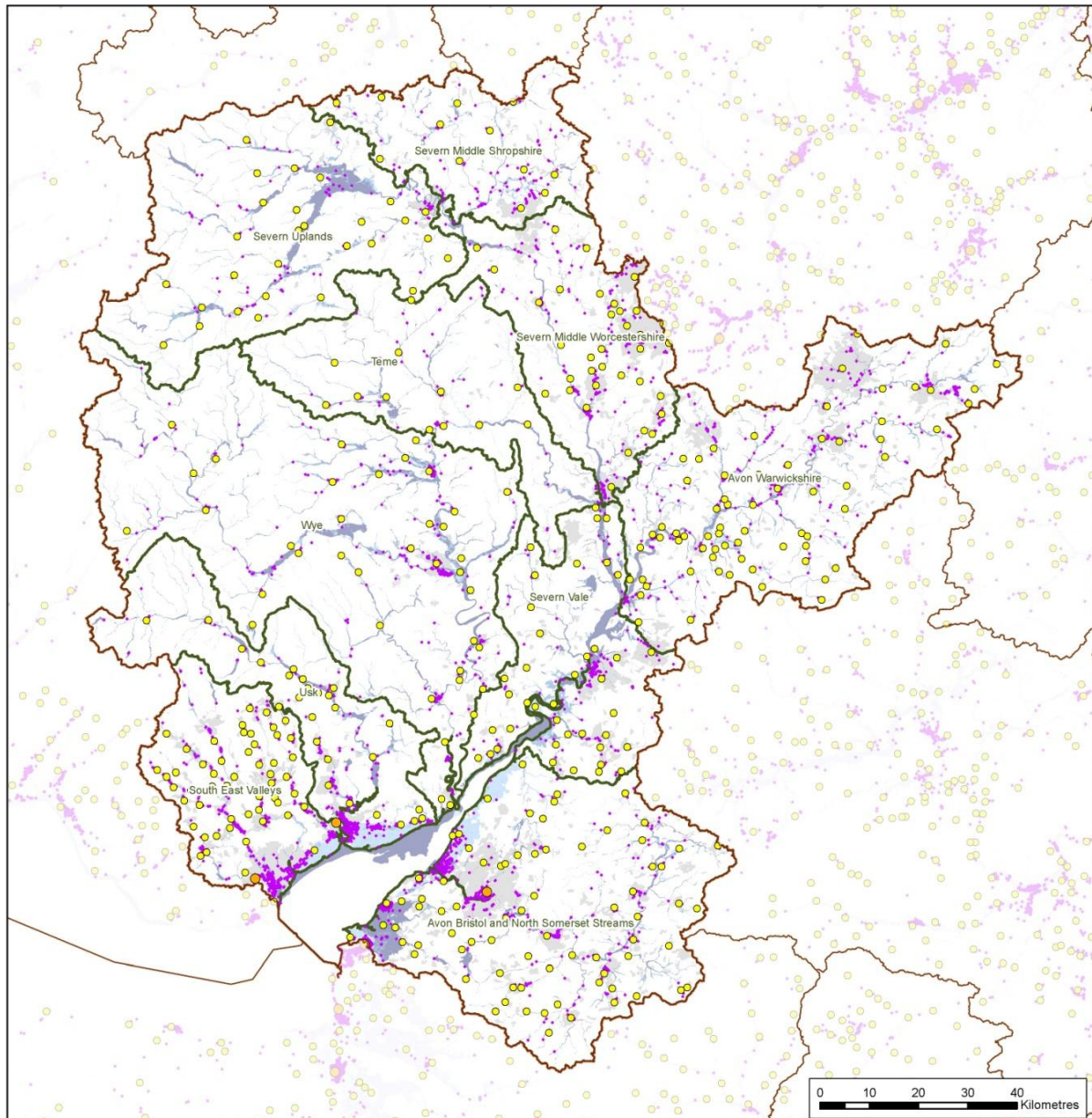
The following maps illustrate the broad scale of flood risk across the RBD from all sources. You can view them in more detail in the links set out below.

Find out more

- [Interactive flood maps for flooding from rivers, the sea , reservoirs and surface water](#)

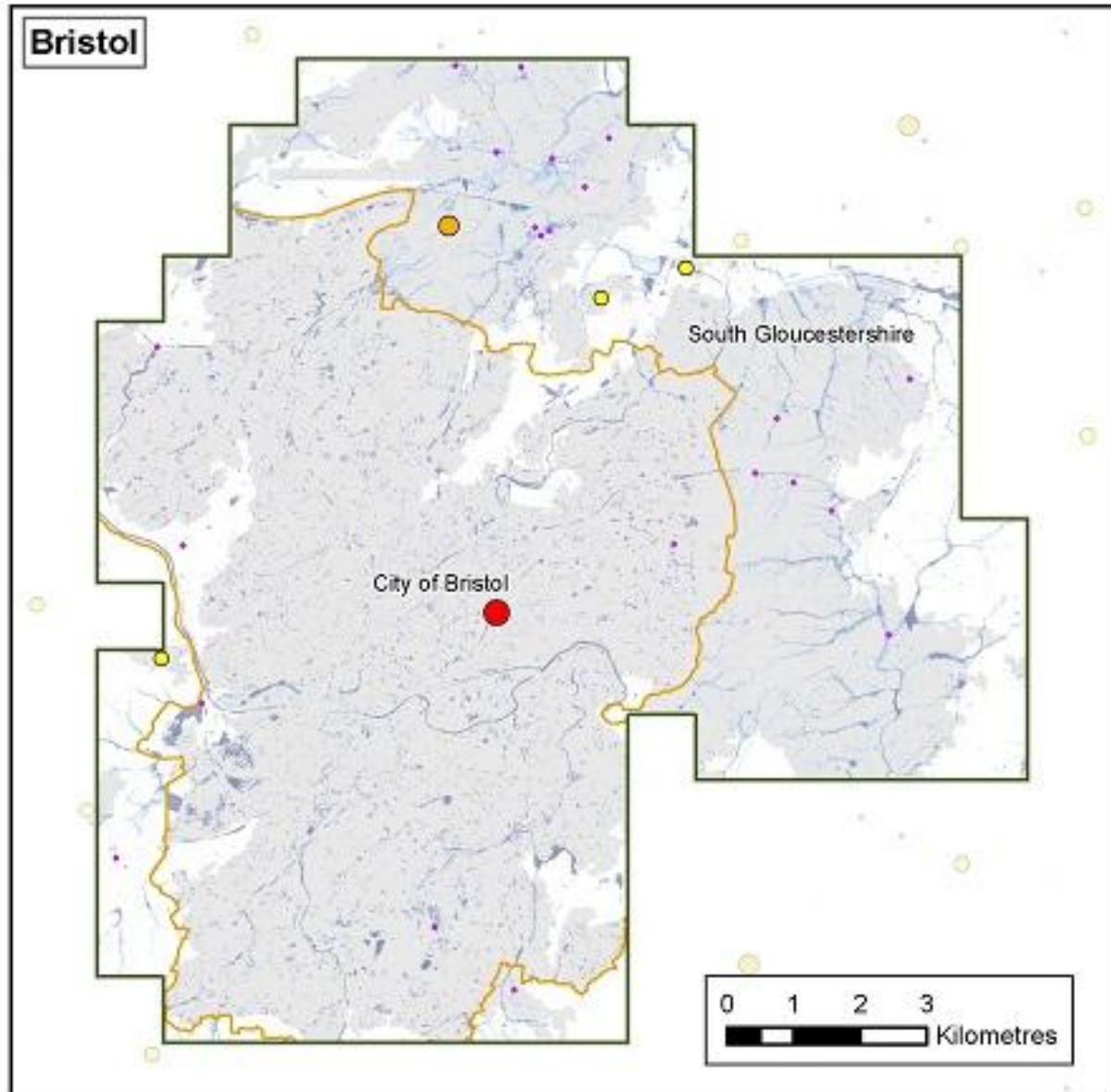
Flood and coastal erosion risk to people

Figure 7.1: Map of flooding from rivers and sea



<p>Rivers and Sea Flood Risk Map</p> <p>Severn River Basin District</p> <p>Risk to People</p>	<p>Flood Risk Source</p> <p>Rivers and Sea</p> <ul style="list-style-type: none"> High Medium Low Very Low 	<p>Reporting Boundaries</p> <ul style="list-style-type: none"> River Basin District River Basin Districts (Neighbouring) Management Catchment 	
	<p>People at Risk</p> <ul style="list-style-type: none"> 0 - 1000 1001 - 5000 5001 + 	<ul style="list-style-type: none"> Services at Risk Built-up Areas 	
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Figure 7.2: Map of flooding from local sources



<p>Surface Water Flood Risk Map</p> <p>Severn River Basin District</p> <p>Risk to People</p>	<p>Flood Risk Source Surface Water</p> <ul style="list-style-type: none"> High Medium Low 	<p>Reporting Boundaries</p> <ul style="list-style-type: none"> Flood Risk Area Flood Risk Area (Neighbouring) River Basin District River Basin Districts (Neighbouring) Lead Local Flood Authorities
	<p>People at Risk</p> <ul style="list-style-type: none"> 0 - 1000 1001 - 5000 5001 + 	<ul style="list-style-type: none"> Services at Risk Built-up Areas

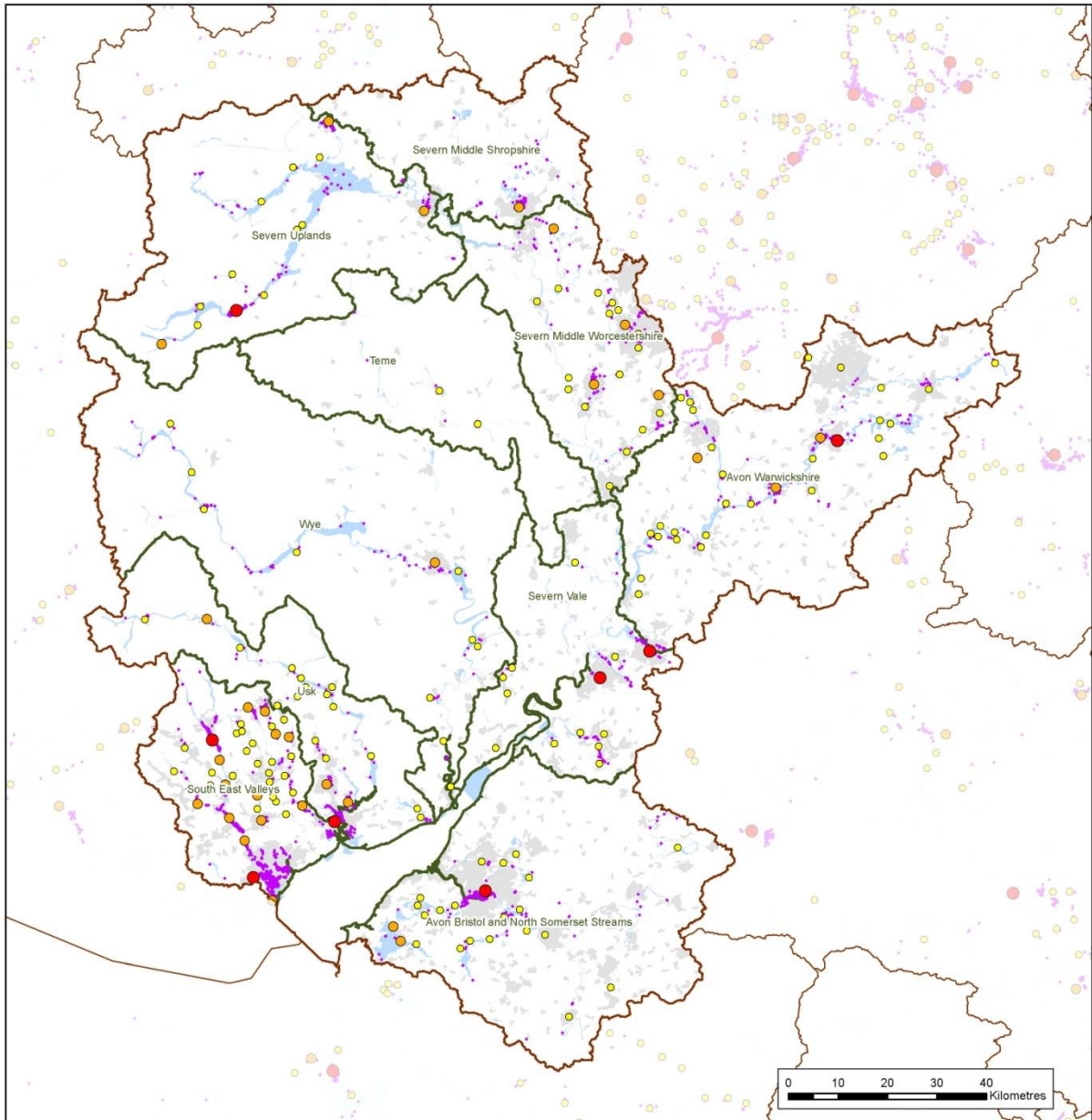
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Figure 7.3: Map of flooding from reservoirs



<p>Reservoirs Flood Risk Map</p> <p>Severn River Basin District</p> <p>Risk to People</p>	<p>Flood Risk Source</p> <p>Reservoirs</p> <p>Maximum extent of flooding</p>	<p>Reporting Boundaries</p> <ul style="list-style-type: none"> River Basin District River Basin Districts (Neighbouring) Management Catchment 	
	<p>People at Risk</p> <ul style="list-style-type: none"> 0 - 1000 1001 - 5000 5001 + 	<ul style="list-style-type: none"> Services at Risk Built-up Areas 	<p>Cyfoeth Naturiol Cymru Natural Resources Wales</p> <p>Environment Agency</p>

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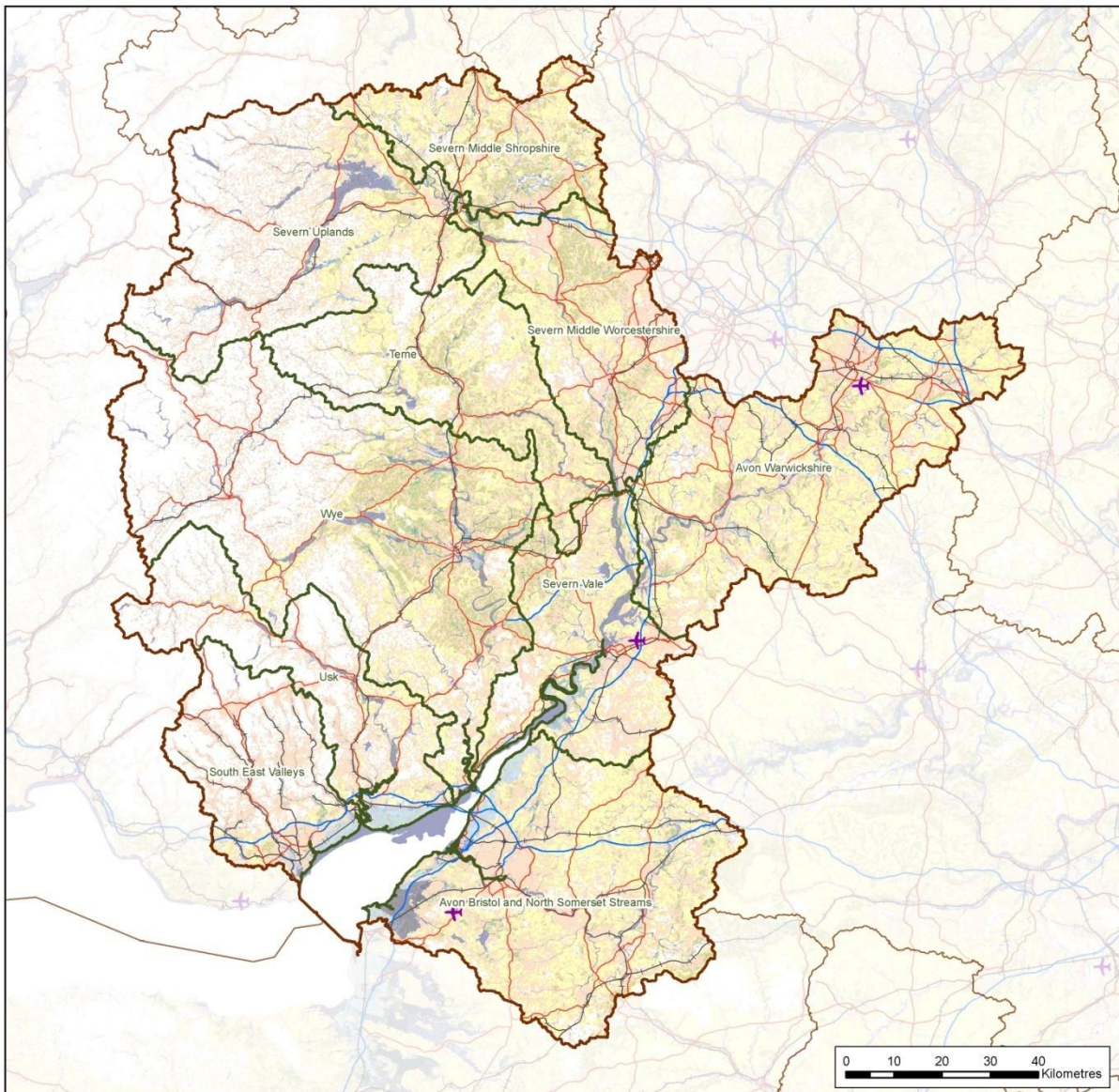
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Flood and Coastal Erosion Risk to Economic Activity

Figure 7.4: Map of flooding from rivers and sea



**Rivers and Sea
Flood Risk Map**

**Severn
River Basin District**

**Risk to
Economic Activity**

Flood Risk Source

Rivers and Sea

- High
- Medium
- Low
- Very Low

Economic Activity

- ✕ Airports
- Main Line Railways
- Motorway
- Other Primary / Trunk Roads
- Non-residential Properties

Reporting Boundaries

- River Basin District
- River Basin Districts (Neighbouring)
- Management Catchment

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3

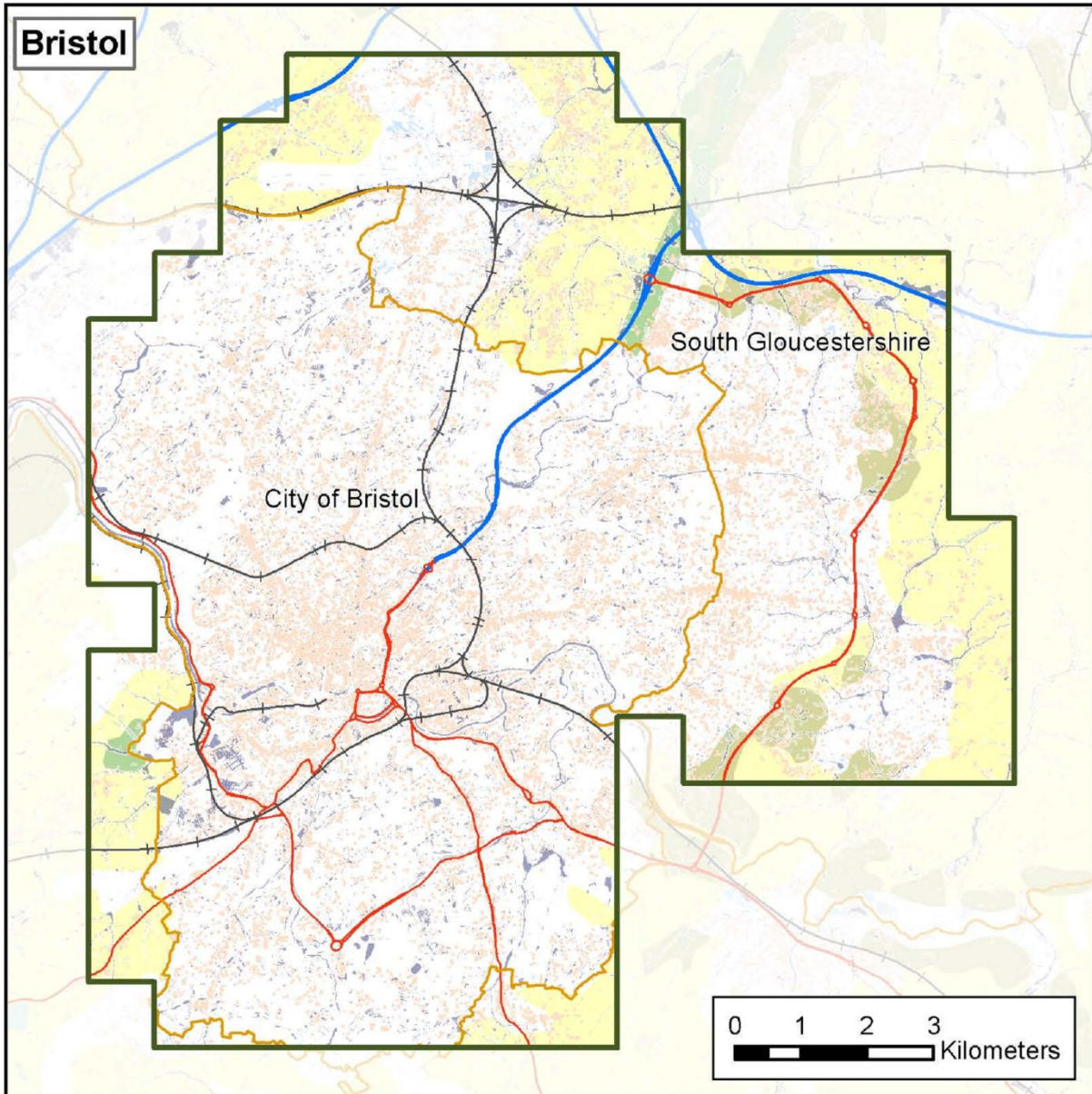
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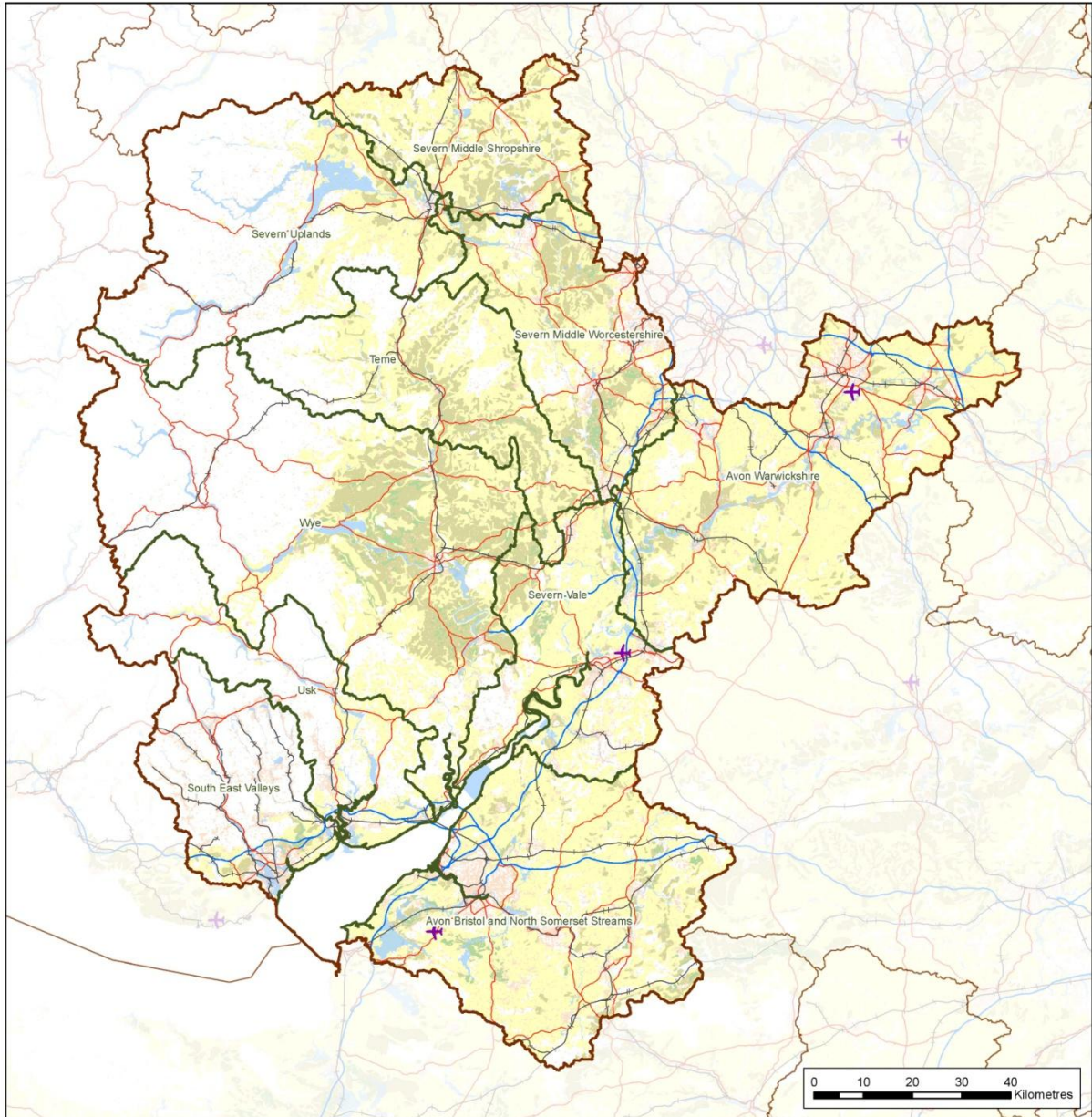
Figure 7.5: Map of flooding from local sources



<p>Surface Water Flood Risk Map</p> <p>Severn River Basin District</p> <p>Risk to Economic Activity</p>	<p>Flood Risk Source</p> <p>Surface Water</p> <ul style="list-style-type: none"> High Medium Low 	<p>Reporting Boundaries</p> <ul style="list-style-type: none"> Flood Risk Area Flood Risk Area (Neighbouring) River Basin District River Basin Districts (Neighbouring) Lead Local Flood Authorities
	<p>Economic Activity</p> <ul style="list-style-type: none"> Airports Main Line Railways Motorway Other Primary / Trunk Roads Non-residential Properties 	<p>Agricultural Land Classification</p> <ul style="list-style-type: none"> Grade 1 Grade 2 Grade 3

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Figure 7.6: Map of flooding from reservoirs





**Reservoirs
Flood Risk Map**

**Severn
River Basin District**

**Risk to
Economic Activity**

<p>Flood Risk Source</p> <p>Reservoirs</p> <p>Maximum extent of flooding</p>	<p>Economic Activity</p> <p>Airports</p> <p>Main Line Railways</p> <p>Motorway</p> <p>Other Primary / Trunk Roads</p> <p>Non-residential Properties</p>	<p>Reporting Boundaries</p> <p>River Basin District</p> <p>River Basin Districts (Neighbouring)</p> <p>Management Catchment</p>	<p>Agricultural Land Classification</p> <p>Grade 1</p> <p>Grade 2</p> <p>Grade 3</p>
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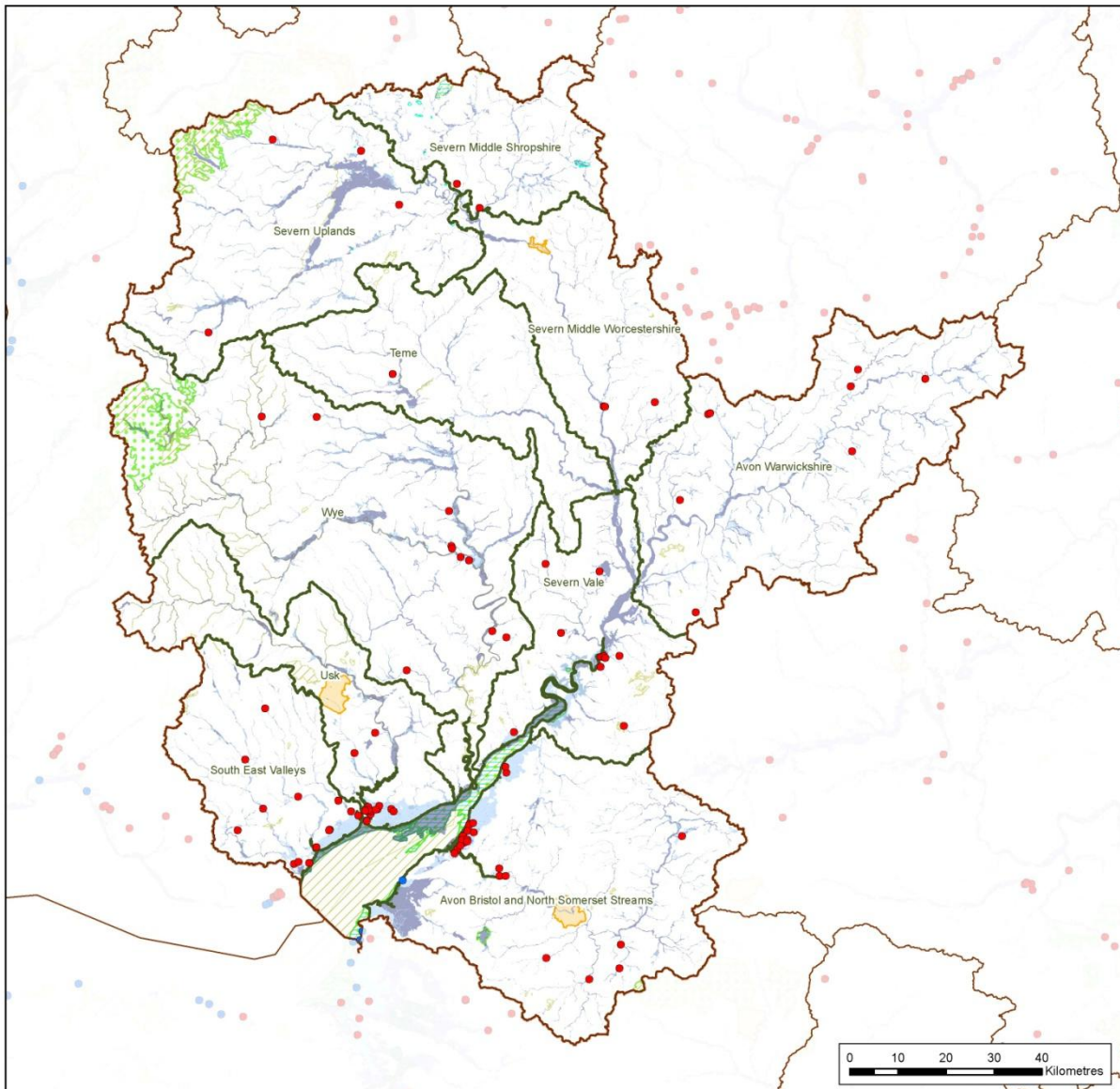
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Flood and coastal erosion risk to the natural and historic environment

Figure 7.7: Map of flooding from rivers and sea



**Rivers and Sea
Flood Risk Map**

**Severn
River Basin District**

**Risk to the
Natural and Historic
Environment**

Flood Risk Source

Rivers and Sea

- High
- Medium
- Low
- Very Low

Internationally Designated Sites

- Bathing waters that may be adversely affected by surface water run-off
- EPR (Environmental Permitting Regulations) Installations within 50m of Risk

Reporting Boundaries

- River Basin District
- River Basin Districts (Neighbouring)
- Management Catchment

Internationally Designated Sites

- Special Areas of Conservation
- Special Protection Areas
- RAMSAR Sites
- World Heritage Sites

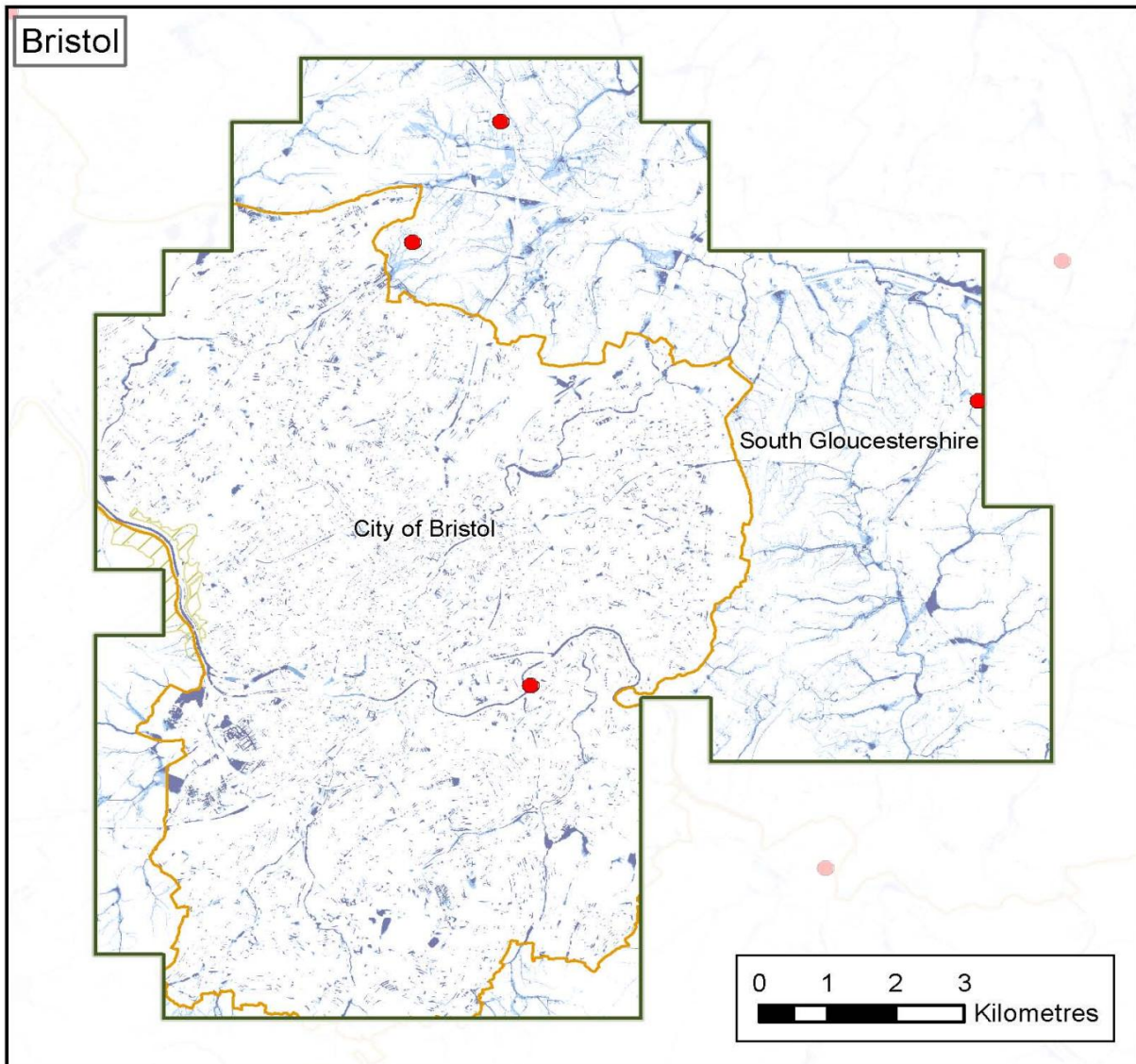
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Figure 7.8: Map of flooding from local sources



<p>Surface Water Flood Risk Map</p> <p>Severn River Basin District</p> <p>Risk to the Natural and Historic Environment</p>	<p>Flood Risk Source</p> <p>Surface Water</p> <ul style="list-style-type: none"> High Medium Low 	<p>Reporting Boundaries</p> <ul style="list-style-type: none"> Flood Risk Area Flood Risk Area (Neighbouring) River Basin District River Basin Districts (Neighbouring) Lead Local Flood Authorities
	<p>Internationally Designated Sites</p> <ul style="list-style-type: none"> Bathing waters that may be adversely affected by surface water run-off EPR (Environmental Permitting Regulations) Installations within 50m of Risk 	<ul style="list-style-type: none"> Special Areas of Conservation Special Protection Areas RAMSAR Sites World Heritage Sites

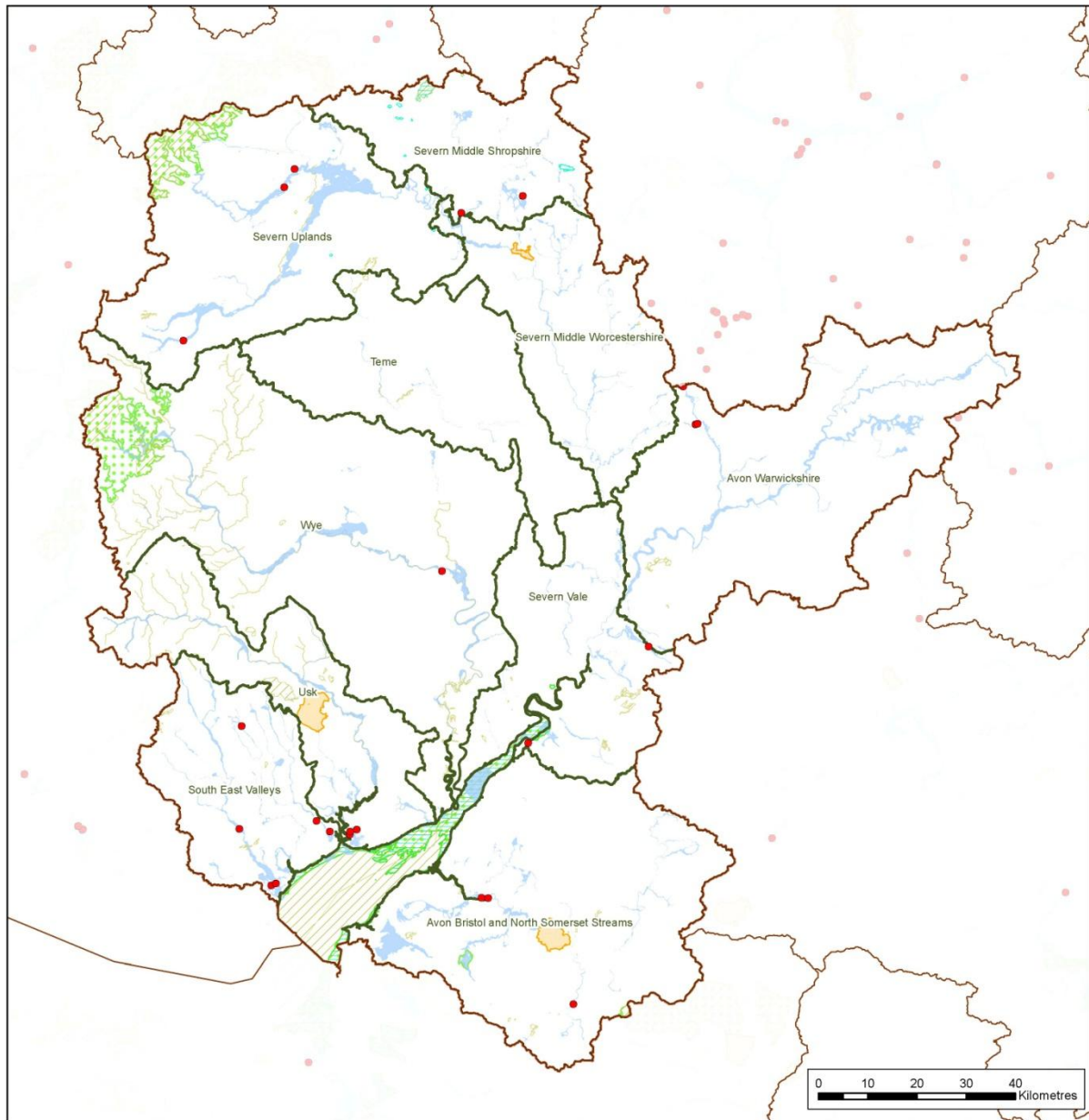
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Figure 7.9: Map of flooding from reservoirs



<p>Reservoirs Flood Risk Map</p> <p>Severn River Basin District</p> <p>Risk to the Natural and Historic Environment</p>	<p>Flood Risk Source</p> <p>Reservoirs</p> <ul style="list-style-type: none"> Maximum extent of flooding 	<p>Reporting Boundaries</p> <ul style="list-style-type: none"> River Basin District River Basin Districts (Neighbouring) Management Catchment
	<p>Internationally Designated Sites</p> <ul style="list-style-type: none"> Bathing waters that may be adversely affected by surface water run-off EPR (Environmental Permitting Regulations) Installations within 50m of Risk 	<ul style="list-style-type: none"> Special Areas of Conservation Special Protection Areas RAMSAR Sites World Heritage Sites

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Key Statistics

Table 7.1: Summary of flood risk to people, economic activity and the natural and historic environment across the Severn RBD.

River & Sea	Total in RBD	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	5664341	32610	62008	240670	33035
Number of services:	12761	446	293	541	147
Risk to economic activity:					
Number of non-residential properties:	765456	13527	13750	34537	6322
Number of airports:	3	0	0	0	0
Length of roads (km):	4089	87	87	183	44
Length of railway (km):	1476	49	50	106	22
Agricultural land (ha):	1157449	47410	16978	26787	9244
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	2	2	0	0	0
Number of EPR installations within 50m:	464	29	20	41	6
Area of SAC within area (ha):	82051	15521	405	161	205
Area of SPA within area (ha):	50959	11232	388	72	174
Area of RAMSAR site within area (ha):	19473	10802	244	54	200
Area of World Heritage Site within area (ha):	6718	136	70	96	65
Area of SSSI within area (ha):	112944	16949	1670	5870	393
Area of parks and gardens within area (ha):	29150	971	464	461	191
Area of Scheduled Ancient Monument within area (ha):	6885	224	109	139	39
Number of listed buildings within area:	62400	1797	1083	2735	711
Number of Licensed water abstractions within the area:	4357	1529	182	124	59

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

Table. 7.2. Summary flood risk from reservoirs to people, economic activity and the natural and historic environment across the Severn RBD.

Reservoirs	Total in RBD	Maximum extent of flooding
Risk to people:		
Number of people in area:	5664341	261730
Number of services:	12761	734
Risk to economic activity:		
Number of non-residential properties:	765456	36617
Number of airports:	3	0
Length of roads (km):	4089	199
Length of railway (km):	1476	100
Agricultural land (ha):	1157449	34004
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	2	0
Number of EPR installations within 50m:	464	22
Area of SAC within area (ha):	82051	6042
Area of SPA within area (ha):	50959	3968
Area of RAMSAR site within area (ha):	19473	3335
Area of World Heritage Site within area (ha):	6718	85
Area of SSSI within area (ha):	112944	8115
Area of parks and gardens within area (ha):	29150	1391
Area of Scheduled Ancient Monument within area (ha):	6885	291
Number of listed buildings within area:	62400	3362
Number of Licensed water abstractions within the area:	4357	895

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

Table. 7.3. Summary flood risk from surface water to people, economic activity and the natural and historic environment across the Bristol Flood Risk Area

Surface Water	Total in RBD	High risk	Medium risk	Low risk
Risk to people:				
Number of people in area:	573063	2147	2805	10079
Number of services:	611	4	4	15
Risk to economic activity:				
Number of non-residential properties:	32376	293	306	801
Number of airports:	0	0	0	0
Length of roads (km):	109	7	5	14
Length of railway (km):	48	5	3	3
Agricultural land (ha):	3562	89	74	249
Risk to the natural and historic environment:				
Number of EU designated bathing waters within 50m:	0	0	0	0
Number of EPR installations within 50m:	7	3	0	1
Area of SAC within area (ha):	98	0	1	1
Area of SPA within area (ha):	0	0	0	0
Area of RAMSAR site within area (ha):	0	0	0	0
Area of World Heritage Site within area (ha):	2900	0	0	0
Area of SSSI within area (ha):	241	3	2	7
Area of parks and gardens within area (ha):	498	19	8	15
Area of Scheduled Ancient Monument within area (ha):	14	0	0	0
Number of listed buildings within area:	2302	41	10	12
Number of Licensed water abstractions within the area:	20	2	0	0

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

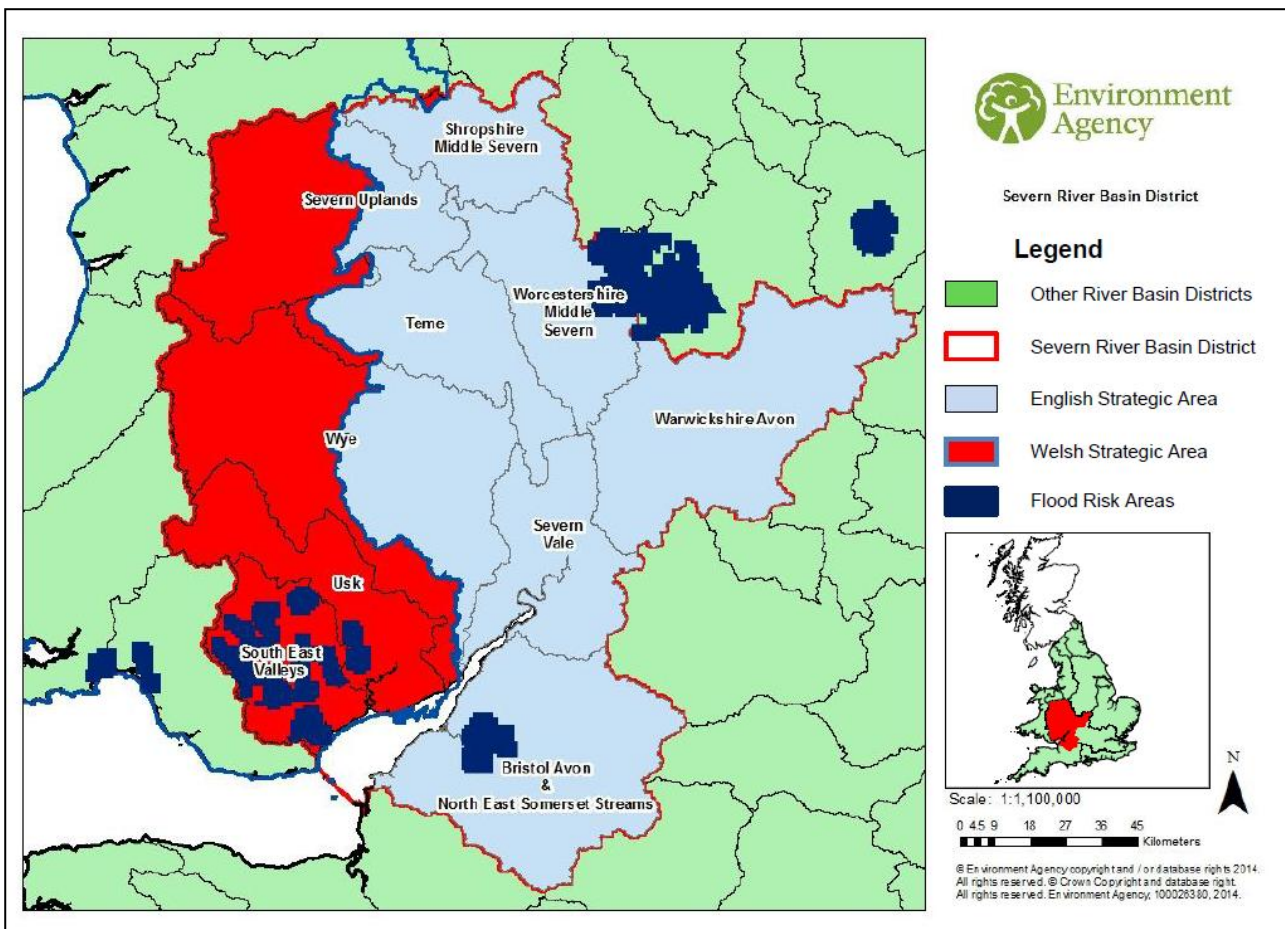
8. Sub-areas in the Severn River Basin District

Introduction

There are a number of sub-areas within the Severn River Basin District (RBD), as shown in Figure 8.1 and outlined below. These are:

- English part of RBD
- Welsh part of RBD
- Catchments (which are set out according to WFD Management Catchments)
- Flood Risk Areas identified in the Preliminary Flood Risk Assessment areas that require flood risk management plans for local sources of flooding.

Figure 8.1: Severn RBD showing Catchments, Flood Risk Areas and other Strategic Areas



English / Welsh part of RBD: Where possible, this plan has been co-ordinated at RBD scale covering the whole of the Severn RBD. As the Severn RBD covers parts of both England and Wales, there may be elements of flood risk management work that are not applicable to the whole RBD and may just cover the Welsh section or the English section due to different administrations. This plan includes two large strategic areas:

- English Severn
- Welsh Severn

This will enable risk conclusions, objectives and measures to be developed for the English Severn as a strategic area and the Welsh Severn as a strategic area. The Teme, Severn Uplands and Wye catchments have areas in both Strategic Areas.

Catchments: These are areas where we focus engagement to enable a catchment based approach to water management. There are 10 catchments in the Severn RBD, as listed below:

- Severn Uplands (cross border)
- Shropshire Middle Severn (English strategic area)
- Worcestershire Middle Severn (English strategic area)
- Teme (cross border)
- Warwickshire Avon (English strategic area)
- Severn Vale (English strategic area)
- Wye (Cross border)
- Usk (Welsh strategic area)
- South East Valleys (Welsh strategic area)
- Bristol Avon & North Somerset Streams (English strategic area)

Flood Risk Areas: These are areas identified through Preliminary Flood Risk Assessments as areas of potentially significant local flood risk (for instance surface runoff, groundwater and ordinary watercourses), for which FRMPs need to be prepared.

The Bristol Flood Risk Area is included within this FRMP and is entirely within the Bristol Avon & North Somerset Streams catchment.

The West Midlands Flood Risk Area is included within the Humber FRMP which can be accessed via the GOV.UK website.

The Flood Risk Areas in Wales form a separate FRMP.

9. Conclusions, objectives and measures to manage risk for the Severn River Basin District

This draft plan sets out the type of measures proposed to manage the risk. In developing the proposed measures the RMA's contributing have:

- drawn conclusions from hazard and risk maps and other sources of information: this helps us all to understand the risks or opportunities the RMA's are aiming to manage;
- developed risk management objectives (related to people and society, the economy and the environment) that set out the outcomes we RMA's are trying to achieve;
- identified the likely approach to managing risk using the following categories: preventing, preparing, protecting and recovering and review.

Conclusions and objectives for the Severn RBD as a whole

We have set out the following for the Severn RBD:

Conclusions

The Severn RBD covers an area of approximately 21,500 km² and water bodies are made up of over 7,500 km of river, 76 lakes, 36 canals, 40 areas of groundwater and 545 km² of estuary.

The large size of the RBD gives rise to a huge variety of land uses, geology, topography and other factors that have an influence on flood risk.

The large majority of the RBD, approximately 90%, is classified as rural, with over 55% of land being used for agricultural purposes.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will alleviate flooding from multiple sources, as well as providing wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development.

Flooding from Rivers and the Sea

The percentage of the population at medium or high risk of flooding from rivers and the sea is relatively low, at less than 2%, for the majority of the catchment as most urban development has historically been located in areas of higher ground.

The percentage of non-residential properties at medium or high risk in the RBD is also relatively low at just under 4%.

In specific locations, mostly in the vicinity of urban areas where rapid post war expansion has taken place, these percentages may increase slightly.

Of the 12,000 km² of agricultural land within the catchment approximately 6% is at high to medium risk. This is mostly associated with the lower lying areas adjacent to the major watercourses such as the Rivers Severn, Wye, Warwickshire Avon and Severn Estuary, though a number of these areas are protected by agricultural defences that reduce the risk, and so impact, of flooding.

Flood risk is influenced by climate change, changes in land use and changes in land management practices.

Reservoir Flooding

In the Severn RBD there are a number of large raised reservoirs that hold at least 25,000m³ of water above natural ground level. The hazard maps show the largest area that might flood if a reservoir were to fail. The chances of a reservoir failing and causing flooding are very low. However the extent of flooding from a reservoir can be up to 50 miles from its source. This is because the local geography, such as valleys, can channel flood water long distances.

Many of these features are located in the upland areas of the RBD such as the Welsh Mountains, Brecon Beacons, Cotswold and Mendip Hills.

In the RBD there are approximately 260,000 people, as well as infrastructure and areas of environmental importance at risk of flooding from reservoirs.

The percentage of the population at risk of flooding from reservoirs is again low, at approximately 4.5%, whilst the percentage of non-residential properties at risk in the RBD is also low at just under 5%. Should failure occur though localised impacts could be severe. These low figures are due to the vast nature of the RBD and many of the main urban centres in the catchment being some distance downstream of the larger reservoirs such as Lyn Clywedog. This percentage however changes significantly in parts of the catchment such as the Welsh Valleys where there is significant urban development downstream of large reservoirs.

The impact on agricultural land within the catchment would be much greater with approximately 20% at risk.

Surface Water Flooding

Surface water flooding is usually the product of short in duration but intense summer storms.

This type of flooding occurs in rural areas when the ground is unable to absorb the high volume of water that falls on it in a short period of time. The water remains on the surface and flows along the easiest flow path towards a low spot in the landscape.

Within urban areas the non-permeability of many surfaces such as paved roads is often responsible for the ground not being able to absorb the water. Poorly maintained or inadequate drainage systems can then exacerbate the problem, leading to flows routes appearing and/or ponding of water to depths that can be a danger to life.

The percentage of the population at a medium to high risk of flooding from surface water is similar to that of fluvial flooding at approximately 2% whilst the percentage of non-residential properties at medium to high risk in the RBD is also low at just under 3%.

The impact on agricultural land within the catchment is again low with approximately 3% at medium to low risk.

Surface Water/sewer flooding is common in many of the larger urban areas; these include Cardiff and the South East Valleys of Wales, Bristol, the Black Country and Coventry as well as some smaller conurbations throughout the catchment. Within these more localised areas the percentage of people and properties at risk may be higher.

The Plan also assesses each catchment and concludes with a short statement about the risks and the focus of flood risk management. These conclusions can be read within each catchment summary.

Objectives

The objectives that have been set are in line with the National Flood and Coastal Risk Management Strategies for Wales and England. These objectives set out the key factors that the measures should aim to tackle. They cover social, economic and environment factors.

- manage flood and coastal erosion risks, taking account of the needs of communities businesses and the environment
- reduce the risk from flooding for more households
- develop and promote a better understanding of flood and coastal risk and use this to prioritise investment in risk management
- ensure that investment in flood and coastal risk management provides environmental, social and economic benefits wherever possible
- target resources to reduce the risk of flooding to communities with the highest flood risk
- set out a clear and consistent plan for flood risk management so that communities and businesses can make informed decisions about the management of their risk
- raise awareness of and engage people on flood and coastal erosion risk to encourage them to take action to manage the risks they face
- provide an effective and sustained response to flood and coastal erosion events
- more households and businesses at high risk of flooding can receive flood warnings
- encourage emergency plans and responses to flood incidents to be effective and communities to respond effectively to flood forecasts, warnings and advice
- facilitate decision-making and action at the appropriate level - individual, community, or local council, river catchment, coastal cell or national
- maintain our flood and coastal risk management assets at or above required condition
- reduce the risk of flooding from reservoirs to people, property, infrastructure and the environment.

Ongoing measures across the Severn RBD as a whole

Across the Severn RBD as a whole the on-going measures to manage flood risk include:

Preventing risk: There are 9 measures already in place to prevent flood risk at the RBD level.

- working with others to avoid inappropriate development in the floodplain;
- ensuring appropriate flood plain compensation to mitigate for development;
- supporting the implementation of sustainable urban drainage systems;
- advising how new development can be more resilient to flooding;
- ensuring works in, over and next to main rivers do not increase flood risk or cause pollution through effective consenting;
- increasing awareness and encouraging landowners to fulfil their riparian landowner responsibilities;
- undertaking mapping and modelling to ensure flood risk information remains up to date and fit for purpose;
- ensuring a robust maintenance programme;
- promoting flood resilience and flood proofing.

Preparing for risk: There are 7 measures already in place to prepare for flood risk at the River Basin District level.

- providing advice and information to Local Resilience Fora to enable them to reduce the impact of flooding;
- providing advice and information to local communities to enable them to reduce the impact of flooding;
- raising awareness with key partners of their roles in flood risk management and exploring opportunities for joint outcomes;
- maintaining and improving the flood forecasting, flood warning and flood incident management service;
- providing flood incident response service 24 hours a day;
- ensuring all 'high risk' reservoirs have on-site reservoir plans in place;
- Natural Resources Wales and Environment Agency working closely to consider the benefit or detriment to the whole river basin in all decision making and activity.

Protecting from risk: There are 5 measures already in place that protect from flood risk at the River Basin District level.

- reviewing Asset System Management Plans;
- encouraging best farming practices to reduce rapid surface water run-off and soil erosion;
- identifying opportunities for floodplain restoration;
- delivering emergency works where needed for flood risk management assets;
- ensuring all 'high-risk' reservoirs are regulated in accordance with the Reservoirs Act 1975.

Recovery and review of risk: There is 1 measure in place to recover and review following flooding at the River Basin District level.

- improve and develop our services based on lessons identified following flood events.

Agreed measures across the Severn RBD as a whole

Across the Severn RBD there are no RBD-wide measures in this category over and above the flood risk activities described in section 7.

Proposed measures across the Severn RBD as a whole

Across the Severn RBD there are no RBD-wide measures in this category over and above the flood risk activities described in section 7.

Contributing to broader benefits

The ongoing, agreed and proposed measures can also help us deliver broader benefits, in particular to biodiversity, water and ecological quality.

The Measures Tables in the following sections of this FRMP show measures which have environmental objectives and contribute to Water Framework Directive outcomes. These include measures to work with natural processes to protect/restore the natural function of catchments, rivers and floodplains. This can provide valuable additional benefits including water quality

improvements through reductions in run-off and diffuse pollution, water resource provision through aquifer recharge, mitigation of, and adaptation to, climate change through measures such as wetland creation and the provision of urban biodiversity and amenity green spaces through sustainable drainage systems (SuDs). In addition, we look for the potential in all measures to improve the local natural, cultural and built environment, and so to achieve environmental gains alongside economic and social gains. These include environmental improvements to meet obligations set out through the EC Water Framework, Habitats and Birds Directives and other domestic commitments that link to flood and coastal erosion risk management. We work to minimise damage to habitats, including those protected by legislation, and the ecological status of watercourses.

The Environmental Report of the SEA of the FRMP describes the environmental effects that are significant within the RBD and identifies measures to mitigate any adverse effects. Opportunities to improve the environment are also considered. The results of the assessment will be used to inform the further development and implementation of the FRMP.

Table 9.1. The Severn River Basin District – Measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Provide advice to local resilience fora	Providing advice and information to Local Resilience Fora to enable them to reduce the impact of flooding.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life, as a result of flooding.	M4 - Preparedness	2015 - 2021	High	On going
Provide advice to local communities	Providing advice and information to local communities at to enable them to reduce the impact of flooding. Increase awareness of flood risk and registration to Floodline through all our communications with the public.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life, as a result of flooding. To improve flood warning procedures to reduce potential risk to communities by extending the coverage of the flood warning service, especially in areas where social vulnerability is high.	M4 - Preparedness	2015 - 2021	High	On going
Learn from Flood Events	We will continue to improve and develop our services based on lessons identified following flood event and feedback from communities and partners	N	N	Y	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life, as a result of flooding. To improve flood warning procedures to reduce potential risk to communities by extending the coverage of the flood warning service, especially in areas where social vulnerability is high.	M5 - Recovery and Review	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Modelling & Hydrology	Undertake mapping and modelling to ensure our flood risk information remains up to date and fit for purpose. This will support the development of our capital programme for new assets, refurbishment work to existing assets, flood forecasting and flood incident management work, planning advice to local authorities and general advice to the public.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and future investment in the catchment is proportional to flood risk	M2 - Prevention	2015 - 2021	Moderate	On going
Flood Forecasting, warning & Incident Management	Undertake work to maintain and improve our flood forecasting, flood warning and flood incident management services. Focus on areas for improvement as highlighted by recent flooding events and routine exercises.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life, as a result of flooding. To improve flood warning procedures to reduce potential risk to communities by extending the coverage of the flood warning service, especially in areas where social vulnerability is high.	M4 - Preparedness	2015 - 2021	High	On going
Review System Asset Management Plans	Review System Asset Management Plans regularly with regard to maintenance, funding requirements and asset condition related works across each catchment. Utilise data from SAMPS, updated surveys & modelling to develop a more strategic approach to routine management & maintenance of the catchments.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and future investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	Moderate	On going
Work with others to avoid inappropriate development	Work closely with local planning authorities, developers, businesses and infrastructure operators to avoid inappropriate development through the planning process.	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life, as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Flood Defence Consents	Ensure works in, over and next to main rivers do not increase flood risk or cause pollution through effective consenting. Use the consenting process to identify opportunities to improve the water environment.	Y	N	N	N	N	N	N	N	N		Y	Y	N	Reduce or prevent an increase in the number of properties affected by flooding. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status	M2 - Prevention	2015 - 2021	High	On going
Support implementation of Sustainable Drainage Systems	Ensure no increase in run-off from new developments through planning advice. Promote the implementation of Sustainable Drainage Systems (SuDS) in new developments to gain environmental, water quality, social and flood risk benefits.	N	N	Y	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Ensure current and existing investment in the catchment is proportional to flood risk. Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	Moderate	On going
Increase awareness of riparian responsibilities	Increase awareness and encourage landowners to fulfil their riparian landowner responsibilities	Y	N	N	N	N	N	N	N	N		Y	Y	N	Reduce or prevent an increase in the number of properties affected by flooding. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status	M2 - Prevention	2015 - 2021	High	On going
Encourage catchment sensitive farming	Work with landowners, local and national Government, to encourage best farming practices to reduce rapid surface water run-off and soil erosion. For example, reduction of surface ponding, cropping techniques and soil management plans. Contribute to research and development to identify best practice for reducing runoff through land use change.	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	Y	Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status.	M3 - Protection	2015 - 2021	Moderate	On going
Ensure appropriate floodplain compensation	Ensure appropriate floodplain compensation in undefended fluvial floodplains to mitigate development, through the planning process.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	High	On going
Promote flood resilience and flood proofing	Work with local authorities, home owners, businesses, developers and farmers to promote flood resilience and flood proofing.	N	N	Y	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M2 - Prevention	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Raise awareness of flood risk issues	Raise awareness with key partners, landowners and land managers in their roles in flood risk management. Work with local authorities, emergency services and other key partners and explore opportunities for joint outcomes.	N	N	Y	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure.	M4 - Preparedness	2015 - 2021	Very High	On going
Identify opportunities for floodplain restoration	Work with Natural England, Natural Resources Wales and other partners to identify opportunities for floodplain restoration (in line with the River Basin Management Plan) and increase storage in the upper catchment through detention basins/wetlands/attenuation that benefit the environment. Encourage activities that may have potential to reduce run-off rates to downstream areas, whilst contributing wider benefits (biodiversity, soil conservation and water quality improvements).	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M3 - Protection	2039 +	Moderate	On going
Ensure a robust revenue maintenance programme exists	Ensure a robust revenue maintenance programme exists that prioritises flood risk management works across each catchment, which is reflected in the maintenance bid within relevant System Asset Management Plans to include, where possible, opportunities for proposed maintenance works to naturalise watercourses and create habitat through possible external/partnership funding.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and future investment in the catchment is proportional to flood risk	M2 - Prevention	2015 - 2021	High	On going
Advise how new development can be more resilient to flooding	Help reduce the damage floods can do by advising local planning authorities, developers, businesses and infrastructure operators on how new development can be designed to be more resilient to flooding.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Deliver emergency works	Secure funding and deliver emergency works where needed for our assets	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and future investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	High	On going
Provide flood incident response service	Provide a flood incident response service 24 hours a day, 7 days a week, 365 days a year including operational response activities and providing information.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life as a result of flooding.	M4 - Preparedness	2015 - 2021	High	On going
Work closely with Natural Resources Wales and Environment Agency	Natural Resources Wales and Environment Agency to work closely and to consider the benefit or detriment to the whole river basin in all decision making and activity.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and future investment in the catchment is proportional to flood risk	M4 - Preparedness	2015 - 2021	High	On going
EA/NRW 'high risk' reservoirs have on site reservoir plans	All Environment Agency/Natural Resources Wales 'high risk' reservoirs have on-site reservoir plans in place.	N	N	N	N	N	Y	N	N	N		Y	N	Y	Reduce or prevent an increase in the economic damages from flooding to residential and commercial property in the catchment. Reduce or prevent an increase in harm to life, as a result of flooding.	M4 - Preparedness	2015-2021	Very High	On going
All 'high risk' reservoirs are regulated under the Reservoirs Act 1975	All 'high-risk' reservoirs are regulated in accordance with the Reservoirs Act 1975 – this is already monitored through business measures.	N	N	N	N	N	Y	N	N	N		Y	N	Y	Reduce or prevent an increase in the economic damages from flooding to residential and commercial property in the catchment. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015-2021	Very High	On going

10. England only section

The following section considers the objectives and measures that are only applicable to the England only side of the Severn River Basin District (RBD) (these will include objectives and measures that are applicable at a scale that is larger than a single catchment but not applicable across the border in the RBD):

Conclusions and objectives for the Severn River Basin District in England

Conclusions:

Flood risk in the English area of the Severn RBD is widespread and originates from a range of sources or a combination of these sources. The flood risk can be split into four categories:

Fluvial flooding, which is the most commonly occurring in what is predominantly a rural catchment. The speed and duration of this type of flooding can vary greatly from the rapidly responding catchments within the upland areas and in some urban locations within the district to the more prolonged events within the lowland floodplains of the larger watercourses. Predicting the extent and impact of these floods can in some circumstances be difficult, being heavily influenced by antecedent conditions.

Tidal flooding whilst easier to predict is rarer in occurrence as the majority of the areas potentially affected are provided with a level of protection by flood defences and are covered by the flood warning system. The main areas affected are in North Somerset, the lower reaches of the River Wye and up the Severn Estuary as far as Gloucester. Tributaries entering into the Severn Estuary/Bristol Channel can be indirectly impacted upon by tides due to tidal locking.

Surface water and sewer flooding is most prevalent in the urban areas of the catchment such as Bristol, Coventry, the Black Country and other smaller towns/cities. However surface water flooding also occurs in rural areas as a result of local influences such as topography, soil type and land use.

The English area of the RBD also has some key reservoirs such as Stanford, Draycote, Chew Valley lake and Blagdon Lake.

Under the Reservoirs Act 1975 the Environment Agency regulates all reservoirs with a capacity of 25,000 cubic metres or more above ground level, which could escape in the event of a dam failure. We are currently going through a process of identifying which of these reservoirs is 'high-risk'. 'High-risk' reservoirs will be those reservoirs that we think, in the event of an uncontrolled release of water, could endanger human life. In the future the Environment Agency will continue to maintain a register of all reservoirs with a capacity of over 25,000 cubic metres above ground level, but we will only fully regulate the 'high-risk' reservoirs.

Flooding from any of these sources individually or in combination can impact on residential and commercial properties as well as some regionally important infrastructure including roads, railways, water treatment works and electricity sub stations throughout the RBD.

Objectives:

The objectives in table 10.1 below have been sourced from the CFMPs that cover the Severn RBD in England. They set out the key factors that the measures should aim to tackle in this strategic area. They cover social, economic and environment factors.

Table. 10.1. Objectives for the Severn River Basin District in England

Objective categories in FRMP		Source	Objectives taken from CFMPs
Economic	Agricultural economy	STT Sev	<ul style="list-style-type: none"> Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment. Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture.
	Commercial properties	STT	<ul style="list-style-type: none"> Reduce or prevent an increase in the economic damages from flooding to cities, towns and commercial property in the catchment.
	Leisure and tourism		
	Other	Sev Sev	<ul style="list-style-type: none"> Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Ensure current and future investment in the catchment is proportional to flood risk.
Objective categories in FRMP		Source	Objectives taken from CFMPs
Environmental	Biodiversity	Other W&U	<ul style="list-style-type: none"> Help maintain and enhance priority habitats and species in line with BAP targets. Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.
	Geology and soils		
	Geomorphology/ hydromorphology	W&U Sev	<ul style="list-style-type: none"> Protect and enhance, where possible, naturally functioning rivers and floodplains. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status.
	Historic Environment	W&U	<ul style="list-style-type: none"> Sustain and protect sites of historic and cultural value from flooding.
	Other	Sev	<ul style="list-style-type: none"> Protect and enhance catchment landscape character.
	Water Quality		
Objective categories in FRMP		Source	Objectives taken from CFMPs
Social	Life	STT W&U	<ul style="list-style-type: none"> Reduce or prevent an increase in harm to life, as a result of flooding. Reduce the likelihood of death or serious injury resulting from rapid inundation or deep and fast flowing water.
	Other	Natural Resources	<ul style="list-style-type: none"> Improve community awareness and resilience to flooding.

		Wales	
	Residential Properties	Sev	<ul style="list-style-type: none"> Reduce or prevent an increase in the number of properties affected by flooding.
	Services and infrastructure	W&U	<ul style="list-style-type: none"> Reduce disruption resulting from flooding to key services and critical infrastructure.
	Vulnerable communities	Sev	<ul style="list-style-type: none"> To improve flood warning procedures to reduce potential risk to communities by extending the coverage of the flood warning service, especially in areas where social vulnerability is high.

On-going measures specific to the Severn River Basin District in England

Across the Severn RBD in England the on-going measures to manage flood risk include:

Preventing risk: There are no specific measures in this category over and above the flood risk activities described in section 7.

Preparing for risk: There are no specific measures in this category over and above the flood risk activities described in section 7.

Protecting from risk: There are 2 measures already in place that protect from flood risk in the Severn RBD in England.

- undertaking a programme to replace/refurbish flood risk management assets;
- investigating the benefits of planting wet woodlands to hold water back.

Recovery and review of risk: There are no specific measures in this category over and above our existing flood risk work.

Agreed measures specific to the Severn River Basin District in England

Across Severn RBD in England there are no specific measures in this category over and above the flood risk activities described in section 7.

Proposed measures specific to the Severn River Basin District in England

Across Severn RBD in England there are no specific measures in this category over and above the flood risk activities described in section 7.

Table 10.2. The Severn River Basin District in England – Measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Replace /refurbish flood risk management assets	Undertake a programme to replace/refurbish flood risk management assets, including pumping stations and outfalls, when needed to reduce flood risk. Public funding contribution subject to meeting technical, environmental and economic criteria and the availability of funding. Seek partnership funding contributions as necessary.	Y	N	N	N	N	N	N	N	N	Modify structure	Y	N	Y	Reduce the number of properties affected by flooding. Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment. Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Investigate the benefits of planting wet woodlands	Investigate the benefits of planting wet woodlands to hold water back.	N	N	Y	N	N	N	N	N	N		Y	Y	N	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures. Reduce or prevent an increase in the number of properties affected by flooding.	M3 - Protection	2015 - 2021	Low	On going

11. Wales only section

Conclusions and objectives for the Wales only area of the Severn River Basin District

This section will outline the ways in which Wales works that are different to those set out in Section 9. It will address the conclusions and objectives that Wales have and the methodology used to ensure all the objectives set by Welsh Government are met.

Conclusions:

Flood risk in the Welsh area of the Severn River Basin District (RBD) is predominantly in the Tidal areas and South East Valleys catchments with over half of the top 50 at risk communities in Wales being in this basin district. The flood risk can be split into two discreet types, with the tidal risk being predictable and relatively well catered for by flood warnings, and the less predictable and difficult to warn for fluvial flooding. The South Wales valleys are highly urbanised, with numerous important infrastructure and economically important areas, while the upper catchments of the Wye and Severn are more rural with typically sheep farming and forestry the dominant activities.

The key communities in the Wales areas are in the South Wales valleys along the rivers Taff, Rhondda, Cynon and lower Usk, with both Newport and Cardiff being within this area. The risk is managed predominantly by well established flood alleviation schemes that have been built in the last 30 to 40 years and maintained by Natural Resources Wales and its predecessor organisations.

The Welsh areas of the river basin also have some key Reservoirs in the headwaters such as Pontsticil, Beacons and Cantref, in and around the Taff, Clywedog on the Severn and Lake Vyrnwy.

Under the Reservoirs Act 1975 Natural Resources Wales regulates all reservoirs in Wales with a capacity of 25,000 cubic metres or more above ground level, which could escape in the event of a dam failure. Once new legislation is commenced, we will go through a process of identifying which of these reservoirs is 'high-risk'. 'High-risk' reservoirs will be those reservoirs that we believe, in the event of an uncontrolled release of water, could endanger human life.

In the future Natural Resources Wales will continue to maintain a register of all reservoirs with a capacity of over 10,000 cubic metres above ground level, but we will only fully regulate the 'high-risk' reservoirs; lower risk reservoirs will require a lesser level of regulation.

Objectives:

The Welsh Government National Flood and Coastal Erosion Risk Management Strategy objectives set the framework for flood and coastal erosion risk management work within Wales.

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion
- Raising awareness of and engaging people in the response to flood and coastal erosion risk
- Providing an effective and sustained response to flood and coastal erosion events;
- Prioritising investment in the most at risk communities.

Every flood risk management action undertaken in Wales aims to deliver the National Flood and Coastal Erosion Risk Management strategy objectives.

Sitting beneath the National Strategy objectives, Natural Resources Wales has developed a set of seven objectives for this plan. The majority of these objectives were developed and agreed by the CFMP Steering Groups based upon understanding of flood risk and issues that are important now and/or in the future. Their suitability has been reviewed against the Welsh Government National Strategy and FRMP requirements and are deemed to still sufficiently reflect the key objectives of flood risk management work in Wales. The sub-objectives were developed by considering the three main aspects of sustainable flood risk management:

Social: people and communities

Economic: potential cost and economic benefit

Environment: cultural heritage, landscape and habitat diversity.

The principles of sustainable flood risk management remain the key deliverables for the flood risk management work of Natural Resources Wales.

The table below provides details on the seven FRMP sub-objectives and how they link to the Welsh Government National Flood and Coastal Erosion Risk Management Strategy and the aspects of sustainable flood risk management.

Table 11.1. Wales FRMP Objectives

FRMP Objective Number	Wales FRMP Objective	Link to Welsh Government National Flood and Coastal Erosion Risk Management Strategy Objectives	Principles of Sustainability		
			People	Environment	Economy
Objective 1	Reduce the risk of harm to life from flooding to people and communities from main rivers, reservoirs and the sea	1, 3	Y		Y
Objective 2	Increase resilience of services, assets and infrastructure to the risk of flooding	1, 3	Y		Y
Objective 3	Improve understanding of flood risk so that decisions are based upon the best available information	1, 3	Y	Y	Y
Objective 4	Improve community awareness and resilience to flooding	2	Y		Y
Objective 5	Provide an effective and sustained response to flood events.	3	Y		Y
Objective 6	Allocate funding and resources for all sources of flooding on a risk basis	4	Y	Y	Y
Objective 7	Incorporate the ecosystem approach into the delivery of flood risk management	1, 4	Y	Y	Y

Selecting measures to achieve objectives

Any measure that Natural Resources Wales undertakes as part of this FRMP will be for the purpose of meeting the sub-objectives set out above, and ultimately, those set out in the Welsh Government National Flood and Coastal Erosion Risk Management Strategy. The measures within this plan have been selected after considering:

- the source and severity of the risk;
- what risk management processes are already in place;
- how the risk might change in the future; and
- the options to address the risk.

The most appropriate measure is selected after considering all of these factors along with the technical feasibility and the cost. The appropriate measure is then assessed against the plan objectives to ensure the proposed measure is in keeping with the preferred Welsh approach.

The measures within the latter sections of this plan are linked to the relevant plan objectives so it is possible to see which measures will deliver which objectives.

Within the Wales area of the Severn RBD, a combination of measures is used to manage and reduce flood risk. This section outlines the RBD scale measures that are already ongoing in the Wales part of the Severn RBD and will continue to be delivered by Natural Resources Wales.

Priority scoring the measures

In Wales we set our priorities for each measure using the table below:

1	Critical - Needs attention - immediately
2	Very High - Needs attention - short term (year 1)
3	High - Needs attention - medium term (year 2 - 3)
4	Medium - Needs attention - medium term (year 4 - 6)
5	Low - Good status - no intervention required for > 6 years

On-going measures in the Wales only section of the Severn River Basin District to manage flood risk

Preventing risk:

- Implement our statutory requirements (i.e. Flood Risk Regulations).
- Provide advice and support to the Welsh Government.

Preparing for risk:

- Review and update the community risk register to ensure all work is carried out in an evidence and risk-based manner
- Undertake a risk based programme to increase awareness of flood risk and improve full registration to Floodline or future flood warning systems.
- Continually improve our understanding of how, when and where flooding could happen in Wales.

Protecting from risk:

- Undertake a maintenance programme to replace/refurbish flood risk management assets, including pumping stations and outfalls, when needed to reduce flood risk.
- Undertake a risk based asset inspection programme to ensure our flood risk management assets are at and maintained to the appropriate standard;

Recovery and review of risk: there are no measures proposed

Other: Undertake the National Habitat Creation Programme for Wales.

12. Conclusions, objectives and measures to manage risk in Severn River Basin District catchments

The following sections consider the on-going, agreed and proposed measures for each of the following catchments in the Severn River Basin District (RBD):

- Severn Uplands (cross border)
- Shropshire Middle Severn (English strategic area)
- Worcestershire Middle Severn (English strategic area)
- Teme (cross border)
- Warwickshire Avon (English strategic area)
- Severn Vale (English strategic area)
- Wye (Cross border)
- Usk (Welsh strategic area)
- South East Valleys (Welsh strategic area)
- Bristol Avon & North Somerset Streams (English strategic area)

12.1. The Severn Uplands Catchment

Introduction to the Severn Uplands catchment

The Severn Uplands catchment extends from the area of Plynlimon in the west to Shrewsbury in the east and from Oswestry in the north to Newtown in the south. It covers an area of approximately 2,500 km².

The catchment is predominantly hilly, dominated on the western edge by the Cambrian Mountains, and is drained by the Rivers Severn and Vyrnwy. Both rivers rise within the area of Plynlimon before dropping quickly through steep sided, incised river valleys. Further downstream, around the Severn-Vyrnwy confluence the topography becomes flatter and this is an important area for flood storage, before the Severn reaches Shrewsbury.

Land use and management

The catchment comprises mostly of upland areas, with steep incised valleys, before opening out into a wider flatter area around the Severn-Vyrnwy confluence. The catchment is predominantly rural in character. The land use is dominated by agriculture with pasture and sheep farming covering approximately a third of the hillsides (Grade 4 to 5 low to poor quality), while dairy farming dominates the valleys and confluence area where soils are of a better quality.

There is a history of metal mining within the headwaters of some streams within the catchment, such as at Stiperstones and Van Lead mine, which has had impacts on water quality downstream. In addition small scale gravel extraction along the river valleys continues to occur.

There is also a concentration of managed forested areas at the western edge of the Severn uplands around Dyfnant Forest, south of Lake Vyrnwy, and the Hafren Forest around Llyn Clywedog.

Tourism and small business is also key to the financial well being of the area. This includes in a number of urban centres including Newtown, Welshpool, Oswestry and Shrewsbury.

The area is popular with anglers and walkers and has a high conservation value, including the Montgomery Canal, which is internationally recognised for its plant species.

Watercourses are also used for a public water supply purposes with a number of large reservoirs situated within the headwaters at Lake Vyrnwy and Llyn Clywedog. These provide an element of attenuation within the upper catchment and control of flows in the two largest watercourses.

Geology

The headwaters of the River Severn rise on Silurian mudstones, siltstones and grits and the Severn flow eastwards over the same rock formations. These rock formations do not allow water to flow easily through them and are classified as non-aquifers with only limited potential for groundwater abstraction. Drift deposits of river sands and gravel exist along the valley floor of the River Severn valley.

National and international designations

There are a number of designated areas of nature conservation importance within the catchment. There are several internationally designated Special Areas of Conservation (SACs) that include the Berwyn/South Clwyd Mountains, and Montgomery Canal and two Special Protection Areas (SPA's) at Berwyn and Elenydd/Mallaen.

There are also numerous Sites of Special Scientific Interest (SSSI's) and three National Nature Reserves including Y Berwyn.

Brown trout and salmon are present in many of the watercourses with the catchment providing many important spawning grounds for both species.

A small part of the Severn Uplands catchment is situated within the Snowdonia National Park.

Partnership working

Within the Severn Uplands Catchment the Environment Agency and Natural Resources Wales have developed good working relationship with our partners. These include, but are not limited to local councils. The catchment is covered by two unitary authorities, Shropshire and Powys.

We also work closely with the Regional Flood and Coastal Committees, Local Flood Fora, Severn Trent Water plc, Dwr Cymru/Welsh Water, Canals & Rivers Trust, National Farmers Union, Forestry Commission and Natural England.

Historic flooding

Flooding in the Severn Uplands catchment is characteristically rapid due to the steep topography of the area, impacting on many rural communities and a number of towns within the bottom of the steep incised valleys through which many of the rivers run. These towns include Newtown, Caersws and Welshpool. Downstream of the Vyrnwy/Severn confluence Shrewsbury is the main conurbation at risk with parts of the town having historically been affected on a regular basis.

The largest flood recorded occurred in 1947 which caused widespread damage and disruption. This event was triggered by a 'rain on snow event' where relatively warm rain fell onto snow resulting in rapid melting of the snowpack. For many communities, including Shrewsbury the 1947 event is the highest recorded event in living memory.

Since then large events were relatively rare until those experienced in October 1998 and the autumn of 2000. These impacted on many communities, with Shrewsbury being particularly badly affected.

In February 2011 significant flooding occurred along the River Vyrnwy resulting in the highest levels recorded since records began in many locations.

Current flood risk

Although the fluvial flood risk within the catchment is predominantly to agricultural land, a number of communities and individual properties within the catchment remain at risk.

The nature of the flooding in the catchment is that of frequent, low impact events which tend to last for prolonged periods of time. The Severn-Vyrnwy confluence area is complex and there are many local issues relating to the speed at which flood waters are returned to the rivers, once levels have dissipated. The confluence area plays a key role in reducing flood risk downstream as it provides storage of flood water. The Hayes Basin storage area along the English and Welsh border provides around 5 million cubic metres of storage.

There are no locations currently in the top 50 flood risk communities in Wales but two are in the top 100 and as a result they do not feature highly on the list of residual risk. Some of the urban centres within the Welsh part of the catchment already have flood alleviation schemes associated with them.

Within the English part of the catchment Shrewsbury is the largest urban area at flood risk. Although risk has been reduced through the construction of flood defences, there are areas that remain unprotected. There are also smaller rural communities along the River Severn that are at risk of from surface water flooding such as Oswestry and Church Stretton.

There are also a number of communities that are affected by watercourses that respond quickly to rainfall. This includes at Llanyblodwel where flooding from the River Tanat can occur rapidly with limited warning.

A significant amount of infrastructure is at risk of flooding, particularly a number of trunk and minor roads which can cause significant disruption as well as isolating some communities. Access around the centre of Shrewsbury can be a particular problem during periods of significant flooding.

Flooding from surface water/sewer sources also occurs in some of the larger urban areas

Recent flood risk management activity in the catchment

There are many flood alleviation schemes along the Severn and its tributaries including at Shrewsbury (Coleham Head and Frankwell), Newtown, Welshpool, Llandrinio and the system of earth embankments, known locally as Argaes, in and around the confluence area that are designed to overtop and control the flow of flood water back into the rivers as the level falls.

A number of isolated and smaller communities at risk of flooding have installed individual property level protection to reduce the risk of flooding.

Natural Resources Wales have commissioned a study to investigate the current operating instructions for the Vyrnwy and Clywedog reservoirs. The study will look at the potential to use both reservoirs as flood risk assets by increasing the available storage without risking their primary purpose of water resource control and drinking water provision. This study will also look at the effects of the reservoirs on flooding within the catchment and the combined effects at the confluence.

Key statistics

Table 12.1.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Severn Uplands Catchment.

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	834884	2867	2834	3799	13061
Number of services:	1589	49	14	18	47
Risk to economic activity:					
Number of non-residential properties:	82567	1232	605	1006	2019
Number of airports:	0	0	0	0	0
Length of roads (km):	514	5	1	3	14
Length of railway (km):	107	1	0	0	3
Agricultural land (ha):	116094	3375	462	435	1477
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	49	1	1	1	0
Area of SAC within area (ha):	21	0	0	0	0
Area of SPA within area (ha):	0	0	0	0	0
Area of RAMSAR site within area (ha):	13	0	0	0	0
Area of World Heritage Site within area (ha):	550				
Area of SSSI within area (ha):	3657	135	20	20	51
Area of Parks and Gardens within area (ha):	3198	104	15	7	54
Area of Scheduled Ancient Monument within area (ha):	421	38	3	2	14
Number of Listed Buildings within area:	4729	124	42	115	287
Number of Licensed water abstractions within the area:	574	181	5	4	18

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency

Table 12.1.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Severn Uplands Catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	834884	14182
Number of services:	1572	84
Risk to economic activity:		
Number of non-residential properties:	82567	1838
Number of airports:	0	0
Length of roads (km):	514	8
Length of railway (km):	107	3
Agricultural land (ha):	116094	3339
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	49	0
Area of SAC within area (ha):	21	3
Area of SPA within area (ha):	0	0
Area of RAMSAR site within area (ha):	13	0
Area of World Heritage Site within area (ha):	550	0
Area of SSSI within area (ha):	3657	159
Area of Parks and Gardens within area (ha):	3198	222
Area of Scheduled Ancient Monument within area (ha):	421	26
Number of Listed Buildings within area:	4729	209
Number of Licensed water abstractions within the area:	574	137

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The Reservoir flood map has been developed and published by the Environment Agency

Conclusions and objectives for the Severn Uplands Catchment

We have set out the following for Severn Uplands Catchment:

Conclusions

The Severn Uplands is a reactive catchment in terms of fluvial flooding that can result in the rapid onset of out of bank events within the steep incised valleys that characterise it upstream of the River Severn–Vyrnwy confluence. This is exacerbated by the higher than average rainfall totals experienced in this part of the country (three times greater than in other parts of the Severn RBD).

However, as a result of the presence of a number of reservoirs, used for water supplies and managing water resources downstream, some of this risk is reduced in the upper reaches.

As the confluence area acts as an attenuating feature, this slows the onset of flooding within the main urban area of Shrewsbury. Events still occur though on a regular basis that impact upon the centre of the town requiring the erection of demountable and temporary flood defences to protect parts of these areas.

Due to the rural nature of the Severn Uplands the overall risk of property flooding is relatively low in comparison to other parts of the Severn RBD as many of the larger urban centres already have some means of flood alleviation.

Flooding from surface water/sewer sources also occurs in some of the larger urban areas.

In the future, the increased frequency and intensity of rainfall events associated with climate change in combination with the fast responding nature of catchments will be the greatest threat to the upper areas where a relatively large number of small to medium sized communities are distributed over a wide area. The increased intensity of rainfall events will mean that the current level of standard of protection provided by some of the existing flood alleviation schemes may reduce over time thus increasing the risk of damage to properties and infrastructure. The system of Argaes in and around the confluence of the rivers Severn and Vyrnwy will be at particular risk, thus reducing the control this area provides on flood peaks downstream.

Thus the main objectives for the Severn Uplands will be dependent on the outcomes of the current study on improved use of assets within the catchment and developing a suitable flood risk management strategy to benefit both the Welsh and English sections in partnership.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will alleviate flooding from multiple sources, as well as providing wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development.

Objectives for Severn Uplands

The following Objectives apply to this management catchment, where possible:

Social:

- Reduce or prevent an increase in harm to life as a result of flooding;
- Reduce the likelihood of death or serious injury resulting from rapid inundation or deep and fast flowing water;
- Improve flood warning services on catchments which react rapidly to rainfall;
- Minimise community disruption by reducing impact of flooding by increasing preparedness through improved flood warning service and public awareness;
- Locate development in areas at lowest risk of flooding;
- Increase understanding and management of flood risk impacts;
- Continue to work with utility providers to improve resilience of infrastructure and services;
- Continue to work with other bodies to improve resilience to the communication network and transport links.

Economic:

- Reduce economic damage to commercial properties;
- Reduce flood risk to private properties;
- Reduce flood risk to agricultural land;
- Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture;
- Ensure current and future investment in the catchment is proportional to flood risk;
- Support tourism by reducing flood risk and enhancing river corridors;
- Reduce risk of flooding to major infrastructure;
- Contribute to integrated catchment water management &/or sustainable drainage approach.

Environmental:

- Take opportunities to restore sustainable natural storage of floodwater on tributaries in their upstream areas, in order to offset increasing flood risk from trends including climate change;
- Work with natural processes wherever possible to achieve WFD objectives;
- Improve water environment through flood risk management activities;
- Improve hydro-morphology of rivers;
- Minimise impacts of flooding on designated sites or areas of environmental interest;
- Create habitat through flood risk management activities;
- Achieve WFD Objectives through Flood Risk Management.

Measures in the Severn Uplands Catchment

Measures that are relevant to this catchment are included in the Severn RBD, Severn England and Severn Wales measures shown in Sections 9, 10 and 11.

In addition, there are measures specific to this catchment as follows:

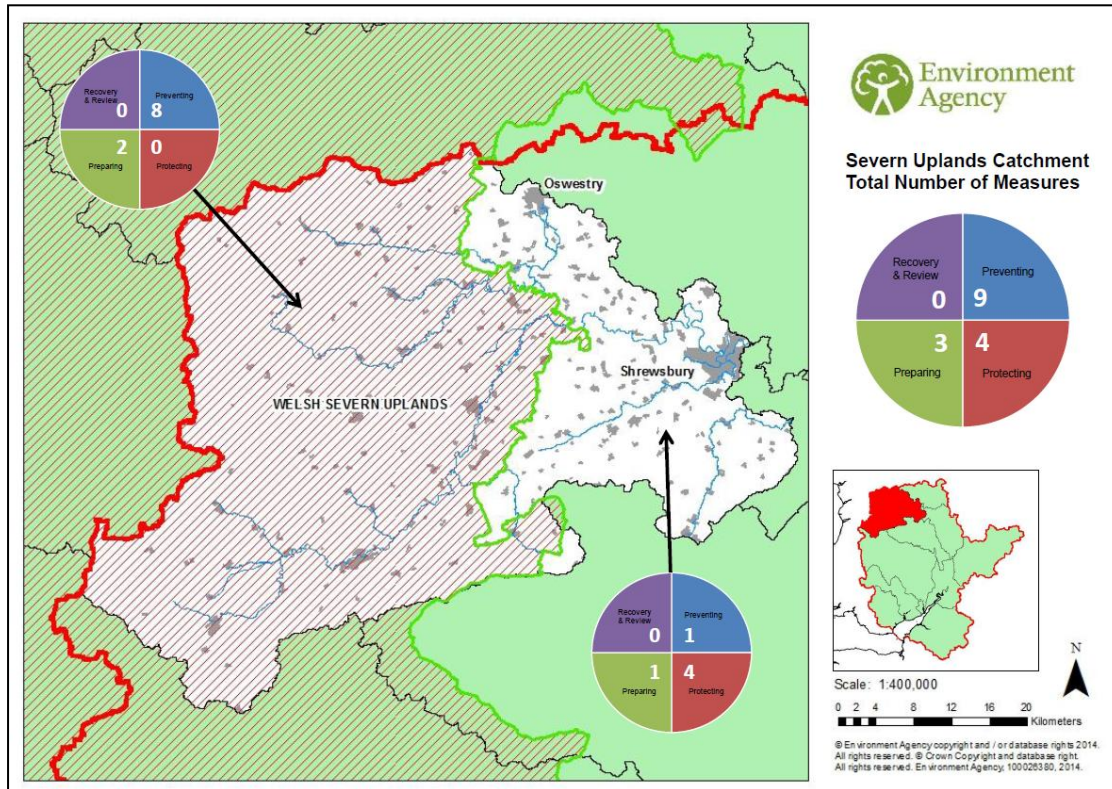


Figure 12.1.1. Total number of measures specific to the Severn Uplands catchment

These specific measures can be further broken down into on-going, agreed and proposed measures as set out below

More detail on the specific objectives and measures is included in tables 12.1.4 and 12.1.5.

On-going measures specific to the Severn Uplands Catchment

Across the Severn Uplands Catchment there are 6 on-going measures to manage flood risk. These include;

Preventing risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Preparing for risk: There are 3 measures already in place to prepare for flood risk that are specific to this catchment.

- improving the existing flood forecasting model for Caersws and Llanidloes (2 measures);

- encouraging the community to prepare for flooding in Llanyblodwel.

Protecting from risk: There are 3 measures already in place that protect from flood risk that are specific to this catchment.

- continuing with defence and channel maintenance and flood warning at Molverley;
- continuing with channel maintenance and flood warning at Hayes, Red Abbey, Shrawardine and Montford in the Severn Uplands;
- review maintenance operations.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Agreed measures specific to the Severn Uplands Catchment

Across the Severn Uplands Catchment there is 1 agreed measure to manage flood risk.

- assess the role of raised defences at the Vyrnwy confluence.

Proposed measures specific to English Severn Uplands Catchment

In the English Severn Uplands Catchment there is 1 measure proposed to manage flood risk from 2015 and beyond.

- prevent risk by working with the community in Shrewsbury to raise awareness of flooding and promote property level protection measures.

Proposed measures specific to the Welsh Severn Uplands Catchment

Given the nature of the flood risk in the Severn Uplands catchment and where it features in the Wales wide risk register the type of flood risk work in this catchment is predominantly around understanding the risk, flood mechanisms and how to maximise the available resources such as the reservoirs. Since the creation of Natural Resources Wales the need to understand the impacts on the Welsh areas of the catchment and how to manage these optimally, without detriment to the English areas, has been the primary measure. Once this study has been undertaken the next phase of managing risk will be to work with partners in the Environment Agency and water companies to put the recommendations in place.

In the Welsh Severn Uplands Catchment there are 8 measures proposed to manage flood risk from 2015 and beyond. These include:

Preventing risk: There are 8 measures proposed to prevent flood risk in the catchment. These include carrying out assessment on existing structures to ensure they are fit for purpose, implementing alternative risk reduction measures and assessing conveyance requirements and implementing maintenance.

Preparing for risk: There are no measures proposed to prepare for flood risk that are specific to this catchment.

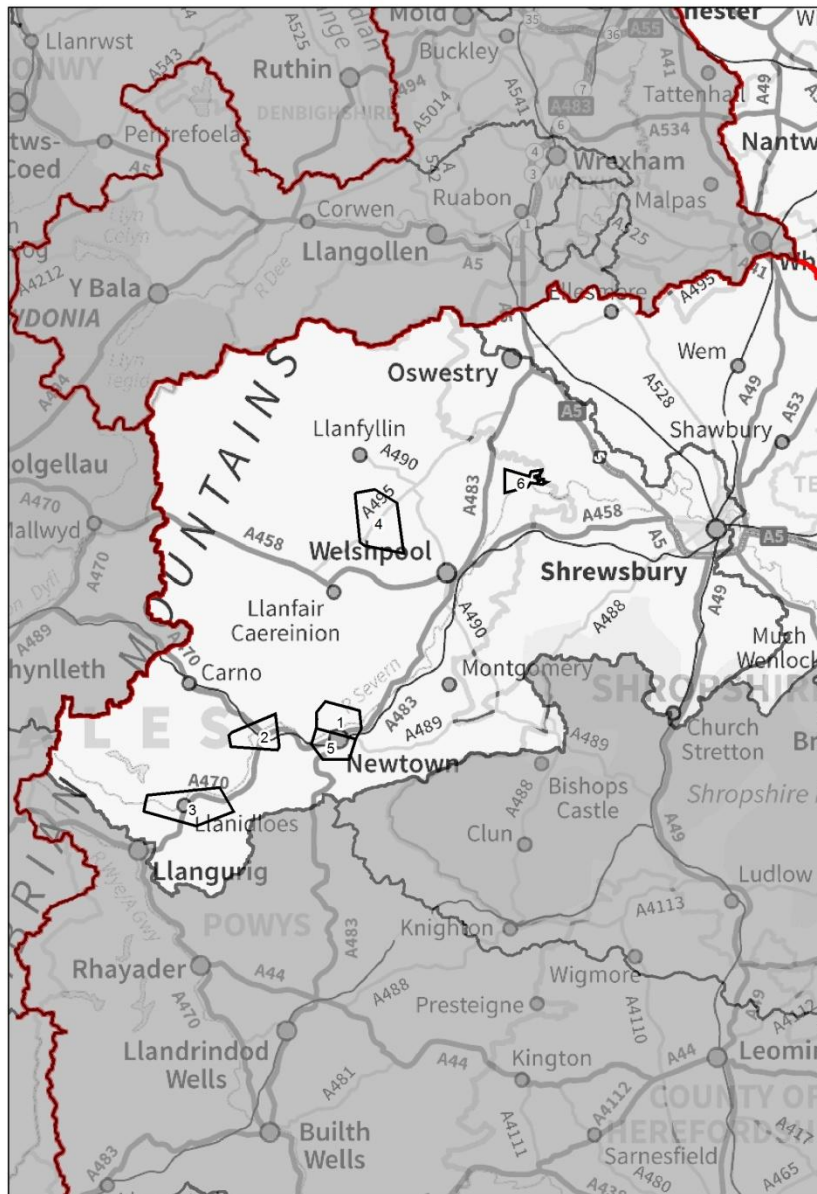
Protecting from risk: There are no measures proposed that protect from flood risk that are specific to this catchment.

Recovery and review of risk: There are no measures proposed to recover and review following flooding that are specific to this catchment.




Table 12.1.3. Key communities where we are planning actions in Wales (Bold Communities are in Top 50 Wales)

Label	Community	Label	Community
1	Llanllwchaiarn	4	Meifod
2	Caersws	5	Newtown / Y Drenewydd
3	Llanidloes	6	Llandrinio

Figure 12.1.2. The Welsh Severn Uplands Catchment



Legend

-  Communities
-  Management Catchments
-  River Basin District

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Table 12.1.4. The English Severn Uplands Catchment – Measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Property Level Protection - Shrewsbury	Work with the community in Shrewsbury to raise awareness of flooding and promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Rapid response catchment awareness - Llanyblodwel	Rapid response catchment awareness in Llanyblodwel. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Assess role of raised defences - Vyrnwy Confluence	Assess role of raised defences at Vyrnwy confluence	Y	N	N	N	N	N	N	N	N	Removal or modification of engineering structure	N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	Moderate	Not started - agreed
Continue maintenance and warning - Melverley	Continue with defence and channel maintenance and flood warning at Melverley	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M3 - Protection	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Continue maintenance and warning - Severn Uplands	Continue with channel maintenance and flood warning at Hayes, Red Abbey, Shrawardine and Montford	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M3 - Protection	2015 - 2021	High	On going
Review maintenance operations	Review maintenance operations. Work with land owners and land managers to identify opportunities for reducing the intensity of our maintenance operations. Review maintenance operations in line with the findings of Defra's R and D Technical Report FD1920/TR.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going

Table 12.1.5. The Welsh Severn Upland Catchment – Measures

The following catchment delivery plan sets out on a community basis, the measures that we have already undertaken; are in the process of undertaking; or plan to undertake to help manage the risk of flooding to that community. This provides a list of measures we intend to undertake within this catchment over the coming years, subject to assessment and funding justification.

Location	Source	Measure Name	Measures	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Caersws	Main River	Implement alternative risk reduction measures.	M2 - Prevention	1 2	Current	High	Not Started Proposed	Natural resources Wales
		Improve existing flood forecasting model	M4 - Preparedness	1 2 3 4	Current	low	On-going	Natural resources Wales
		Carry out assessment on existing structures to ensure they are fit for purpose.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural resources Wales
Meifod	Main River	Carry out assessment on existing structures to ensure they are fit for purpose.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural resources Wales
Llanidloes	Main River	Assess conveyance requirements and implement maintenance.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural resources Wales
		Improve existing flood forecasting model	M4 - Preparedness	1 2 3 4	Current	low	On-going	Natural resources Wales
Llanllwchaiarn	Main River	Carry out assessment on existing structures to ensure they are fit for purpose.	M2 - Prevention	1 2 3	Current	Low	Not Started Proposed	Natural resources Wales
		Review and Update model	M2 - Prevention	3	Current	Low	Not Started Proposed	Natural resources Wales
Llandrinio	Main River	Carry out assessment on existing structures to ensure they are fit for purpose.	M2 - Prevention	1 2 3	Current	Low	Not Started Proposed	Natural resources Wales
Newtown	Main River	Review and Update model	M2 - Prevention	3	Current	Low	Not Started Proposed	Natural resources Wales

12.2. The Shropshire Middle Severn Catchment

Introduction to the catchment

The Shropshire Middle Severn catchment extends from Telford in the South to Whitchurch in the north and from Staffordshire in the east to Oswestry in the west covering an area of 1,107 km².

The landscape is comprised mostly of the relatively flat Shropshire plain which is crossed by a number of tributaries of the River Severn including the Rivers Roden, Tern and Perry.

Land use and management

The land use within the catchment is mainly agricultural (Grade 3 or better land quality), with an even mix of arable and managed grassland farming.

Small business is also key to the financial well being of the area. This includes business based in a number of small urban centres across the Shropshire Plain including Shawbury, Ellesmere, Wem, Newport and other rural communities.

The northern part of Telford which is the largest urban area is located on the southern edge of the catchment.

Geology

Geology in the Shropshire Middle Severn is dominated by the Permo-Triassic sandstones underlying the Shropshire Plain, which are classified as a major aquifer and are highly permeable, highly productive and able to support large groundwater abstractions.

Glacial and postglacial sands, alluvium and river terrace gravels from palaeo-channels overlie much of the bedrock and provide mobile sediment re-worked by the present-day rivers.

For this reason the catchment is very important in relation to the abstraction of groundwater for water supply purposes.

National and international designations

There are a number of designated areas of nature conservation importance located within the catchment including Ramsar sites (under the Ramsar Convention).

There are also three internationally designated Special Areas of Conservation (SAC) within the Shropshire Middle Severn catchment.

There also a number of Sites of Special Scientific Interest (SSSIs) and one National Nature Reserve (NNR) at Fenn's, Whixall and Bettisfield mosses on the northern boundary of the catchment that are known for their species, habitats or geology.

Partnership working

Within the Shropshire Middle Severn Catchment the Environment Agency has developed good working relationship with our partners. These include, but are not limited to, Local Councils. The catchment is covered by two unitary and three local councils, Shropshire, Telford & Wrekin, Stafford District, Newcastle under Lyme District and South Staffordshire District.

We also work closely with the Regional Flood and Coastal Committee, Severn Trent Water plc, National Farmers Union and Natural England.

Historic flooding

Due to the mostly rural nature of the area, which are mostly rural, there is no significant history of flooding to large numbers of properties within the catchment and any flooding is limited to relatively isolated locations.

Current flood risk

Flooding from fluvial sources within the catchment is relatively low and this is not expected to change significantly even when accounting for climate change. Agricultural farm land is affected which could impact on food production.

Changes in land use within the catchment may contribute in incidents of flooding in certain locations.

There is a greater risk of flooding as a result of surface water, particularly in locations such as Oswestry and the villages in the south that have expanded rapidly in recent years, including Newport and Telford.

Climate change is most likely to have a greater impact on urban areas where there are existing surface water drainage problems or where further urban expansion occurs without any appropriate mitigation measures being put in place.

Recent flood risk management work

As there has been relatively few fluvial flood risk incidents in recent years the main aspect of flood relief works have been concentrated on the urban locations of the catchment and any surface water/sewerage issues.

Key statistics

Table 12.2.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Shropshire Middle Severn Catchment.

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	173991	1165	340	376	3940
Number of services:	782	30	12	9	32
Risk to economic activity:					
Number of non-residential properties:	36975	219	94	84	637
Number of airports:	0	0	0	0	0
Length of roads (km):	177	1	0	0	4
Length of railway (km):	65	1	0	0	3
Agricultural land (ha):	91222	1714	686	404	1645
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	40	1	1	0	0
Area of SAC within area (ha):	853	49	17	13	18
Area of SPA within area (ha):	0	0	0	0	0
Area of RAMSAR site within area (ha):	1233	164	31	19	26
Area of World Heritage Site within area (ha):	0	0	0	0	0
Area of SSSI within area (ha):	1759	192	54	26	89
Area of parks and gardens within area (ha):	1500	26	20	9	41
Area of Scheduled Ancient Monument within area (ha):	187	2	2	1	5
Number of listed buildings within area:	1888	48	6	8	47
Number of licensed water abstractions within the area:	626	205	14	8	14

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency

Table 12.2.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Shropshire Middle Severn Catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	473991	2914
Number of services:	781	33
Risk to economic activity:		
Number of non-residential properties:	36975	834
Number of airports:	0	0
Length of roads (km):	177	6
Length of railway (km):	65	0
Agricultural land (ha):	91222	1710
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	40	2
Area of SAC within area (ha):	853	0
Area of SPA within area (ha):	0	0
Area of RAMSAR site within area (ha):	1233	0
Area of World Heritage Site within area (ha):	0	0
Area of SSSI within area (ha):	1759	38
Area of parks and gardens within area (ha):	1500	40
Area of Scheduled Ancient Monument within area (ha):	187	1
Number of listed buildings within area:	1888	39
Number of licensed water abstractions within the area:	628	88

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The reservoirs flood map has been developed and published by the Environment Agency.

Conclusions and objectives for the Shropshire Middle Severn Catchment

We have set out the following for the Shropshire Middle Severn catchment:

Conclusions

Flood risk within the Shropshire Middle Severn is relatively low due to its rural nature, the highest risks being associated with surface water/sewer flooding in the urban areas that have expanded in recent years.

As the catchment is within the upper part of the RBD, it is important to ensure there is no increase in runoff as a result of changes in land use management and where possible that opportunities are sought to help reduce downstream peaks. Future impacts may also be minimised through managing surface water from any future urban expansion around the existing towns/villages.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will alleviate flooding from multiple sources, as well as providing wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development

Objectives

The following objectives apply to this management catchment, where possible:

Social:

- Reduce or prevent an increase in harm to life, as a result of flooding.
- Minimise community disruption by reducing impact of flooding by increasing preparedness through improved flood warning service and public awareness
- Locate development in areas at lowest risk of flooding
- Continue to work with utility providers to improve resilience of infrastructure and services.
- Continue to work with other bodies to improve resilience to the communication network and transport links.

Economic:

- Reduce economic damage to commercial properties.
- Reduce flood risk to private properties.
- Reduce flood risk to agricultural land.
- Reduce risk of flooding to major infrastructure.
- Ensure current and future investment in the catchment is proportional to flood risk.
- Contribute to integrated catchment water management &/or sustainable drainage approach.

Environmental:

- Take opportunities to restore sustainable natural storage of floodwater in the upstream area, in order to offset increasing flood risk from trends including climate change.
- Improve water environment through flood risk management activities
- Improve hydro-morphology of rivers
- Minimise impacts of flooding on designated sites or areas of environmental interest
- Create habitat through flood risk management activities
- Achieve WFD Objectives through Flood Risk Management

Measures in the Shropshire Middle Severn Catchment

Measures that are relevant to this catchment are included in the RBD and Severn England level measures shown in Sections 9 and 10. In addition, there are measures specific to this catchment as follows:

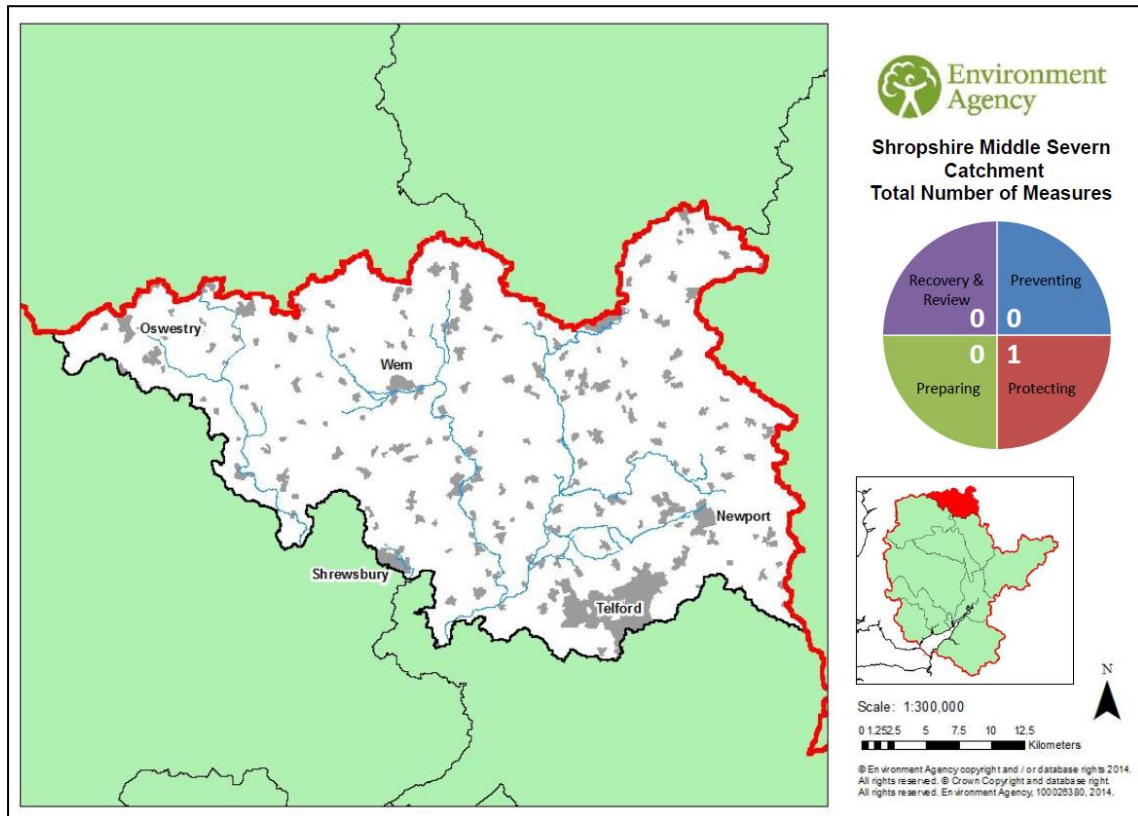


Figure 12.2.1 Total number of measures specific to the Severn Vale catchment

These specific measures can be further broken down into on-going, agreed and proposed measures as set out below

On-going measures specific to the Shropshire Middle Severn Catchment

Across the Shropshire Middle Severn Catchment there is one on-going measure to manage flood risk.

- Review the effectiveness of raised defences.

Agreed measures specific to the Shropshire Middle Severn Catchment

Across the Shropshire Middle Severn Catchment there are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures specific to the Shropshire Middle Severn Catchment

In the Shropshire Middle Severn Catchment there are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

More detail on the specific objectives and measures is included in Table 12.2.3

Table 12.2.3. The Shropshire Middle Severn Catchment

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure	
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment						Economic
Review effectiveness of raised defences	Review the effectiveness of all raised defences (including use of temporary defences, where applicable). Determine the impact of removal / non-maintenance of defences on flooding in this management catchment and elsewhere. High value agricultural assets should be included in the economic assessment of the ongoing viability of the defences. Undertake a study to determine the impact of removal / non-replacement of defences. Work with landowners that maintain private defences to ensure that our management aims are complementary	Y	N	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	Y	Protect and enhance, where possible, naturally functioning rivers and floodplains. Ensure current and existing investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	Moderate	On going

12.3. The Worcestershire Middle Severn Catchment

Introduction to the catchment

The Worcestershire Middle Severn catchment extends from Worcester in the south up to Shrewsbury and Telford in the north covering an area of 1,510 km².

The landscape is a mixture of woodland and open farmland on the undulating Midlands Plateau (including Ironbridge Gorge) and the broader flatter floodplain of the River Severn towards Worcester. The Shropshire Hills form the north west boundary to the area and land rises steadily on the eastern boundary towards the West Midlands conurbation.

Land use and management

The land use within the catchment is mainly agricultural (Grade 3 – good to moderate land quality or better), with a mixture of arable and managed grassland farming. There are also some larger areas of woodland in the centre of the catchment. The eastern edge is covered by parts of the West Midlands conurbation that includes the Black Country. These areas traditionally contained heavy industry much of which has now closed down. Other larger urban centres include Worcester, Kidderminster, Bromsgrove and the southern half of Telford. Elsewhere tourism and small business are key to the financial well being of smaller rural communities.

Watercourses within the catchment are used for a variety of activities including recreation, public water supply, fisheries and conservation. The area is rich in landscape, wildlife and industrial heritage, including the World Heritage Site of Ironbridge Gorge.

Geology

Geology in the Worcestershire Middle Severn area is divided in broadly the same way as the topography, with clays, mudstones and shales across the valley of the River Severn with igneous rocks forming the higher ground of the Shropshire Hills.

The clays and mudstones in the river valley lie close to the groundwater table for much of the year and are frequently saturated resulting in standing water across the floodplain. When this happens, rainfall is slow to drain away and may lead to localised flooding even when the River Severn is not in flood. Previous aggregate extractions have formed several artificial lakes in several areas on the Severn floodplain. Often these sites maintain high water levels and provide little capacity for storing floodwater.

National and international designations

There are a number of designated areas of nature conservation importance located within the catchment, including a SAC (Special Area of Conservation) at Fen Pools.

There are many Sites of Special Scientific Interest (SSSIs) especially within the Wyre Forest part of the catchment. These designated sites are located throughout the catchment and the way in which they are managed can have an effect on the risk of flooding (by affecting the surface run-off into the River Severn and its tributaries).

The Worcestershire Middle Severn is also partially situated within the Shropshire Hills Area of Outstanding Natural Beauty (AONB).

Partnership working

Within the Worcestershire Middle Severn Catchment the Environment Agency has developed good working relationship with our partners. These include, but are not limited to local councils. The catchment is covered by two unitary and eleven local councils, including Shropshire, Telford & Wrekin, Newcastle under Lyme Borough, Stafford Borough, South Staffordshire District, City of Wolverhampton, Sandwell Borough, Dudley Borough, Bromsgrove District, Wyre Forest District, Worcester City, Wychavon District and Malvern Hills District.

We also work closely with the English Severn & Wye Regional Flood and Coastal Committee, Severn Trent Water plc, Canals & Rivers Trust, National Farmers Union and Natural England.

Historic flooding

There is a long and well documented history of fluvial flooding within the catchment, especially along the River Severn from Shrewsbury to Worcester. The most recent events occurred in January/February 2014 and July 2007 resulting in varying degrees of property flooding within Worcester and other riverside towns such as Stourport, Bewdley, Ironbridge and Bridgnorth. The events of 1947 had the greatest impacts catchment wide. Others historical floods include those of October 1998 and October – December 2000 that impacted upon various communities along the River Severn and some of the tributaries, affecting urban areas such as Kidderminster, Droitwich and Bromsgrove.

Current flood risk

The Worcestershire Middle Severn Catchment has a variety of flooding issues ranging from extended periods of elevated levels along the River Severn between Bewdley and Worcester to watercourses which respond rapidly to rainfall in some of the more urban areas.

High river levels and out of bank flooding from the River Severn between Shrewsbury and Worcester is a regular occurrence resulting in some disruption to local communities, although the number of properties affected in the most common events is low. However such events do result in the operation of temporary defences in Ironbridge, Bridgnorth and Hylton Road in Worcester. Larger events along the River Severn as witnessed in 2000, 2007 and 2014 cause wider disruption especially within Worcester where the city centre bridge may be closed as a result of high water levels.

Elsewhere many other smaller rural communities can be impacted upon either directly or as a result in flooding of local infrastructure such as roads.

There are a number of watercourses that react quickly to rainfall in the catchment. These include the rapidly responding catchments of the Dick Brook (Astley), Coal Brook (Coalbrookdale) and Shyte Brook (Much Wenlock). Flood levels on these watercourses may

rise suddenly resulting in a risk to life and major disruption locally. It is difficult to provide accurate and timely warnings in such locations and these events may become more common as a result of climate change.

Isolated locations across the catchment are at risk of surface water flooding. Flooding from surface water /sewers occurs in many of the urban areas such as Wolverhampton, Dudley, Sandwell, Droitwich, Bromsgrove and Worcester. It is likely that these issues will become more pronounced and regular as a result of climate change where it is difficult to upgrade current infrastructure.

Recent flood risk management work

Following the floods of 2000 demountable flood defences were constructed in Bewdley Severn Side north, followed by Severnside South. Temporary flood defences have been trialled in Ironbridge, Beales Corner, Bewdley and parts of Worcester. In Kidderminster a permanent attenuation area was built to the north of the town to reduce the risk of flooding within the town centre from the River Stour. Along Hylton Road the temporary defences were upgraded to include a permanent earth bund. Following the event of early 2014 further reviews are currently being undertaken for small scale community led schemes in Worcester and provision of property level protection elsewhere in the catchment.

Key statistics

Table 12.3.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Worcestershire Middle Severn Catchment.

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	834884	2867	2834	3799	13061
Number of services:	1589	49	14	18	47
Risk to economic activity:					
Number of non-residential properties:	82567	1232	605	1006	2019
Number of airports:	0	0	0	0	0
Length of roads (km):	514	5	1	3	14
Length of railway (km):	107	1	0	0	3
Agricultural land (ha):	116094	3375	462	435	1477
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	49	1	1	1	0
Area of SAC within area (ha):	21	0	0	0	0
Area of SPA within area (ha):	0	0	0	0	0
Area of RAMSAR site within area (ha):	13	0	0	0	0
Area of World Heritage Site within area (ha):	550				
Area of SSSI within area (ha):	3657	135	20	20	51
Area of Parks and Gardens within area (ha):	3198	104	15	7	54

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Area of Scheduled Ancient Monument within area (ha):	421	38	3	2	14
Number of Listed Buildings within area:	4729	124	42	115	287
Number of Licensed water abstractions within the area:	574	181	5	4	18

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency.

Table 12.3.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Worcestershire Middle Severn Catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	834884	14182
Number of services:	1572	84
Risk to economic activity:		
Number of non-residential properties:	82567	1838
Number of airports:	0	0
Length of roads (km):	514	8
Length of railway (km):	107	3
Agricultural land (ha):	116094	3339
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	49	0
Area of SAC within area (ha):	21	3
Area of SPA within area (ha):	0	0
Area of RAMSAR site within area (ha):	13	0
Area of World Heritage Site within area (ha):	550	0
Area of SSSI within area (ha):	3657	159
Area of Parks and Gardens within area (ha):	3198	222
Area of Scheduled Ancient Monument within area (ha):	421	26
Number of Listed Buildings within area:	4729	209
Number of Licensed water abstractions within the area:	574	137

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The reservoirs flood map has been developed and published by the Environment Agency.

Conclusions and objectives for the Worcestershire Middle Severn Catchment

We have set out the following for the Worcestershire Middle Severn Catchment:

Conclusions

Flood risk will remain for many communities along the Severn Valley, including for communities along some of the tributaries which respond rapidly to rainfall. The latter includes Dick Brook (Astley), Coal Brook (Coalbrookdale) and Shyte Brook (Much Wenlock). There is also a risk of surface water and sewer flooding within urban areas, including in the Black Country on the western edge of the Birmingham conurbation, and other isolated locations. Flood risk may increase as a result of climate change.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will alleviate flooding from multiple sources, as well as providing wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development.

Objectives

The following Objectives apply to this management catchment, where possible:

Social:

- Reduce or prevent an increase in harm to life as a result of flooding.
- Reduce the likelihood of death or serious injury resulting from rapid inundation or deep and fast flowing water.
- Improve flood warning services on catchments that react rapidly to rainfall.
- Minimise community disruption by reducing impact of flooding by increasing preparedness through improved flood warning service and public awareness.
- Locate development in areas at lowest risk of flooding.
- Increased understanding and management of flood risk impacts.
- Continue to work with utility providers to improve resilience of infrastructure and services.
- Continue to work with other bodies to improve resilience to the communication network and transport links.
- Contribute to recreational amenity & cultural heritage conservation through managing flood risk.

Economic:

- Reduce economic damage to commercial properties.
- Reduce flood risk to private properties.
- Reduce flood risk to agricultural land
- Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture.
- Ensure current and future investment in the catchment is proportional to flood risk.
- Support tourism by reducing flood risk and enhancing river corridors
- Reduce risk of flooding to major infrastructure
- Contribute to integrated catchment water management &/or sustainable drainage approach

Environmental:

- Take opportunities to restore sustainable natural storage of floodwater on tributaries in their upstream areas, in order to offset increasing flood risk from trends including climate change.
- Work with natural processes wherever possible to achieve WFD objectives
- Improve water environment through flood risk management activities
- Improve hydro-morphology of rivers
- Minimise impacts of flooding on designated sites or areas of environmental interest
- Create habitat through flood risk management activities
- Achieve WFD Objectives through Flood Risk Management

Measures in the Worcestershire Middle Severn Catchment.

Measures that are relevant to this catchment are included in the RBD and Severn England level measures shown in Sections 9 and 10. In addition, there are measures specific to this catchment as follows:

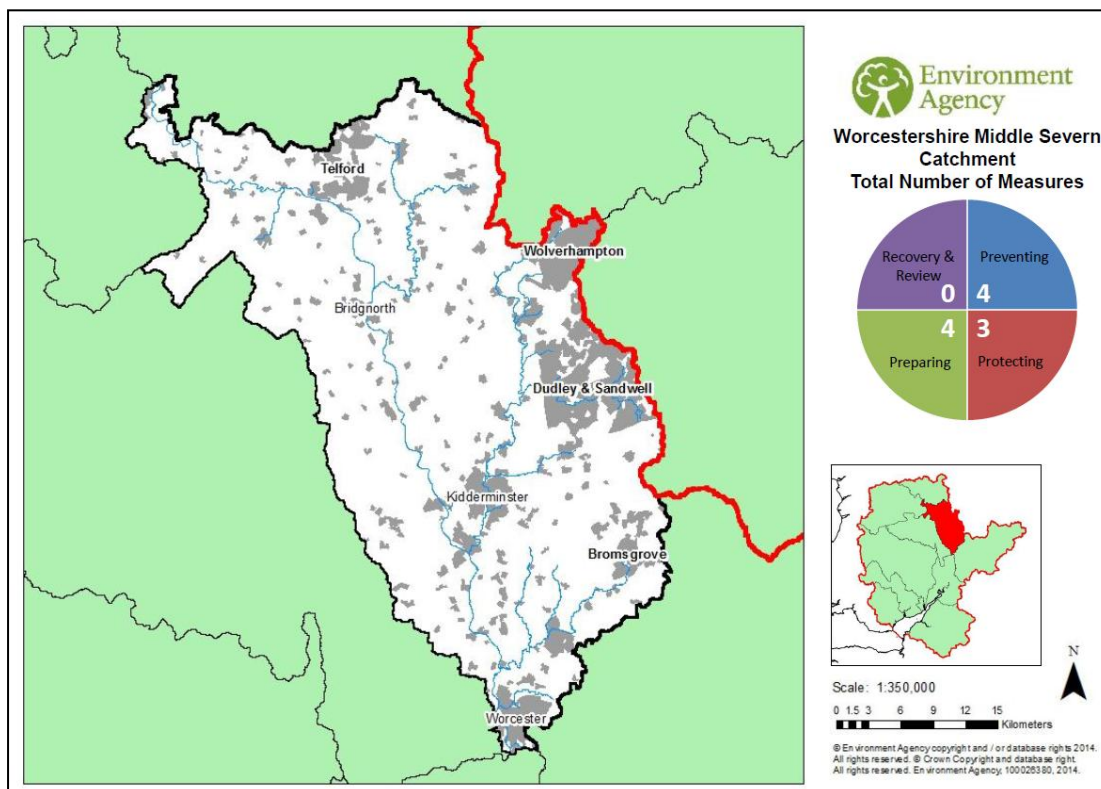


Figure 12.3.1. Total number of specific measures in the Worcestershire Middle Severn catchment

The measures specific to this catchment can be further broken down into on-going, agreed and proposed measures as set out below.

On-going measures specific to the Worcestershire Middle Severn Catchment

Across the Worcestershire Middle Severn Catchment there are 6 on-going measures to manage flood risk. These include:

Preventing risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Preparing for risk: There are 4 measures already in place to prepare for flood risk that are specific to this catchment.

- work with the community at Bewdley to encourage taking action to prepare for flooding
- raising awareness of communities in catchments that respond rapidly to rainfall at Much Wenlock, Coalbrookdale and Astley (3 measures).

Protecting from risk: There are 2 measures already in place that protect from flood risk that are specific to this catchment.

- continue with channel maintenance and flood warning at Shrewsbury, Monkmore, Ironbridge, Coalport, Hampton, Bridgnorth, Bewdley, Stourport-on-Severn, Holt Fleet, Bevere, and Worcester;
- determine the role of agricultural defences within the catchment.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Agreed measures specific to the Worcestershire Middle Severn Catchment

Across the Worcestershire Middle Catchment there are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures specific to the Worcestershire Middle Severn Catchment

In the Worcestershire Middle Severn Catchment there are 5 measures proposed to manage flood risk from 2015 and beyond. These include:

Preventing risk: There are 4 measures proposed to prevent flood risk in the catchment.

- work with the community at Blanquettes Estate to raise awareness of flood risk;

- work with the communities at Diglis and Worcester to promote property level protection measures (2 measures);
- work with the community at Hunters Way Droitwich to identify measures to reduce flood risk.

Preparing for risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Protecting from risk: There is 1 measure proposed that protects from flood risk in this catchment.

- work with the community in Bromsgrove to assess the feasibility of using public money to provide measures to reduce flood risk.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

More detail on the specific objectives and measures is included in Table 12.3.3.

Table 12.3.3. The Worcestershire Middle Severn Catchment – Measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Community engagement - Bewdley	Bewdley community engagement. Work with the community to encourage taking action to prepare for flooding within the town.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	High	On going
Rapid response catchment awareness - Much Wenlock	Rapid response catchment awareness in Much Wenlock. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Rapid response catchment awareness - Coalbrookdale	Rapid response catchment awareness in Coalbrookdale. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Rapid response catchment awareness - Astley	Rapid response catchment awareness in Astley (Wyre Forest). Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Flood risk reduction feasibility - Bromsgrove	Work with the community to assess the technical, environmental, and economic feasibility of using public money to provide measures to reduce flood risk from the Bromsgrove Tributaries and Spadesbourne and Battlefield Brooks. Implement measures with contribution from public funding if meets criteria. Seek partnership funding contributions as necessary.	N	N	Y	N	N	N	N	N	N	14.Modify structure	Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Measures to reduce flood risk - Blanquettes Estate	Work with the community at Blanquettes Estate to raise awareness of flood risk and to identify measures to reduce flood risk/improve resilience.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Property Level Protection - Diglis	Work with the community at Diglis to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Measures to reduce risk- Hunters Way, Droitwich	Work with the community at Hunters Way, Droitwich (Elmbridge Brook) to identify measures to reduce flood risk/improve resilience.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Property Level Protection - Worcester	Work with the community at Worcester to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Continue maintenance and warning Middle Severn	Continue with channel maintenance and flood warning at Shrewsbury, Monkmore, Ironbridge, Coalport, Hampton, Bridgnorth, Bewdley, Stourport-on-Severn, Holt Fleet, Bevere, Worcester	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M3 - Protection	2015 - 2021	High	On going
Determine role of agricultural defences - Mid Sev	Determine the role of the agricultural defences in flood risk management within the catchment.	Y	N	N	N	N	N	N	N	N		N	N	Y	Protect and enhance, where possible naturally functioning rivers and floodplains. Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	Low	On going

12.4. The Teme Catchment

Introduction to the catchment

The Teme catchment extends from Worcester in a north westerly direction over the Welsh border at Knighton covering an area of 1,650 km². Its tributaries include the Rivers Clun, Onney and Corve which drains Wenlock Edge.

The landscape is varied extending from low lying relatively flat areas around Worcester, before narrowing within the valley of the River Teme that extends into the upland region of the Shropshire Hills on the English – Welsh border.

Land use and management

The land use within the catchment is predominantly agricultural (ranging from Grade 2/3 – good to moderate land quality in the Teme Valley to Grade 5 - poor quality in the upland areas), with a mixture of arable, managed grassland and rough grassland farming. The main urban centres are the market towns of Ludlow and Tenbury Wells with tourism and some small business key to the financial well being of the surrounding rural communities.

Watercourses within the catchment are used for a variety of activities including recreation, public water supply, fisheries and conservation. The area is rich in landscape and wildlife heritage, including being partially within both the Shropshire Hills and Malvern Hills Areas of Outstanding Natural Beauty.

Geology

Geology in the Teme catchment is divided in broadly the same way as the topography, with clays and mudstones across the bottom of the Teme Valley and its lower reaches around Worcester, with sandstones and igneous rocks forming the higher ground of the Shropshire Hills.

National and international designations

There are some designated areas of nature conservation importance located within the catchment.

These include two internationally designated Special Areas of Conservation (SACs). In addition, there are a number of Sites of Special Scientific Interest (SSSIs), including the River Teme for its full length, and one National Nature Reserve (NNR) at Downton Gorge, that are known for their species, habitats or geology. These designated sites and the way in which they are managed can have an effect on the risk of flooding from the Teme catchment.

Partnership working

Within the Teme Catchment the Environment Agency and Natural Resources Wales have developed good working relationship with our partners. These include, but are not limited to

local councils. The catchment is covered by three unitary and one local council, Herefordshire Council, Shropshire Council, Powys and Malvern Hills District.

We also work closely with the Regional Flood and Coastal Committees, Severn Trent Water plc, Forestry Commission, National Farmers Union and Natural England.

Historic flooding

Flooding in the Teme catchment has been recorded over many years within those towns affected, but due to its rural nature there are not many widespread historic records. The most recent severe events occurred in 1947 and 2007 when a large number of properties were affected in Tenbury Wells.

Current flood risk

Due to the rural nature of the upper catchment flood risk is mainly constrained to agricultural land and isolated properties. However, in larger events such as those experienced in 1947 and 2007 flooding to properties in the few urban areas such as Tenbury Wells, Craven Arms and Ludlow, occurs. The onset of flooding is normally relatively quick due to the steep nature of the upstream catchment with its narrow river valleys.

In the lower parts of the catchment west of Worcester flood levels in the River Teme can combine with longer periods of flooding around its confluence with the River Severn.

Recent flood risk management work

Since 2007 several properties in Tenbury Wells and surrounding rural areas have benefited from property level protection.

Key Statistics

Table 12.4.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Teme Catchment.

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	93156	796	552	768	1957
Number of services:	552	17	7	8	21
Risk to economic activity:					
Number of non-residential properties:	36441	489	277	321	635
Number of airports:	0	0	0	0	0
Length of roads (km):	95	2	1	3	3
Length of railway (km):	73	2	2	2	5
Agricultural land (ha):	104740	3498	734	847	1067
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	19	0	0	0	1
Area of SAC within area (ha):	293	24	1	1	0
Area of SPA within area (ha):	0	0	0	0	0
Area of RAMSAR site within area (ha):	0	0	0	0	0
Area of World Heritage Site within area (ha):	0	0	0	0	0
Area of SSSI within area (ha):	4255	443	27	17	5
Area of Parks and Gardens within area (ha):	2387	42	10	12	26
Area of Scheduled Ancient Monument within area (ha):	540	5	1	1	1
Number of Listed Buildings within area:	3602	99	48	50	61
Number of Licensed water abstractions within the area:	163	80	0	2	4

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency.

Table 12.4.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Teme Catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	93156	131
Number of services:	550	4
Risk to economic activity:		
Number of non-residential properties:	36441	81
Number of airports:	0	0
Length of roads (km):	95	0
Length of railway (km):	73	0
Agricultural land (ha):	104740	464
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	19	0
Area of SAC within area (ha):	293	19
Area of SPA within area (ha):	0	0
Area of RAMSAR site within area (ha):	0	0
Area of World Heritage Site within area (ha):	0	0
Area of SSSI within area (ha):	4255	139
Area of Parks and Gardens within area (ha):	2387	31
Area of Scheduled Ancient Monument within area (ha):	540	0
Number of Listed Buildings within area:	3602	33
Number of Licensed water abstractions within the area:	163	27

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The reservoirs flood map has been developed and published by the Environment Agency.

Conclusions and objectives for the Teme catchment

Conclusions

The nature of flooding within the Teme catchment tends to be flashy in nature due to the steepness of much of the upper areas, affecting properties in some urban centres such as Craven Arms, Ludlow and Tenbury Wells as well as isolated properties in smaller rural communities and agricultural land.

In the lower parts of the catchment west of Worcester flood levels in the River Teme can combine with longer periods of flooding around its confluence with the River Severn.

The greatest impact on future flooding is considered to originate from changes in land use and farming practices in addition to climate change. Further intensification in land use and removal of field margins would result in faster runoff and increase in transportation of silts into the natural river system. The results would be an increase in peak flows and reduction in channel capacity through increased siltation.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will provide wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development.

Objectives

The following Objectives apply to this management catchment, where possible:

Social:

- reduce or prevent an increase in harm to life as a result of flooding
- reduce the likelihood of death or serious injury resulting from rapid inundation or deep and fast flowing water
- improve flood warning services on catchments that react rapidly to rainfall
- minimise community disruption by reducing impact of flooding by increasing preparedness through improved flood warning service and public awareness
- locate development in areas at lowest risk of flooding
- increased understanding and management of flood risk impacts
- contribute to recreational amenity & cultural heritage conservation through managing flood risk

Economic:

- reduce flood risk to private properties.
- reduce flood risk to agricultural land
- reduce economic damage to commercial properties.
- reduce risk of flooding to major infrastructure
- support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture.
- ensure current and future investment in the catchment is proportional to flood risk.
- support tourism by reducing flood risk and enhancing river corridors
- contribute to integrated catchment water management and/or sustainable drainage approach

Environmental:

- take opportunities to restore sustainable natural storage of floodwater on tributaries in their upstream areas, in order to offset increasing flood risk from trends including climate change.
- achieve WFD objectives through Flood Risk Management
- improve water environment through flood risk management activities
- improve hydro-morphology of rivers
- minimise impacts of flooding on designated sites or areas of environmental interest
- create habitat through flood risk management activities

Measures in the Teme catchment

Measures that are relevant to this catchment are included in the RBD and Severn England level measures shown in Sections 9 and 10. In addition, there are measures specific to this catchment as follows:

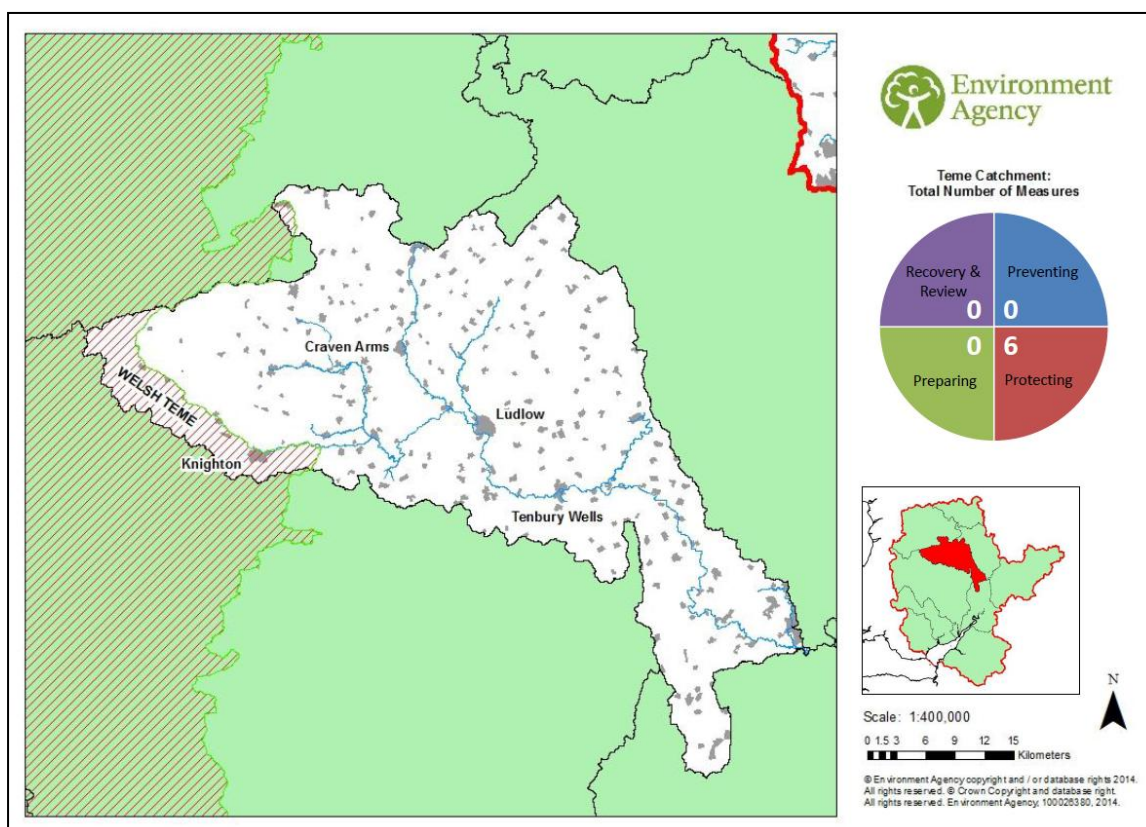


Figure 12.4.1 Total number of specific measures in the Teme catchment

These specific measures can be further broken down into on-going, agreed and proposed measures as set out below.

On-going measures specific to the Teme Catchment

Across the Teme Catchment are 3 on-going measures to manage flood risk. These include:

Preventing risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Preparing for risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Protecting from risk: There are 3 measures already in place that protect from flood risk in this catchment.

- review maintenance operations;
- ensure weed control is carried out in the most effective way on the Teme;
- review the effectiveness of raised defences in the catchment.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Agreed measures specific to the Teme Catchment

There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures specific to the Teme catchment

In the Teme catchment there are 3 measures proposed to manage flood risk from 2015 and beyond. These include:

Preventing risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Preparing for risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Protecting from risk: There are 3 measures proposed that protect from flood risk in the catchment.

- work with the community at Tenbury Wells to assess the long term strategy for delivering a viable flood alleviation scheme;
- work with the community at Cleobury Mortimer to assess the feasibility of carrying out measures to reduce flood risk;
- work with partners to investigate where natural processes can be used to reduce flow on the Shropshire Rivers.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

More detail on the specific objectives and measures is included in Table 12.4.3.

Table 12.4.3. The Teme catchment – measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Slow the Flow - Shropshire Rivers	Work with partners to investigate opportunities where natural processes can be used to reduce flow into the watercourse and reduce flood risk downstream.	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	Y	Protect and enhance, where possible, naturally functioning rivers and floodplains. Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Community flood alleviation works - Tenbury Wells	Work with the community at Tenbury Wells (River Teme) to assess the long term strategy for delivering a suitable technical, environmental and economic justification of using public money to construct a permanent flood alleviation scheme. Seek partners and opportunities for contributions where necessary.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Measures to reduce flood risk - Cleobury Mortimer	Work with the community to assess the technical, environmental, and economic feasibility of using public money to carry out measures to reduce flood risk at Cleobury Mortimer (Pudding Brook). Carry out measures with contribution from public funding if meets criteria. Seek partnership funding contributions as necessary.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Review maintenance operations	Review maintenance operations. Work with land owners and land managers to identify opportunities for reducing the intensity of our maintenance operations. Review maintenance operations in line with the findings of Defra's R and D Technical Report FD1920/TR.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Review maintenance activities on Teme	Review of our current maintenance activities to ensure that weed control is carried out in the most effective way. Consideration of the impact of our Land Drainage Consenting (LDCs) activities on SSSI condition.	Y	N	N	N	N	N	N	N	N	34. Vegetation control	N	Y	N	Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M3 - Protection	2015 - 2021	Low	On going
Review effectiveness of raised defences	Review the effectiveness of all raised defences (including use of temporary defences, where applicable). Determine the impact of removal / non-maintenance of defences on flooding in this Policy Unit and elsewhere. High value agricultural assets should be included in the economic assessment of the ongoing viability of the defences. Undertake a study to determine the impact of removal / non-replacement of defences. Work with landowners that maintain private defences to ensure that our management aims are complementary	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	Y	Protect and enhance, where possible, naturally functioning rivers and floodplains. Ensure current and existing investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	Moderate	On going

12.5. The Warwickshire Avon catchment

Introduction to the Warwickshire Avon catchment

The Warwickshire Avon catchment extends from Rugby and Lutterworth in the north east to Tewkesbury and Cheltenham in the south west covering an area of 2,870 km². The River Avon runs through the centre of the catchment in a south westerly direction with its main tributaries joining from the north and south. These include the River Sowe, River Leam, River Stour, River Arrow, River Isbourne and Bow Brook.

The landscape is mostly characterised by low lying undulating hills with the valley of the River Avon running north east to south west increasing in width until it joins the River Severn at Tewkesbury. The southern boundary of the catchment consists of the steep Cotswold escarpment off which many of the southern tributaries drain.

Land use and management

The land use within the catchment is mainly agricultural (Grade 3 – good to moderate land quality or better), with a mixture farming, including market gardening in the Vale of Evesham. A number of larger urban centres are located within the catchment that include Coventry, Rugby and Redditch, where the traditional manufacturing industries have declined and urban regeneration is beginning to take place.

Tourism and small business is also key to the financial well being of the area based in a number of urban centres including Stratford upon Avon, Tewkesbury, Chipping Campden, Evesham, Pershore, Henley in Arden, Warwick and Leamington Spa.

Watercourses within the catchment are used for a variety of activities. This includes recreation - the River Avon is navigable from Tewkesbury to just upstream of Stratford upon Avon. The area is rich in landscape and wildlife heritage, including being partially within an Area of Outstanding Natural Beauty.

There are many designated areas of nature conservation importance located within the catchment. There are two internationally designated Special Areas of Conservation (SACs) Bredon Hill and Dixton Wood.

There are also many Sites of Special Scientific Interest (SSSIs) within the catchment that are known for their species, habitats or geology.

The Warwickshire Avon catchment is also partially situated within the Cotswolds Area of Outstanding Natural Beauty (AONB).

Geology

Geology in the Warwickshire Avon catchment is mostly made up of clays and mudstones with sand and gravels present along much of the length of the Avon Valley. Limestone form

the higher ground of the Cotswolds escarpment and glacial tills are present within the north western corner of catchment around Rugby.

Flood risk

The catchment has a long and well documented history of river flooding with larger events occurring in 1901, 1947, 1968, 1998 and most recently 2007. Each event has had its own characteristics and has affected different parts of the catchment.

The April 1998 Easter floods were caused by an active frontal zone becoming stationary across the south Midlands, causing extensive flooding in a number of communities including Leamington, Stratford and Evesham. The River Avon at Evesham rose 4.7m causing flooding up to a mile from the river, while the River Leam at Royal Leamington Spa rose nearly 3m causing extensive flooding in the Town centre.

In 2007 approximately 2,000 properties were flooded across Warwickshire with significant flooding in Shipston-on-Stour, Wellesbourne, Henley-in-Arden, Alcester and Bidford-on-Avon. In Worcestershire, properties in Evesham and Pershore were also affected.

Other towns and cities affected by flooding include Coventry, Stratford-upon-Avon and Warwick. Flood risk in most other parts of the catchment with regards to property numbers is relatively low, owing to its rural nature.

Flooding from the Cotswold escarpment can be very rapid resulting in water levels rising quickly in such watercourses as the River Dene, River Leam, River Stour, River Isbourne, and Badsey Brook.

In Rugby a large flood alleviation scheme protects large parts of the town. Downstream of Coventry and Redditch the River Sowe and Bow Brook may also react quickly to intense rainfall events.

Some smaller communities benefit from formal flood defences such as those at Alcester, Broom, Marlcliff, Clay Coton, Wooton Wawen, Henley in Arden, Barton, Wellesbourne, Sedgeberrow, Hinton on the Green, Pershore and North Littleton.

In addition to fluvial flooding, there is risk of flooding from surface water and sewer flooding in many of the urban areas such as Rugby, Coventry, Bedworth Leamington Spa, Warwick, Redditch and Evesham.

There are a number of large raised reservoirs within the catchment, used for water supply, irrigation, and flood storage. Over 1 million people and over 2,000 services are at risk of flooding from reservoirs in this area.

Partnership working

Within the Warwickshire Avon catchment the Environment Agency has developed good working relationship with our partners. These include, but are not limited to local councils. The catchment is covered by thirteen local councils, including Tewkesbury Borough, Wychavon District, Redditch Borough, Stratford on Avon District, Warwick District, Coventry City, Rugby Borough and parts of Cheltenham Borough, Cotswold District, Bromsgrove District, Nuneaton & Bedworth Borough, Harborough District and Daventry District.

We also work closely with the English Severn and Wye Regional Flood and Coastal Committee, Severn Trent Water Authority and Natural England.

Key statistics

Table 12.5.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Warwickshire Avon catchment.

River & Sea	Total in MC	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	1020565	2744	6594	18221	3539
Number of services:	2211	70	64	63	12
Risk to economic activity:					
Number of non-residential properties:	119600	1343	1425	3197	785
Number of airports:	1	0	0	0	0
Length of roads (km):	885	10	21	21	4
Length of railway (km):	246	2	5	3	4
Agricultural land (ha):	242716	8013	3344	3365	1742
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	52	5	1	1	1
Area of SAC within area (ha):	374	0	0	0	0
Area of SPA within area (ha):	0	0	0	0	0
Area of RAMSAR site within area (ha):	0	0	0	0	0
Area of World Heritage Site within area (ha):	0	0	0	0	0
Area of SSSI within area (ha):	2430	338	19	26	7
Area of Parks and Gardens within area (ha):	3866	304	84	112	20
Area of Scheduled Ancient Monument within area (ha):	1466	82	55	55	13
Number of Listed Buildings within area:	10082	192	163	522	138
Number of Licensed water abstractions within the area:	929	422	38	41	9

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency.

Table 12.5.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Warwickshire Avon catchment.

Reservoirs	Total in MC	Maximum extent of flooding
Risk to people:		
Number of people in area:	1020565	22355
Number of services:	2194	91
Risk to economic activity:		
Number of non-residential properties:	119600	3332
Number of airports:	1	0
Length of roads (km):	885	29
Length of railway (km):	246	6
Agricultural land (ha):	242716	7853
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	52	3
Area of SAC within area (ha):	374	0
Area of SPA within area (ha):	0	0
Area of RAMSAR site within area (ha):	0	0
Area of World Heritage Site within area (ha):	0	0
Area of SSSI within area (ha):	2430	294
Area of parks and gardens within area (ha):	3866	373
Area of Scheduled Ancient Monument within area (ha):	1466	447
Number of listed buildings within area:	10082	447
Number of licensed water abstractions within the area:	929	288

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The reservoirs flood map has been developed and published by the Environment Agency.

Conclusions and objectives for the Warwickshire Avon catchment

We have set out the following for the Warwickshire Avon catchment:

Conclusions

The Warwickshire Avon catchment has a long history of flooding, but the relatively dispersed nature of the settlements affected has meant that traditional flood defence schemes have often not been viable. Partnership working (between the Environment Agency, Regional Flood and Coastal Committee, Lead Local Flood Authority, developers and the affected communities) to raise the necessary funds for new viable flood risk reduction schemes and to maintain existing schemes will continue to be vital.

There remains a requirement to influence the planning system to reduce flood risk by directing development away from the floodplain and to slow rates of runoff in the upstream catchment.

While there is good understanding of the flood risk from rivers, better information on the interaction between river and surface water flooding would help identify potential solutions and inform emergency planning in urban areas.

Objectives

Our objectives when preparing this flood risk management plan have been as follows:

Where possible to:

Social

- reduce risk to people
- promote understanding of flood risk and work in partnership
- prepare communities and build resilience
- minimise community disruption
- consider flood risk in development plans
- maintain existing assets that protect people
- river, watercourse and defence maintenance

Economic

- reduce economic damage
- maintain existing assets that protect business
- protect transport services
- minimise flood risk to agricultural land
- protect tourism when undertaking flood risk management

Environmental

- achieve WFD objectives through flood risk management
- protect designated nature conservation sites
- protect designated heritage sites

Ongoing measures to manage risk in the Warwickshire Avon catchment

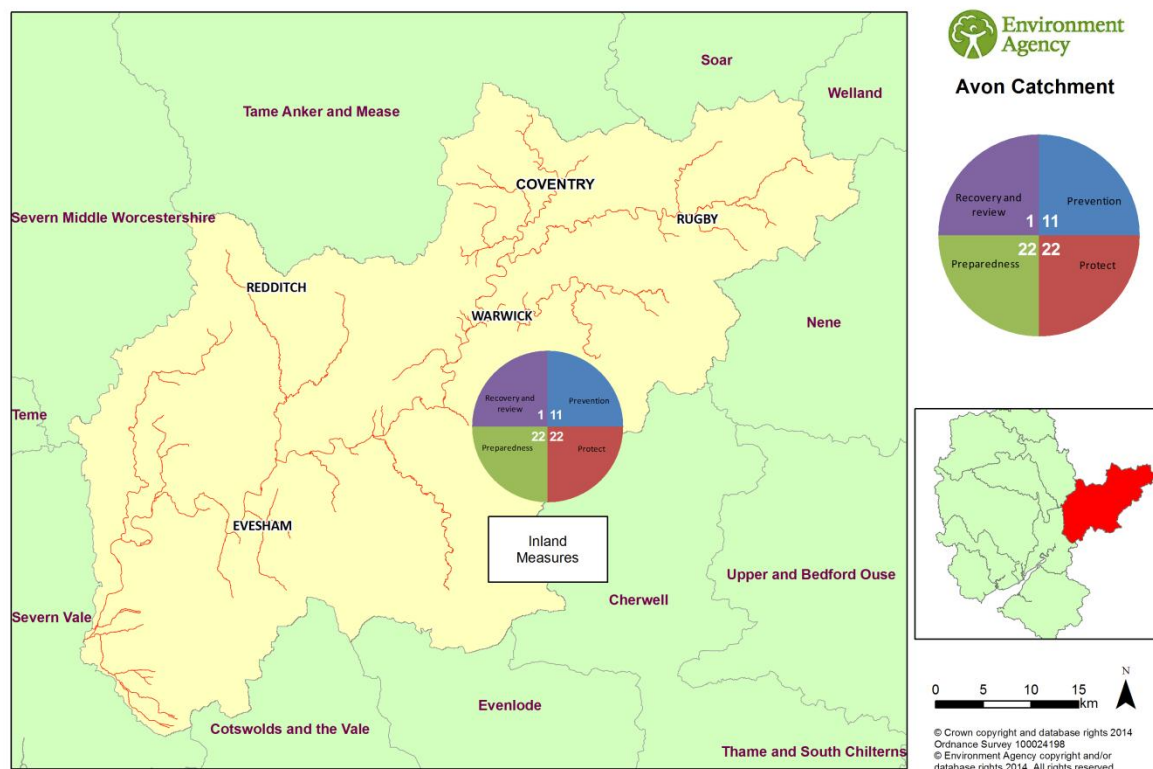


Figure 12.5.1. Ongoing measures within the Warwickshire Avon catchment

Across the Warwickshire Avon catchment the ongoing measures to manage flood risk include:

Preventing risk: 11 measures which include measures to avoid inappropriate development in the flood plain, maintaining watercourses and improving our understanding of all sources of flooding to inform future flood risk management.

- To inform decisions about planning and suitability for infiltration SuDS, Northamptonshire County Council will develop GIS mapping of flood risk data from strategies, plans and studies.
- Northamptonshire County Council will provide information and advice to inform planning policy.
- Northamptonshire County Council will set up the SuDS Approval Body (SAB) to adopt and maintain sustainable drainage (subject to Autumn 2014 consultation by Defra/DCLG).
- Northamptonshire County Council will encourage Riparian owners to manage flood risk in priority areas. Other flood risk management authorities will also use their permissive powers to reduce flood risk as appropriate.
- Avoid inappropriate development in areas of flood and coastal erosion risk by influencing development plans and working with Lead Local Flood Authorities and Planners. This work is supported by the National Planning Policy Framework and Technical Guidance.

- Minimise the economic damage from flooding to non-residential properties by maintaining current level of flood risk management within areas that already benefit from flood defences, subject to availability of funding.
- Environment Agency provides evidence, advice and comment to support sustainable growth through Local Enterprise Partnerships (LEPs) and planning bodies.
- Work closely with local planning authorities, developers, businesses and infrastructure operators to avoid inappropriate development through the planning process.
- Support Northamptonshire County Council in implementation and review of its Local Flood Risk Management Strategy to further improve understanding of risk to local communities from all sources of flooding and management of this risk.

Preparing for risk: 22 measures which include measures to develop and improve emergency response plans with our partners, improving flood mapping, maintaining and improving our flood forecasting and warning systems and working to raise community awareness and improve their preparedness.

- Work with community groups and the Parish Council in Charlton to promote land management and flood preparations/actions in the village to reduce and prepare for flooding.
- Work with communities and Local Resilience Forum (LRF) partners to encourage community at Badsey Brook to prepare for rapid response flooding.
- Assess feasibility of extending Flood Warning service to warn for flooding from Tirlle, Carrant and Swilgate and feasibility of pluvial warnings.
- Northamptonshire County Council will train call centre staff to give correct advice to the public in a flood event.
- LLFA will continue to develop and implement actions in highest priority wards, taking account of climate change implications. Includes: data collection and asset (structure) register for Ordinary Watercourses and surface water features; review of flooding hotspots and historic flood investigations; assessment of suitable flood mitigation schemes; designation of assets with a significant flood defence function; regular culvert inspection and maintenance regimes on council owned assets.
- Northamptonshire County Council will work with the LRF to review and update the Multi Agency Flood Plan (MAFP) and disseminate outputs of studies. LRF will continue to develop emergency plans and review essential and critical infrastructure protection.
- Northamptonshire County Council will develop community flood resilience in Northamptonshire including a community flood toolkit for 15 pilot communities and guidance for other communities through a web portal.
- Northamptonshire County Council will create a series of leaflets/guidance notes, to assist communications about: local sources of flood risk, flood risk and development, riparian responsibilities, insurance and Water Framework Directive.
- Environment Agency will maximise accuracy of its flood forecasting and warning in areas where these services currently exist.
- Investigate feasibility of providing forecasting and warning service to communities at high fluvial flood risk where no service currently exists.
- Promote awareness of fluvial flooding and encourage flood action groups, individuals and businesses to take preparatory actions in high risk communities.
- All Risk Management Authorities will work to understand risks of flooding from all sources and develop long term plans to manage the risks with direct involvement from the community in the decision making process.
- Reduce the consequences of flooding by enabling communities to take effective action before, during and after a flood.
- Consider the value of agricultural land, potential flood damages and the importance of food security within the economic appraisal of decision and investment options.

- Integrated catchment-based management of flood risk and climate change adaptation using a partnership funding approach - includes early strategic spatial planning involvement, working with Local Enterprise Partnerships (LEPs) for sustainable growth, influencing strategic plans and ensuring best use of risk information by the insurance industry.
- Promote flood risk awareness, understanding and action by householders and businesses, particularly in communities at high risk.
- Promote awareness and provide advice to avoid inappropriate development in areas at flood risk and manage land to avoid increasing risks. Update Environment Agency's land drainage consent process.
- Before and during floods the Environment Agency will work with emergency services and local authorities to minimise harm to people and property and provide leadership in reservoir safety and protection of critical national infrastructure.
- Review and update flood hazard and risk maps for England by 2019. Make flood and coastal risk information more accessible, including use of social media.
- Work with Charlton community groups and Parish Council to promote land management to reduce flood risk and encourage taking action to prepare for flooding within the village.
- Work with Badsey Brook communities and LRF partners to encourage communities to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.
- Maintain warnings to reduce risk to isolated communities. Assess feasibility of Flood Warning service extensions for Tirlé, Carrant and Swilgate and for pluvial warnings.

Protecting from risk: 18 measures which include measures to introduce property level protection schemes and maintain and replace when necessary major flood defence structures.

- Implement flood alleviation scheme on the Badsey Brook to reduce risk of flooding to properties at Broadway, Childswickham and Murcot (subject to feasibility, acceptability, justification and funding).
- Work with the community to assess the technical, environmental, and economic feasibility of a flood alleviation scheme at Wickhamford (Badsey Brook) with partnership funding contributions as necessary.
- Investigate the potential of wetland creation around the north of Gloucester (including Innsworth Meadow SSSI).
- Work with land owners and land managers to identify opportunities for reducing the intensity of Environment Agency's maintenance operations.
- Investigate opportunities for improving flow conveyance through Tewkesbury including possible de-silting on the Tirlé, Carrant and Swilgate at bridges and culverts and improvement of road bridges. Either a Highways Authority action or partnership opportunities.
- Northamptonshire County Council will produce Surface Water Management Plans for the Borough of Wellingborough, District of East Northants, District of South Northants and the District of Daventry.
- Northamptonshire County Council will promote environmental actions including: de-culverting, natural flood risk management, blue/green infrastructure, increased tree cover, and catchment sensitive farming.
- Northamptonshire County Council will promote Water Framework Directive actions to improve the status of heavily modified ordinary watercourses as opportunities arise.
- Investigate installing surface water flooding Property Level Protection measures.
- Engage with external stakeholders, public bodies and businesses to seek and promote flood risk management/ resilience schemes, to minimise the impact of flooding to community services such as schools, hospitals, emergency services and utilities.
- Reduce flood risk to people and existing residential properties in priority communities.

- Reduce the economic damage of flooding to non-residential properties in priority communities, subject to the availability of funding.
- Minimise the risk of flooding to key transport links within the catchment such as railway lines, motorways, primary roads and trunk roads, subject to availability of funding.
- Contribute to achieving WFD objectives by working with natural processes wherever possible, to manage flood risk through protecting and restoring the natural function of the catchment, rivers and floodplains.
- Support the WFD objective of addressing poor water quality.
- Pilot project using "Woodlands for Water" fund for tree planting to reduce run off rates and possible small scale 'leaky dams' or similar to slow run-off from the headwaters of catchments upstream of more populated areas.
- Utilise data from System Asset Management Plans, updated surveys and modelling to develop a more strategic approach to routine management and maintenance of the catchments.
- Work with landowners, local and national Government, to encourage best farming practices to reduce rapid surface water run-off and soil erosion.

Recovery and review of risk: 1 measure which involves reducing flood risk and improving resilience as the result of the findings of formal investigation of flood incidents.

- Northamptonshire County Council will investigate flooding incidents in accordance with Flood and Water Management Act (2010).

Agreed measures to manage risk in the Warwickshire Avon catchment

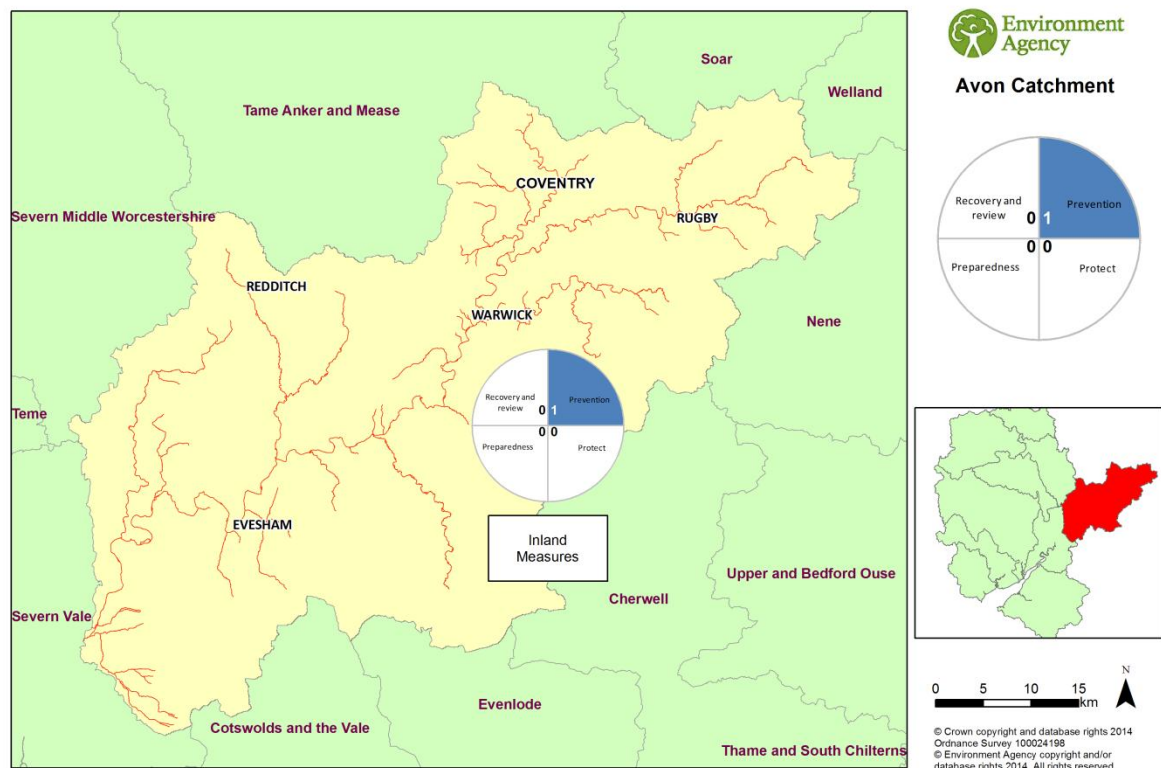


Figure 12.5.2. Agreed measures within the Warwickshire Avon catchment

Across the Warwickshire Avon catchment the agreed measures to manage flood risk include:

Preventing risk: 1 measure.

- Work with the community to promote property level protection measures at Pershore to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.

Preparing for risk: There are no ongoing measures in this category over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Protecting from risk: There are no ongoing measures in this category over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Recovery and review of risk: There are no ongoing measures in this category over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures to manage risk in the Warwickshire Avon catchment

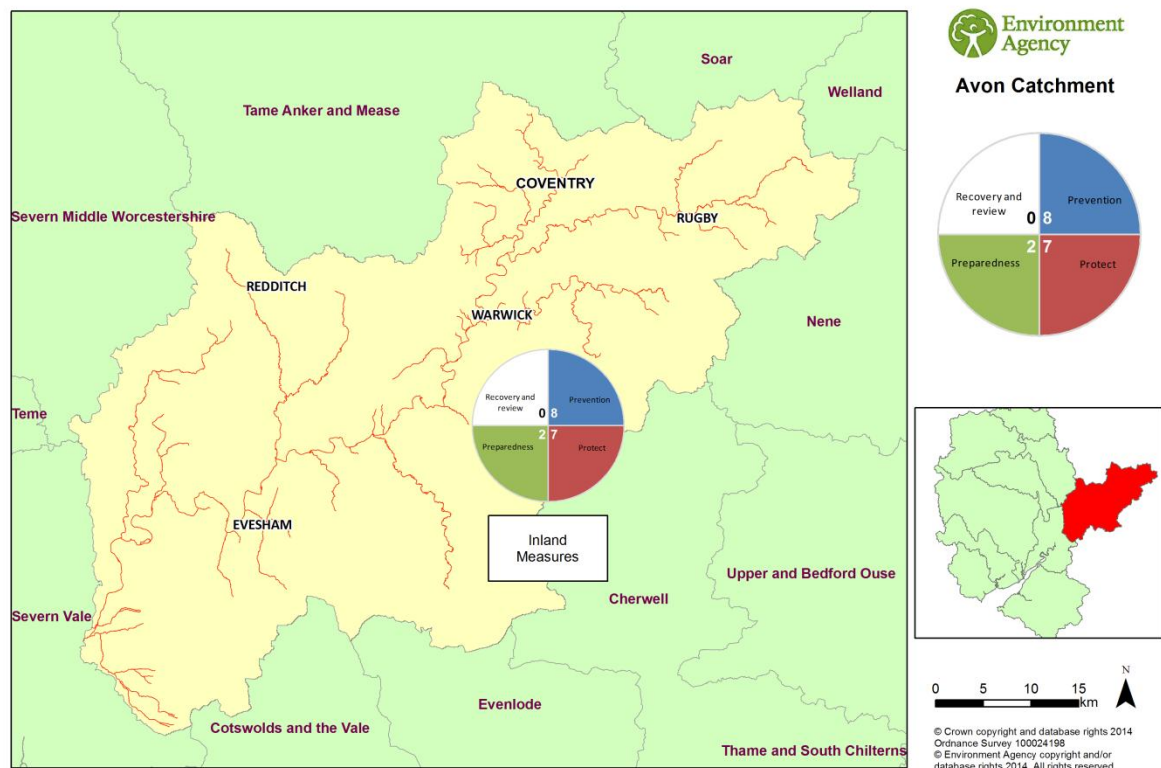


Figure 12.5.3. Proposed measures within the Warwickshire Avon catchment

In the Warwickshire Avon catchment there are 15 measures proposed to manage risk from 2015 and beyond. These are shown in Figure 12.5.2 and summarised as follows. The measures are described more fully in table 12.5.3.

Preventing risk: 6 measures which include upstream attenuation and property level protection.

- Same measure at 3 locations – Himbleton, Evesham and Pershore: Work with the communities to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.
- Property flooding has occurred frequently in Kenilworth. Promote property level protection scheme using funding secured by the local Flood Action Group.
- Flood storage required to mitigate the impacts of the proposed development at each of the Sustainable Urban Extensions (SUEs) in Northamptonshire. Schemes to be assessed by developers and details to be provided as part of the planning process.
- Address flooding from the River Sherbourne which occurs in Butt Lane, Coventry – possible property level protection and localised highway raising.

Preparing for risk: There are 2 proposed measures in this category which include considering new flood awareness campaigns and linking flood warnings to information derived from CCTV to utilise real time information.

Northamptonshire County Council will:

- explore opportunities for Flood Awareness Campaigns and Flood Fairs.
- explore potential for flood warnings to be linked to CCTV, combining existing systems to see real time flooding incidents.

Protecting from risk: 6 measures which include measures to investigate future defence schemes, including working with natural processes to reduce catchment runoff and river restoration projects.

- Carry out integrated project to address Water Framework Directive delivery, habitat and flood risk management issues across the Avon catchment. (Worcs LEP Vale of Evesham)
- Northamptonshire County Council will investigate potential for flood risk improvement works at Stanford Road, Cold Ashby to reduce risk of flooding to properties from surface water.
- Northamptonshire County Council will work in partnership to assess the potential positive, negative and neutral impacts of flooding on designated heritage sites.
- The Environment Agency is working with the local community to explore opportunities for flood risk management measures and repair of a failing culvert to Bell Brook, Snitterfield.
- Promote a flood mitigation solution for Racecourse Brook, Stratford-Upon-Avon including possible above-ground flood attenuation.
- Flooding from the St Johns Brook will be investigated. Options include a flood storage area and bund.

Recovery and review of risk: There are no ongoing measures in this category over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Other measures to manage risk in the Warwickshire Avon catchment

There are 51 other measures in the flood risk management plan which do not fall (or have not yet been placed) within the above four categories. They include measures to investigate funding opportunities, change land use management, improve access and adopt best practice.

Ongoing Measures

- Northamptonshire County Council will continue to promote partnership working through the Flood and Water Management Framework.
- Northamptonshire County Council will continue to develop partnership funding arrangements.
- The Local Flood Risk Management Strategy will be used by Northamptonshire County Council to influence high level plans and strategies and to seek developer funding where appropriate.

- Promote further flood awareness and self-help action relating to the Flood Warning Service for River Arrow, Redditch.
- 14 measures that relate to Redditch and 12 for Rugby regarding Town and Country Planning. These include: development plans, strategic and site-specific flood risk assessments, attenuating run-off rates, raised floor levels, setting development back from river banks and canals, promoting WFD, planning evacuation routes, properties on stilts, avoiding living space in basements.
- At Rugby:
 - Open up culverts where possible in line with WFD aims.
 - Assess risks of overtopping or breach for properties close to defences to ensure risk to life can be safely managed throughout the lifetime of the development
 - Seek safe, dry pedestrian access/ egress up to 100 year plus climate change event and emergency vehicle access possible during times of flood
 - Car parking needs to be safe, especially in terms of flood warning and overnight parking areas.
 - Where there are no alternative options available, and development is required within the highest risk zone 3b, flood risk shall be managed through upstream alleviation
 - Encourage environmental best practice, sustainable construction, waste management and flood mitigation measures
- Minimise the negative impacts of flooding to designated nature conservation sites and heritage assets (2 measures) and where possible contribute to improvements.
- WFD objective to de-culvert, endeavour to undertake riparian habitat enhancement, etc
- Our investment in flood risk management infrastructure will support growth in areas previously affected by floods.

Proposed Measures

- Promote flood awareness and local actions while investigating potential flood mitigation measures at:
 - Rugby - alleviate flooding problems from both sewers and surface water
 - Broad Lane, Coventry - possible capacity problems with a culvert
 - Shipston-on-Stour - flooding from rivers and surface water - flood storage is one possible measure
 - Fenny Compton - overland flow - potential solutions are a flood storage area, new road culvert and a catch grid
 - Rugby - flood risk from the River Leam and surface water - proposed solution is property level protection
 - Southam - complex flooding issues include watercourse flooding, overland flood flow from fields, minor highways and surface water drainage systems (including culvert blockages)
 - Rugby - surface water flooding to two properties - proposed solution is property level protection
 - Coventry - flood risk from the Withybrook and sewers – possible solutions are to increase the size of culverts and sewers and/or provide storage capacity or alter a pumping station.

More detail on the objectives and measures is included in table 12.5.3. In addition there are measures that are relevant to this catchment included in the Severn RBD and Severn England measures shown in sections 9 and 10 and 11.

Table 12.5.3. The Warwickshire Avon catchment – measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
																Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Community engagement - Charlton	Charlton community engagement. Work with the community groups and the Parish Council to promote land management to reduce flood risk and encourage taking action to prepare for flooding within the village.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Rapid response catchment awareness - Badsey Brook	Rapid response catchment awareness in Badsey Brook. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Property Level Protection - Himbleton, Bow Brook	Work with the community at Himbleton to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Integrated project - Vale of Evesham	Carry out integrated project to address Water Framework Directive delivery, habitat and flood risk management issues across the Avon catchment. (Worcs LEP Vale of Evesham)	N	N	Y	N	N	N	N	N	N		N	Y	N	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Property Level Protection - Evesham	Work with the community at Evesham to promote property level protection measures to reduce flood risk from River Avon. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Flood Alleviation Scheme - Badsey Brook	Implement technically feasible, environmentally acceptable and economically justified flood alleviation scheme on the Badsey Brook to reduce risk of flooding to properties at Broadway, Childswickham and Murcot (subject to funding).	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	High	On going
Property Level Protection - Pershore	Work with the community to promote property level protection measures at Pershore to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Extension of Flood Warning Service - Tewkesbury	Maintain community warnings to reduce risk to isolated communities. Undertake study to assess feasibility of extension of Flood Warning service to warn for flooding from Tirl, Carrant and Swilgate. Undertake study on feasibility of pluvial warnings.	Y	N	N	N	N	N	N	N	N		Y	N	N	To improve flood warning procedures to reduce potential risk to communities by extending the coverage of the flood warning service, especially in areas where social vulnerability is high. Reduce or prevent an increase in harm to life, as a result of flooding.	M4 - Preparedness	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Investigate improving flood flow routes - Glos	Investigate the potential of wetland creation around the north of Gloucester (including Innsworth Meadow SSSI).	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Protect and enhance, where possible naturally functioning rivers and floodplains. Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M3 - Protection	2015 - 2021	Low	On going
Review maintenance operations	Review maintenance operations. Work with land owners and land managers to identify opportunities for reducing the intensity of our maintenance operations. Review maintenance operations in line with the findings of Defra's R and D Technical Report FD1920/TR.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2039 +	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Improve conveyance through Tewkesbury	Investigate opportunities for improving conveyance through Tewkesbury. The location of Tewkesbury makes it difficult technically to have protection in the form of raised defences. Dredging is not an option for the Severn or Avon. There may be some short term merit in de-silting on the Tirl, Carrant and Swilgate at bridges and culverts; however, this is not a long term solution for flood risk management. Improvement of road structures (bridges - A38 Swilgate, B4080 Carrant Brook, Road Bridge at Tredington). Either a Highways Authority action or partnership opportunities. Bottlenecks particularly in summer 2007 floods.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk. Reduce or prevent an increase in harm to life as a result of flooding.	M3 - Protection	2039 +	Moderate	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Is there a WFD assessment that covers this action	Social	Environment						
	Northamptonshire County Council as LLFA will investigate potential for flood risk improvement works at Stanford Road, Cold Ashby, to reduce risk of flooding to properties from surface water.	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	Northants LFRMS Objective 4 Preparedness and Resilience: Reduce the harmful consequences of local flooding to communities and human health through proactive actions, activities and education programmes that enhance preparedness and resilience to local flood risk, and contribute to minimising community disruption	M3 - Protection	2015 – 2021	Moderate	Northamptonshire County	Not started - proposed
	Northamptonshire County Council as LLFA will explore opportunities for Flood Awareness Campaigns. A series of flood fairs were undertaken in 2011, which included public consultation on the LFRMS and the Northampton. Opportunities for future Flood Fairs should be explored.	N	N	Y	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 1 Collaborative Approach: Adopt a collaborative approach to managing local flood risk by working with local partners and stakeholders to identify, secure and optimise resources, expertise and opportunities for reducing flood risk and increasing resilience to flooding	M4 - Preparedness	2015 – 2021	High	Northamptonshire County	Not started - proposed
	Northamptonshire County Council as LLFA will continue to promote partnership working, maintaining communication between all partners and stakeholders through the Flood and Water Management Framework.	N	N	Y	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 1 Collaborative Approach: Adopt a collaborative approach to managing local flood risk by working with local partners and stakeholders to identify, secure and optimise resources, expertise and opportunities for reducing flood risk and increasing resilience to flooding	M6 - Other	2015 – 2021	Very High	Northamptonshire County	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	Northamptonshire County Council as LLFA will train staff in each of the call centres to enable correct advice to be given to the public in a flood event, ensuring right questions are asked and information is recorded correctly and is saved on a database.	N	N	Y	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 1 Collaborative Approach: Adopt a collaborative approach to managing local flood risk by working with local partners and stakeholders to identify, secure and optimise resources, expertise and opportunities for reducing flood risk and increasing resilience to flooding	M4 - Preparedness	2015 – 2021	High	Northamptonshire County	On going
	"Northamptonshire County Council as LLFA will investigate flooding incidents in accordance with Flood and Water Management Act (2010). Undertake formal investigations of flood incidents that occur and meet the thresholds set. Continue to send monthly reminders for partners to provide records of flooding incidents."	N	Y	N	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 1 Collaborative Approach: Adopt a collaborative approach to managing local flood risk by working with local partners and stakeholders to identify, secure and optimise resources, expertise and opportunities for reducing flood risk and increasing resilience to flooding	M5 - Recovery and Review	2015 – 2021	Critical	Northamptonshire County	On going
	Northamptonshire County Council has a GIS tool which is used for planning, which will continue to be developed to include the results of new strategies, plans and studies, to ensure that surface water and other local sources of risk are accurately presented and can be used to inform planning decisions. Tool will be expanded to include identification of suitability for infiltration SuDS within Northamptonshire, to advise on drainage applications.	N	Y	N	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 2 Local Flood Risk: Develop a greater understanding of local flood risk by improving the scope of local knowledge and understanding of current and future local flood risks	M2 - Prevention	2015 – 2021	High	Northamptonshire County	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	"The LLFA will continue to develop and implement actions in highest priority wards, taking account of climate change implications. The following activities will be given precedence: Greater than Data collection and registration of existing assets, particularly focussed on Ordinary Watercourses and surface water features; Greater than Review of flooding hotspots and investigation into the cause of historic flooding along with the assessment of suitable flood mitigation schemes; Greater than Designation of assets which have a significant flood defence function; and Greater than Establishing regular, proactive culvert inspection and maintenance regimes on council owned assets."	N	Y	N	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 2 Local Flood Risk: Develop a greater understanding of local flood risk by improving the scope of local knowledge and understanding of current and future local flood risks	M4 - Preparedness	2015 – 2021	Low	Northamptonshire County	On going
	Northamptonshire County Council as LLFA will carry out SWMPs for the Borough of Wellingborough, the District of East Northants, the District of South Northants and the District of Daventry, to gain a better understanding of surface water flooding mechanisms in the areas, for the subsequent development of priority flood alleviation measures. To include identification of areas where targeted maintenance and improvements to watercourses and drainage systems are required. Planners to be informed of areas identified to be vulnerable to surface water flooding.	N	Y	N	N	N	N	Y	N	Y	Y	Y	N	N	Northants LFRMS Objective 2 Local Flood Risk: Develop a greater understanding of local flood risk by improving the scope of local knowledge and understanding of current and future local flood risks	M3 - Protection	Pre 2015	High	Northamptonshire County	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	Northamptonshire County Council as LLFA will continue to inform new and update development plan policies, ensuring planning officers are aware of ongoing changes in national and local policy. Ensure lines of communication and roles and responsibilities are clear. Inform planning officers of the outputs of the LFRMS for Northamptonshire.	N	Y	N	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 3 Enhance the Natural and Historic Environment: Adopt a sustainable approach to reducing local flood risk, seeking to lessen the risk of localised flooding using mechanisms that are economically viable, deliver wider environmental benefits and promote the wellbeing of local people	M2 - Prevention	2015 – 2021	Moderate	Northamptonshire County	On going
	Northamptonshire County Council as LLFA will work in partnership with the Wildlife Trust to assess the potential positive, negative and neutral impacts of flooding on designated environmental sites, to improve understanding of flood risk and to inform updates of the prioritisation assessment for the LFRMS.	N	N	Y	N	N	N	Y	Y	N	Y	N	Y	N	Northants LFRMS Objective 3 Enhance the Natural and Historic Environment: Adopt a sustainable approach to reducing local flood risk, seeking to lessen the risk of localised flooding using mechanisms that are economically viable, deliver wider environmental benefits and promote the wellbeing of local people	M3 - Protection	Pre 2015	Low	Northamptonshire County	Completed - outcomes delivered
	Northamptonshire County Council as LLFA will work in partnership to assess the potential positive, negative and neutral impacts of flooding on designated heritage sites, to improve understanding of flood risk and to inform updates of the prioritisation assessment.	N	N	Y	N	N	N	Y	Y	N	Y	N	Y	N	Northants LFRMS Objective 3 Enhance the Natural and Historic Environment: Adopt a sustainable approach to reducing local flood risk, seeking to lessen the risk of localised flooding using mechanisms that are economically viable, deliver wider environmental benefits and promote the wellbeing of local people	M3 - Protection	2015 – 2021	Low	Northamptonshire County	Not started - proposed

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	Northamptonshire County Council as LLFA will promote environmental actions including: de-culverting, natural flood risk management, blue/green infrastructure, increased tree cover, and catchment sensitive farming.	N	N	Y	N	N	N	Y	Y	N	Y	N	Y	N	Northants LFRMS Objective 3 Enhance the Natural and Historic Environment: Adopt a sustainable approach to reducing local flood risk, seeking to lessen the risk of localised flooding using mechanisms that are economically viable, deliver wider environmental benefits and promote the wellbeing of local people	M3 - Protection	2015 – 2021	Moderate	Northamptonshire County	On going
	WFD investigations on heavily modified ordinary watercourses resulted in a number of actions to improve their status. Northamptonshire County Council as LLFA will promote these actions as opportunities arise.	N	Y	N	N	N	N	N	N	N	Y	N	Y	N	Northants LFRMS Objective 3 Enhance the Natural and Historic Environment: Adopt a sustainable approach to reducing local flood risk, seeking to lessen the risk of localised flooding using mechanisms that are economically viable, deliver wider environmental benefits and promote the wellbeing of local people	M3 - Protection	2015 – 2021	Moderate	Northamptonshire County	On going
	Northamptonshire County Council will work with the Local Resilience Forum (LRF) to review and update the Multi Agency Flood Plan (MAFP) and disseminate outputs of any studies undertaken. LRF will continue to develop business continuity, emergency and evacuation plans, and review essential and critical infrastructure protection, to inform the MAFP.	N	N	Y	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 4 Preparedness and Resilience: Reduce the harmful consequences of local flooding to communities and human health through proactive actions, activities and education programmes that enhance preparedness and resilience to local flood risk, and contribute to minimising community disruption	M4 - Preparedness	2015 – 2021	Moderate	Northamptonshire	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	"Northamptonshire County Council as LLFA will undertake a project to develop community flood resilience in Northamptonshire. A community flood toolkit will be developed for 15 pilot communities. The tools and guidance will then be available to other communities through a web portal. The projects approach will be to help communities to understand their flood risk and enable them to work out local resilience solutions."	N	Y	N	N	N	N	Y	Y	N	Y	Y	N	N	Northants LFRMS Objective 4 Preparedness and Resilience: Reduce the harmful consequences of local flooding to communities and human health through proactive actions, activities and education programmes that enhance preparedness and resilience to local flood risk, and contribute to minimising community disruption	M4 - Preparedness	2015 – 2021	Very High	Northamptonshire County	On going
	Northamptonshire County Council as LLFA will explore potential for flood warnings to be linked to CCTV, combining existing systems to see real time flooding incidents.	N	Y	N	N	N	N	N	N	N	Y	N	N	Y	Northants LFRMS Objective 4 Preparedness and Resilience: Reduce the harmful consequences of local flooding to communities and human health through proactive actions, activities and education programmes that enhance preparedness and resilience to local flood risk, and contribute to minimising community disruption	M4 - Preparedness	2015 – 2021	Low	Northamptonshire County	Not started - proposed
	Northamptonshire County Council as LLFA will set up the SuDS Approval Body (SAB), to include creation of local SuDS Guidance, determination of SAB applications, enforcement, management, adoptions, designations, appeals and future maintenance.	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	Northants LFRMS Objective 5 Flood Risk and Development: Minimise the increase in local flood risk that may arise from new development by producing guidance, setting standards, promoting the sustainable use of water and supporting the development of local policies and guidance, discouraging wherever possible surface water runoff in new and future developments and where possible influencing or supporting developments that	M2 - Prevention	Pre 2015	Very High	Northamptonshire County	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure	
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic							
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed	
															seek to reduce existing flood risk						
	Northamptonshire County Council as LLFA will create a series of leaflets/guidance notes, to assist in communications. Subjects will include: local sources of flood risk, flood risk and development, riparian responsibilities, WFD, insurance etc.	N	N	Y	N	N	N	Y	Y	N	Y		N	N	Y	Northants LFRMS Objective 5 Flood Risk and Development: Minimise the increase in local flood risk that may arise from new development by producing guidance, setting standards, promoting the sustainable use of water and supporting the development of local policies and guidance, discouraging wherever possible surface water runoff in new and future developments and where possible influencing or supporting developments that seek to reduce existing flood risk	M4 - Preparedness	Pre 2015	High	Northamptonshire County	On going
	Northamptonshire County Council as LLFA will continue to develop and establish short and long term funding arrangements to deliver the requirements of the Flood and Water Management Act. This to include bidding for relevant funding as and when the opportunity arises, to support future projects and flood alleviation schemes i.e. Flood Defence Grant in Aid funding.	N	N	Y	N	N	N	Y	Y	N	Y		N	N	Y	Northants LFRMS Objective 6 Economically Sustainable Approach: Ensure the financial viability of flood related schemes through the development of appropriate policies and assessment tools to ensure that flood risk management measures provide value for money whilst minimising the long-term revenue costs. Seeking to use natural processes where	M6 - Other	2015 - 2021	Very High	Northamptonshire County	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
															possible or source the costs of any maintenance from the financial beneficiaries of the development.					
	"Northamptonshire County Council as LLFA will ensure Infrastructure Development Plans, Community Infrastructure Strategies and Transport Infrastructure Plans are influenced by the LFRMS and that developer funding is sought where considered appropriate and necessary. When information or studies become available, any schemes, including their costs, will be identified and added to the Infrastructure Delivery Plan or Community Infrastructure Levy list."	N	N	Y	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 6 Economically Sustainable Approach: Ensure the financial viability of flood related schemes through the development of appropriate policies and assessment tools to ensure that flood risk management measures provide value for money whilst minimising the long-term revenue costs. Seeking to use natural processes where possible or source the costs of any maintenance from the financial beneficiaries of the development.	M6 - Other	2015 – 2021	High	Northamptonshire County	On going
	Northamptonshire County Council as LLFA will actively encourage Flood Risk Management activities by Riparian owners in highest priority areas. This will include making Riparian owners aware of their roles and responsibilities. Other flood risk management authorities will also use their permissive powers to reduce flood risk as appropriate.	N	N	Y	N	N	N	Y	Y	N	Y	N	N	Y	Northants LFRMS Objective 7 Riparian Responsibilities: Encourage flood management activities by private owners of ordinary watercourses and flood defence structures as well as limit the development of constrictions on ordinary watercourses.	M2 - Prevention	2015 – 2021	Moderate	Northamptonshire County	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
	Attenuation storage required to mitigate to mitigate the impacts of the proposed development at each of the Sustainable Urban Extensions (SUEs) in Northamptonshire. Schemes to be assessed by developers and details to be provided as part of the planning process. SUEs include Northampton West, Northampton South, Northampton North, Northampton South of Brackmills, Northampton Kints Heath, Daventry North East, Towcester South, Brackley East, and Brackley North.	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	Northants LFRMS Objective 4 Preparedness and Resilience: Reduce the harmful consequences of local flooding to communities and human health through proactive actions, activities and education programmes that enhance preparedness and resilience to local flood risk, and contribute to minimising community disruption	M2 - Prevention	2021 – 2027	Low	Daventry District	Not started - proposed
Quinton, Birmingham	Investigate installing PLP measures to protect properties from surface water flooding.	N	N	N	N	N	N	Y	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M3 - Protection	2015 – 2021	Moderate	Birmingham Metropolitan District	On going
Redditch	Discharge must be limited to Greenfield runoff rates experienced at the site before the development took place.	N	N	Y	N	N	N	Y	N	N	N	N	N	Y	Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going
Redditch	If a Greenfield site is chosen for development then it will be necessary to ensure that the development does not contribute additional runoff to receiving watercourses and thereby increase the risk of flooding to other areas.	N	N	Y	N	N	N	Y	N	Y	N	N	N	Y	Reduce Surface Water Flood Risk.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going
Redditch	Redditch town suffers from urban runoff and underlying impermeable clayey substrata. These two factors result in fairly high levels of overland flow, which has caused flooding on numerous occasions, affecting both highways and properties. The rapid response of the catchments, coupled with a lack of highway drains maintenance, also attributes to flooding of the road system and overloading of the sewers.	N	N	Y	N	N	N	Y	N	Y	N	N	N	Y	Consider flood risk when planning and promoting developments.	M6 - Other	2015 – 2021	High	Redditch District (B)	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
Redditch	Redditch has Flood Warning Service for River Arrow.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Increase awareness of flood risk and promote individual and collective action. Build and maintain relationships between communities, local authorities and the Environment Agency to better prepare for flooding and enable sustained partnership working. This will create communities that are empowered to proactively manage the impacts of flooding.	M6 - Other	2015 – 2021	High	Redditch District (B)	On going
Redditch	Until a Level 2 SFRA has been produced or appropriate site specific Flood Risk Assessments (FRAs), or equivalent, show this zone for the above watercourses to the satisfaction of the Environment Agency, it is recommended that all areas within Flood Zone 3a, (FZ3a), or equivalent, where available, should be considered as the Functional Floodplain.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Improve data available for all flood risk management activities.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going
Redditch	Where land in Flood Zone 2, 3a or 3b (Functional Floodplain) or above one hectare in Flood Zone 1 is proposed for development, a comprehensive Flood Risk Assessment (FRA) will be required.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Consider flood risk when planning and promoting developments.	M6 - Other	2015 – 2021	High	Redditch District (B)	On going
Redditch	If adjacent watercourse has no flood zone definition then a site specific FRA is carried out or a new model constructed to assess the flood risk to the site including effects of Climate Change.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Consider flood risk when planning and promoting developments.	M6 - Other	2015 – 2021	Low	Redditch District (B)	On going
Redditch	Management of surface runoff from the proposed sites should use a combination of site specific and strategic Sustainable Drainage Systems (SUDS), or equivalent, measures encouraging "source control" where possible. These measures should be developed with a strategic approach to flood management in mind.	N	N	N	N	N	N	Y	N	Y	N	Y	N	N	Reduce Surface Water Flood Risk.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure	
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic							
Redditch	"The development of any site should not lead to deterioration of EU Water Framework Directive (WFD) water body status nor have a negative impact on water quality, either directly through the pollution of surface or ground water or indirectly through overloading of sewage treatment work. Development should, where necessary and feasible, help to conserve and enhance watercourses and riverside habitats."	N	N	Y	N	N	N	Y	N	Y	N		N	N	Y	Consider WFD requirements while addressing flood risk.	M6 - Other	2015 – 2021	High	Redditch District (B)	On going
Redditch	Investigate opportunities to provide on-site attenuation for flooding.	N	N	Y	N	N	N	N	N	N	N		N	N	Y	Investigate potential for flood storage area(s) to reduce flood risk.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going
Redditch	The greatest risk of flooding within Redditch Borough is from rapid rainfall runoff resulting in high flows on poorly maintained ordinary watercourses which are constrained by development and subsequently overtop. It is therefore imperative that any new development takes this into account and minimises the volume of runoff produced through the implementation of Sustainable Drainage Systems (SUDS), or equivalent, especially where located on Greenfield sites.	N	N	Y	N	N	N	N	N	N	N		N	N	Y	Consider, and endeavour to mitigate against, flood risk.	M6 - Other	2015 – 2021	High	Redditch District (B)	On going
Redditch	Redditch town suffers from urban runoff and underlying impermeable clayey substrata. These two factors result in fairly high levels of overland flow, which has caused flooding on numerous occasions, affecting both highways and properties.	N	N	Y	N	N	N	N	N	N	N		N	N	Y	Consider, and endeavour to mitigate against, flood risk.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
Redditch	Endeavour to maintain the functional floodplain for the River Arrow (upstream extent is north of Arrow valley park, SP 052 507); and Bow Brook, the Swans Brook, the Wixon Brook and the Wharrage (upstream extent of Sillins Lane on the Swans Brook and Swinbourne Road on The Wharrage). Functional floodplain still has to be identified for many other watercourses.	Y	N	N	N	N	N	N	N	N	N	N	N	Y	Endeavour to maintain the functional floodplain.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going
Redditch	Where land in Flood Zones 2, 3a or 3b (Functional Floodplain, or equivalent) or above one hectare in Flood Zone 1, or equivalent, is proposed for development, a comprehensive Flood Risk Assessment (FRA), or equivalent, will be required.	Y	N	N	N	N	N	N	N	N	N	N	N	Y	Endeavour to maintain the functional floodplain.	M6 - Other	2015 – 2021	Moderate	Redditch District (B)	On going
Rugby	Discharge limited to Greenfield minus 20%.	N	N	Y	N	N	N	Y	N	N	N	N	N	Y	Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going
Rugby	Surface water run-off rates should be limited to the Greenfield equivalent in areas upstream of flood risk problem areas wherever possible	N	N	Y	N	N	N	Y	N	N	N	N	N	Y	Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going
Rugby	Discharge limited to Greenfield minus 20%	N	N	Y	N	N	N	Y	N	N	N	Y	N	N	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going
Rugby	Nothing Specific	N	N	Y	N	N	N	Y	N	Y	N	N	Y	Reduce Surface Water Flood Risk.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going	
Rugby	Infiltration Sustainable Drainage Systems (SUDS), or equivalent, should be promoted where it is practical. Where infiltration SUDS or equivalent are not applicable, surface water should be discharged to a watercourse in agreement with the EA.	N	N	Y	N	N	N	Y	N	Y	N	N	Y	Reduce Surface Water Flood Risk.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going	

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure	
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic							
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed	
Rugby	"The Council and developers should ensure appropriate Sustainable Drainage Systems (SUDS), or equivalent techniques are implemented into all new developments (as per the Floods and Water Management Act) and as far as possible retrofitted into existing settlements, especially where historic flood events have been identified; SUDS or equivalent should be proportionately incorporated in all new scales of developments"	N	N	Y	N	N	N	Y	N	Y	N		N	N	Y	Reduce Surface Water Flood Risk.	M6 - Other	2015 – 2021	High	Rugby District (B)	On going
Rugby	Proposed finished floor levels of new developments should be set 600mm above the 1 in 100 year (plus 20% allowance for climate change on peak flows) flood level.	N	N	Y	N	N	Y	Y	N	N	N		Y	N	N	Where possible, set Finished Floor levels for commercial buildings 300mm above the 1 in 100yr (1% AEP), plus an allowance for climate change, flood event; and residential buildings 600mm above the 1 in 100yr (1and AEP), plus and allowance for climate change, flood event.	M6 - Other	2015 – 2021	Very High	Rugby District (B)	On going
Rugby	Proposed development should be set back from the watercourse with a minimum 8m wide undeveloped buffer zone, to allow appropriate access for maintenance and emergency clearance	N	N	Y	N	N	N	N	N	N	N		N	Y	N	Maintain buffer zone.	M6 - Other	2015 – 2021	Low	Rugby District (B)	On going
Rugby	Proposed new developments should incorporate flood storage where appropriate.	N	N	Y	N	N	N	N	N	N	N		N	N	Y	Investigate potential for flood storage area(s) to reduce flood risk.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going
Rugby	A Flood Warning & Evacuation Plan should be prepared for developments within Flood Zone 3 (FZ3), or equivalent.	N	N	Y	N	N	N	Y	N	N	N		Y	N	N	Reduce the damage caused by flooding.	M6 - Other	2015 – 2021	Very High	Rugby District (B)	On going
Rugby	Act to avoid the construction of proposed developments on stilts, and the creation of voids.	N	N	Y	N	N	N	N	N	N	N		Y	N	N	Increase awareness of flood risk and promote individual and collective action. Build and maintain relationships between communities, local authorities and the Environment Agency to better prepare for flooding	M6 - Other	2015 - 2021	Low	Rugby District (B)	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
															and enable sustained partnership working. This will create communities that are empowered to proactively manage the impacts of flooding.					
Rugby	Habitable use of basements within Flood Zone 3 should not be permitted	N	N	N	N	N	N	Y	Y	N	N	Y	N	N	Increase awareness of flood risk and promote individual and collective action. Build and maintain relationships between communities, local authorities and the Environment Agency to better prepare for flooding and enable sustained partnership working. This will create communities that are empowered to proactively manage the impacts of flooding.	M6 - Other	2015 – 2021	Low	Rugby District (B)	On going
Rugby	Encourage environmental best practice, sustainable construction, waste management and flood mitigation measures	N	N	Y	N	N	N	Y	N	Y	N	Y	N	N	Increase awareness of flood risk and promote individual and collective action. Build and maintain relationships between communities, local authorities and the Environment Agency to better prepare for flooding and enable sustained partnership working. This will create communities that are empowered to proactively manage the impacts of flooding.	M6 - Other	2015 – 2021	High	Rugby District (B)	On going
Rugby	Nothing Specific	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Improve data available for all flood risk management activities.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going
Rugby	Nothing Specific	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Improve data available for all flood risk management activities.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure	
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic							
Rugby	De-culverting where possible	N	N	Y	N	N	N	Y	N	Y	N	Is there a WFD assessment that covers this action	Y	N	N	Seek opportunities to deculvert wherever possible.	M6 - Other	2015 – 2021	High	Rugby District (B)	On going
Rugby	In line with FD2320. Properties situated within close proximity to formal defences or water retaining structures will require a detailed breach and overtopping assessment to ensure that the potential risk to life can be safely managed throughout the lifetime of the development	N	N	Y	N	N	N	Y	N	Y	N	Is there a WFD assessment that covers this action	Y	N	N	Reduce the risk of flood damage for residential and commercial properties where it is economically viable to do so.	M6 - Other	2015 – 2021	High	Rugby District (B)	On going
Rugby	Safe, dry pedestrian access/ egress up to 100 year plus climate change event and emergency vehicle access possible during times of flood	N	N	Y	N	N	N	N	N	N	N	Is there a WFD assessment that covers this action	Y	N	N	Improve the access to sites where flood risk management operations are undertaken.	M6 - Other	2015 – 2021	Low	Rugby District (B)	On going
Rugby	Any development adjacent to a canal should leave a minimum of an 8 metre wide buffer strip	N	N	Y	N	N	N	Y	N	Y	N	Is there a WFD assessment that covers this action	Y	N	N	Increase awareness of flood risk and promote individual and collective action. Build and maintain relationships between communities, local authorities and the Environment Agency to better prepare for flooding and enable sustained partnership working. This will create communities that are empowered to proactively manage the impacts of flooding.	M6 - Other	2015 – 2021	Low	Rugby District (B)	On going
Rugby	Car parking needs to be safe, especially in terms of flood warning and overnight parking areas.	N	N	N	N	N	N	Y	N	N	N	Is there a WFD assessment that covers this action	Y	N	N	Reduce the impact of flooding.	M6 - Other	2015 – 2021	Low	Rugby District (B)	On going
Rugby	Where there are no alternative options available, and development is required within the highest risk zone 3b, flood risk shall be managed through upstream alleviation in order to bring development in line with national planning policy	Y	N	N	N	N	N	N	N	N	N	Is there a WFD assessment that covers this action	N	N	Y	Endeavour to maintain the functional floodplain.	M6 - Other	2015 – 2021	Moderate	Rugby District (B)	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	Maintain, and where possible, seek to improve accuracy of our flood forecasting and warning capability in those areas where these services currently exist.	Y	N	N	N	N	N	N	N	N	N	Y	N	Y	Forecasting and warning services for residential properties within existing community flood warning areas Forecasting and warning services for commercial properties within existing community flood warning areas Forecasting and warning services for vulnerable communities within existing flood warning areas	M4 - Preparedness	2015 – 2021	Very High	Environment Agency	On going
	Investigate the feasibility of expanding the forecasting and warning service in communities at high fluvial flood risk where no service currently exists.	Y	N	N	N	N	N	N	N	N	N	Y	N	Y	Expand the existing flood forecasting and warning service to provide a service to more residential properties at high fluvial flood risk Expand the existing flood forecasting and warning service to provide a service to more commercial properties at high fluvial flood risk Expand the existing flood forecasting and warning service to provide a service to more commercial properties at high fluvial flood risk	M4 - Preparedness	2015 – 2021	High	Environment Agency	On going
	Promote awareness of fluvial flooding and encourage flood action groups, individuals and businesses to take preparatory actions in high risk communities.	N	N	Y	N	N	N	N	N	N	N	Y	N	Y	Promote awareness of fluvial flooding and encourage vulnerable communities to take preparatory actions in high risk areas. Promote awareness of fluvial flooding and encourage local residents to take preparatory actions in high risk areas. Promote awareness of fluvial flooding and encourage businesses to take preparatory actions in high risk areas.	M4 - Preparedness	2015 – 2021	High	Environment Agency	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
Rugby	The area suffers flooding from both sewers, and surface water. Investigate a scheme that could potentially alleviate flooding problems from both sources.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Low	Warwickshire County	Not started - proposed
Coventry	Some properties on Broad Lane are at potential risk of flooding, as it is believed the culverted section of River Brookstray under Broad Lane is under capacity. There have also been known historic flood events in the area.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	High	Coventry Metropolitan District	Not started - proposed
Coventry	This project could address flooding from the River Sherbourne which occurs in Butt Lane. A potential solution could be property level protection and localised highway raising.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M2 - Prevention	2015 – 2021	High	Environment Agency	Not started - proposed
Shipston-on-Stour	Flooding occurs from the rivers that flow northwards into the village, and from surface water. There have been two potential areas identified for the creation of flood storage, which could alleviate this problem.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Very High	Warwickshire County	Not started - proposed
Fenny Compton	Significant overland flow from surrounding fields has caused surface water flooding through the village. It has been identified that a potential solution could be a flood storage area, new road culvert, and a catch grid.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Very High	Warwickshire County	Not started - proposed
Kenilworth	Property flooding has occurred frequently in the past in the area. In response, the community has established a Flood Action Group and has secured funding for a property level protection scheme.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M2 - Prevention	2015 – 2021	High	Environment Agency	Not started - proposed
Rugby	The predominant flood risk is from the River Leam, flowing from the north/east, but surface water flooding is also an issue, flowing from the south. The proposed solution is property level protection, subject to availability of funding.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Very High	Warwickshire County	Not started - proposed

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure	
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic							
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed	
Southam	Complex flooding issues in Ladbroke are largely due to exceedance of channel capacity on Lot Brook. The issues include overland flood flow from fields, minor highways, surface water drainage systems and Lot Brook (including culvert blockages). There is also believed to be flood risk from flows draining from the bypass. It is also understood that flooding may occur due to the bridge on the old Banbury Road through the village, which may be providing a restriction to large flows.	Y	N	N	N	N	N	N	N	N	N		Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Very High	Warwickshire County	Not started - proposed
Rugby	Surface water flooding to two properties south of Leamington Road. The proposed solution is property level protection, subject to feasibility and funding.	Y	N	N	N	N	N	N	N	N	N		Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Very High	Warwickshire County	Not started - proposed
Snitterfield	A culverted section of the Bell Brook under multiple ownership has been assessed as a failing asset. The Environment Agency are working with the local community to explore opportunities for flood risk management measures and repair of the culvert.	Y	N	N	N	N	N	N	N	N	N		Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M3 - Protection	2015 – 2021	High	Environment Agency	Not started - proposed
Stratford-Upon-Avon	There is an area of historic flood risk immediately adjacent to the Racecourse Brook in Stratford-Upon-Avon. The flooding mechanism is a combination of an undersized culvert, insufficient channel capacity and overland flows. The flood mitigation solution is likely to be above ground flood attenuation, either in one single location, or at a number of locations in the upstream catchment.	Y	N	N	N	N	N	N	N	N	N		Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M3 - Protection	2015 – 2021	Low	Environment Agency	Not started - proposed
Warwick	Flooding from the St Johns Brook should be investigated. Options include a flood storage area and bund.	Y	N	N	N	N	N	N	N	N	N		Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M3 - Protection	2015 – 2021	Moderate	Environment Agency	Not started - proposed

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		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
Coventry	Reduce fluvial flood risk to properties from the Withybrook by increasing the size of culverts, and/or providing storage. Investigate options to reduce amount of flooding from sewers by increasing the capacity of the local sewerage network and increasing the capacity of the pumping station.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M6 - Other	2015 – 2021	Very High	Severn Trent Water	Not started - proposed
	Working in partnership with Risk Management Authorities and communities, as appropriate, to understand the risk of flooding from all sources. Partnership working will develop long term plans to manage the risks with direct involvement from the community in the decision making process.	N	N	Y	N	N	N	Y	Y	N	N	N	N	Y	Work in partnership.	M4 - Preparedness	2015 – 2021	High	Environment Agency	On going
	Reduce the consequences of flooding by enabling communities to take effective action before, during and after a flood.	N	N	Y	N	N	Y	Y	N	N	N	Y	N	N	Promote awareness and local action on flood risk activities, while investigating potential flood mitigation measures.	M4 - Preparedness	2015 – 2021	High	Environment Agency	On going
	Engage with external stakeholders, public bodies and businesses to seek and promote flood risk management/ resilience schemes, to minimise the impact of flooding to community services such as schools, hospitals, nursing/care/retirement homes, police stations, fire and ambulance stations, sewerage treatment works and electricity installations.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the damage caused by flooding.	M3 - Protection	2015 – 2021	High	Environment Agency	On going
	Avoid inappropriate development in areas of flood and coastal erosion risk through application of the Technical Guidance to the National Planning Policy Framework and working in partnership with Lead Local Flood Authorities to create a strong flood protection capability. Seek opportunities to reduce existing and future flood risk through new and future development plans, through consultation with Upper and Lower Tier Authority planning teams.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the damage caused by flooding.	M2 - Prevention	2015 – 2021	High	Environment Agency	On going

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		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
	Reduce flood risk to people and existing residential properties in priority communities.	N	N	Y	N	N	N	N	N	N	N	Y	N	N	Reduce the damage caused by flooding.	M3 - Protection	2015 – 2021	High	Environment Agency	On going
	Minimise the risk of flooding to residential properties by maintaining current levels of flood risk management within areas that already benefit from flood defences, subject to availability of funding.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Undertake maintenance.	M2 - Prevention	2015 – 2021	High	Environment Agency	On going
	Continue appropriate levels of river and watercourse maintenance, subject to availability of funding.	N	N	Y	N	N	N	N	N	N	N	N	Y	N	Reduce the damage caused by flooding.	M2 - Prevention	2015 – 2021	High	Environment Agency	On going
	Reduce the economic damage of flooding to non-residential properties in priority communities, subject to the availability of funding.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the damage caused by flooding.	M3 - Protection	2015 - 2021	High	Environment Agency	On going
	Minimise the economic damage from flooding to non-residential properties by maintaining current level of flood risk management within areas that already benefit from flood defences, subject to availability of funding.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the damage caused by flooding.	M2 - Prevention	2015 - 2021	High	Environment Agency	On going
	Minimise the risk of flooding to key transport links within the catchment such as railway lines, motorways, primary roads and trunk roads, subject to availability of funding.	N	N	Y	N	N	N	N	N	N	N	Y	N	N	Endeavour to maintain working transportation services during and after flooding.	M3 - Protection	2015 - 2021	High	Environment Agency	On going
	Consider the value of agricultural land, the damages that can occur as a result of flooding and the importance of food security within the economic appraisal of decision and investment options.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Work in partnership.	M4 - Preparedness	2015 - 2021	High	Environment Agency	On going
	Contribute to achieving WFD objectives by working with natural processes wherever possible, to manage flood risk through protecting and restoring the natural function of the catchment, rivers and floodplains.	N	N	Y	N	N	N	N	N	N	N	N	Y	N	Endeavour to achieve WFD objectives.	M3 - Protection	2015 - 2021	High	Environment Agency	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action				Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed	
	Minimise the negative impacts of flooding to designated nature conservation sites (SSSI, SPA, SAC and Ramsar sites), wherever possible contributing to the improvement of such sites, subject to availability of funding.	N	N	Y	N	N	N	Y	N	N	N	N	Y	N	Reduce the damage caused by flooding.	M6 - Other	2015 - 2021	High	Environment Agency	On going
	Minimise the negative impacts of flooding to heritage assets and landscape value (SAMs, listed buildings and historic parks and gardens), wherever possible enhancing such assets, subject to availability of funding.	N	N	Y	N	N	N	Y	N	N	N	N	Y	Reduce the damage caused by flooding.	M6 - Other	2015 - 2021	High	Environment Agency	On going	
	WFD objective to address poor water quality.	N	N	Y	N	N	N	N	N	N	N	N	Y	Implement SUDs where possible.	M3 - Protection	2015 - 2021	High	Environment Agency	On going	
	"Identify location where approach recommended by ""Woodlands for Water"" fund can be applied to reduce flood risk. This involves planting trees to increase interception of rainfall and reduce run off rates. It usually also involves strategically placing ""leaky dams"" or other channel obstructions which slow run off from the headwaters of catchments to the more populated areas downstream. "	N	N	Y	N	N	N	N	N	N	N	N	Y	"Recommend where ""Woodlands for Water"" fund can be applied."	M3 - Protection	2015 - 2021	High	Environment Agency	On going	
	WFD objective to de-culvert, endeavour to undertake riparian habitat enhancement, etc	N	N	Y	N	N	N	N	N	N	N	N	Y	Endeavour to seek opportunities to improve heavily modified water bodies.	M6 - Other	2015 - 2021	High	Environment Agency	On going	

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action				Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed	
	We will work with others to continue to improve incident management and the advice and support that we provide on adapting to a changing climate. We will take an integrated approach to our work in catchments and we will engage early with strategic spatial planning and Local Enterprise Partnerships (LEPs), or equivalent, to help enable sustainable growth and avoid delays to development. Work with local authorities, coastal groups and others to ensure that strategic plans take account of evidence and knowledge. Work with other organisations to help them make the best use of our risk information, including the insurance industry. Continue to implement and enhance the partnership funding approach with other risk management authorities and beneficiaries to increase and broaden the funding for investment in flood risk management.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Work in partnership.	M4 - Preparedness	2015 - 2021	High	Environment Agency	On going
	Through our investment in flood risk management infrastructure we not only reduce the risks of flooding and the costs associated with flooding incidents, but also support growth by helping to create new jobs and by bringing confidence to areas previously affected by floods. Ensure that investments in flood and coastal risk management provide environmental benefits wherever possible.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Endeavour to reduce the cost of flooding.	M6 - Other	2015 - 2021	High	Environment Agency	On going
	We also help to support sustainable growth through planning and development by contributing to local strategic growth initiatives including Local Enterprise Partnerships (LEPs), or equivalent, and Enterprise Zones.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the damage caused by flooding.	M2 - Prevention	2015 - 2021	High	Environment Agency	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	Target resources to reduce the risk of flooding to communities with the highest flood risk. Promote a greater awareness and understanding of the risks of flooding, particularly in those communities at high risk, and encourage and enable householders, businesses and communities to take action to manage the risks.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Increase awareness of flood risk and promote individual and collective action. Build and maintain relationships between communities, local authorities and the Environment Agency to better prepare for flooding and enable sustained partnership working. This will create communities that are empowered to proactively manage the impacts of flooding.	M4 - Preparedness	2015 - 2021	High	Environment Agency	On going
	Promote awareness and provide advice on the need to avoid inappropriate development in areas at flood risk and the need to manage land to avoid increasing risks. Modernise and effectively communicate our land drainage consent process.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the damage caused by flooding.	M4 - Preparedness	2015 - 2021	High	Environment Agency	On going
	When a flood happens, we work with the emergency services and local authorities to minimise the harm to people and property. We provide leadership in reservoir safety and ensure that other services managing critical national infrastructure are aware of their risk and take action to manage it with the support of the emergency services.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the impact of flooding.	M4 - Preparedness	2015 - 2021	High	Environment Agency	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	Action Owner	On-going, agreed or proposed
	Help develop and promote a better understanding of flood and coastal erosion risk. Improve and update our assessment of flood and coastal risk in England, incorporating climate change impacts. Review and update flood hazard and risk maps for England by 2019. Improve evidence, information, and mapping and modelling tools to understand better the risks of flooding and coastal erosion and to support better decisions and greater resilience. Make flood and coastal risk information more accessible, taking account of social and technological change and opportunities, such as the increasingly widespread use of social media.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Improve data available for all flood risk management activities.	M4 - Preparedness	2015 - 2021	High	Environment Agency	On going
Charlton	Charlton community engagement. Work with the community groups and the Parish Council to promote land management to reduce flood risk and encourage taking action to prepare for flooding within the village.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	Environment Agency	On going
	Rapid response catchment awareness in Badsey Brook. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	Environment Agency	On going
Severn River Basin District	Review System Asset Management Plans regularly with regard to maintenance, funding requirements and asset condition related works across each catchment. Utilise data from SAMPS, updated surveys & modelling to develop a more strategic approach to routine management & maintenance of the catchments.	Y	N	N	N	N	N	N	N	N	N	N	N	Y	Ensure current and future investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	Moderate	Environment Agency	On going

Action Location	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		Social	Environment	Economic						
											Is there a WFD assessment that covers this action									
	Work closely with local planning authorities, developers, businesses and infrastructure operators to avoid inappropriate development through the planning process.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent an increase in harm to life, as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency	On going
	Maintain community warnings to reduce risk to isolated communities. Undertake study to assess feasibility of extension of Flood Warning service to warn for flooding from Tirle, Carrant and Swilgate. Undertake study on feasibility of pluvial warnings.	Y	N	N	N	N	N	N	N	N	N	N	Y	N	To improve flood warning procedures to reduce potential risk to communities by extending the coverage of the flood warning service, especially in areas where social vulnerability is high. Reduce or prevent an increase in harm to life, as a result of flooding.	M4 - Preparedness	2015 - 2021	Moderate	Environment Agency	On going
Severn River Basin District	Work with landowners, local and national Government, to encourage best farming practices to reduce rapid surface water runoff and soil erosion. For example, reduction of surface ponding, cropping techniques and soil management plans. Contribute to research and development to identify best practice for reducing runoff through land use change.	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status.	M3 - Protection	2039 +	Moderate	Environment Agency	On going
	Continue to work with Northamptonshire County Council to support the implementation and review of the Local Flood Risk Management Strategy to further improve our understanding of flood risk to local communities from all sources of flooding and improve our joint approach to manage this risk.	N	N	Y	N	N	N	N	N	N	N	N	Y	N	Working in partnership with Risk Management Authorities, other organisation and communities (as appropriate) to understand the risk of flooding from all sources. Partnership working will develop long term plans and secure funding to manage the risks, with direct involvement in the decision making process	M2 - Prevention	Pre 2015	High	Environment Agency	On going

Action Location	Action Details	Source of flood risk or coastal erosion								Contribution to WFD Outcomes	Category of objective			Objective	Measures	Timing	Priority	Responsible authority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding		Sewer flooding	Social	Environment						
										Is there a WFD assessment that covers this action					<i>Prevention, protection, preparedness etc</i>	<i>FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc</i>	<i>Critical, Very High, High, Moderate, Low</i>	<i>Action Owner</i>	<i>On-going, agreed or proposed</i>
														by those affected.					

12.6. The Severn Vale catchment

Introduction to the catchment

The Severn Vale catchment extends from Lydney and Dursley in the south to Ledbury and Great Malvern in the north covering an area of 1,465 km². It includes the lower reach of the fluvial River Severn and its tributaries among which are the Rivers Leadon and Chelt. Below Gloucester the River Severn enters the tidal Severn Estuary into which enter tributaries such as the River Lyd on the west bank and River Frome on the east bank .

The landscape is mostly low lying including the wide valley of the River Severn running north to south, but is bounded by higher upland areas such as the heavily wooded Forest of Dean in the South West, the grass uplands of the Cotswold escarpment to the east and the Malvern Hills in the north.

Land use and management

The land use within the catchment is mainly agricultural (Grade 3 – good to moderate land quality or better), with a mixture of farming. Tourism and small business are also key to the financial wellbeing of the area and is based in a number of urban centres including Gloucester, Cheltenham, Stroud, Tewkesbury, Lydney, Cinderford, Malvern and rural communities.

Watercourses within the catchment are used for a variety of activities including recreation, public water supply, fisheries and conservation.

Geology

Geology in the Severn Vale area is divided in broadly the same way as the topography, with clays and mudstones across the wide Severn Valley. These lie close to the groundwater table for much of the year and are frequently saturated with standing water across the floodplain. When this happens, rainfall is slow to drain away and may lead to localised flooding even when the River Severn is not in flood.

Limestones, sandstones and igneous rocks form the higher ground of the Forest of Dean, Cotswolds and Malvern Hills. These areas are permeable and can absorb rainfall, but the slopes are often steep which causes rainwater to run-off the land. There are also numerous groundwater springs in these areas, which respond to prolonged periods of rainfall or seasonal variations in climate and make a significant contribution to the flow in many rivers. The limestone formations of the Cotswolds are nationally significant aquifers, which are used for supplying drinking water.

National and international designations

There are many designated areas of nature conservation importance located within the catchment. A relatively large area of the catchment, the Severn Estuary and Walmore Common, are internationally important wetland habitats and so are designated as Special Protection Areas (SPAs) and Ramsar sites (under the Ramsar Convention).

There are also several internationally designated Special Areas of Conservation (SACs). In addition, there are many Sites of Special Scientific Interest (SSSIs) and one National Nature Reserve (NNR) within the catchment that are known for their species, habitats or geology. These designated sites cover a significant area of the catchment and the way in which they are managed can have an effect on the risk of flooding (by affecting the surface run-off into the River Severn and its tributaries).

The Severn Vale is also partially situated within the Cotswolds Area of Outstanding Natural Beauty (AONB) and contains the Malvern Hills AONB. These areas are rich in natural beauty and biodiversity, with a number of internationally and nationally designated landscape habitats.

Partnership working

Within the Severn Vale Catchment the Environment Agency has developed good working relationship with our partners. These include, but are not limited to local councils. The catchment is covered by one unitary and eight local councils, Herefordshire Council, Malvern Hills District, Tewkesbury Borough, Cheltenham Borough, Gloucester City, Stroud District and Forest of Dean District with small parts of Cotswold District and Wychavon District.

We also work closely with the English Severn & Wye Regional Flood and Coastal Committee, Lower Severn Internal Drainage Board, Severn Trent Water plc, Canal & River Trust, National Farmers Union and Natural England.

Historic flooding

Flooding within the Severn Vale catchment can be divided into two categories, fluvially led or tidal. It is rare to have a combination of a significant event on both, though one will always influence the other, especially in the area stretching from Haw Bridge down to Minsterworth.

There is a well documented history of fluvial flooding within the catchment, especially along the River Severn from Worcester to Gloucester. The most severe recent events occurred in July 2007 and 1947 when significant numbers of properties were affected on the River Severn and its tributaries between Worcester and Gloucester.

Flooding occurs regularly within the River Severn valley and affects small numbers of properties mainly in rural communities as well as some properties in the city of Gloucester and town of Tewkesbury.

Other events such as those experienced in January/February 2014 and October- December 2000 have also caused widespread disruption. The most recent flooding in 2014 affected around 150 homes and businesses (source: Tewkesbury Borough Council).

Tidal events are rarer with the most recent incidents occurring in the beginning of 2014 where a series of high tides resulted in the overtopping of some flood defences below Gloucester.

Current flood risk

Parts of the urban areas of Gloucester, Tewkesbury and Upton upon Severn and a number of smaller rural communities are at risk of flooding from the River Severn. Small numbers of properties are affected frequently by flooding but generally large scale property flooding is not seen until the larger River Severn events.

The River Severn has floodplains of over 1 mile wide in the lower reaches. Road flooding causes access issues and travel disruption. Water can take many weeks to drain from the floodplain and this delays the recovery of the communities affected by flooding.

Flooding from some of the smaller catchments such as the River Chelt, Horsbere Brook, Dimore Brook, River Twyver, Daniels Brook and Sud Brook will affect some of the larger urban areas of Gloucester and Cheltenham.

There are a number of catchments where river levels react quickly to rainfall, including in the Forest of Dean, Gloucester and the Stroud Valleys. The River Lyd (Lydney), Cinderford Brook (Ruspidge), Slad Brook (Slad Valley) and the River Chelt (Charlton Kings) are rapidly responding catchments where there is a high risk to communities.

Flood alleviation schemes existing prior to the floods of 2007 include those at Cheltenham (River Chelt), Deerhurst, Ashleworth and Lydney town centre.

A number of communities along the Severn Estuary are at risk of tidal flooding. The western edge of Gloucester City and associated communities are also at risk from tidal events. Many of these areas are currently defended by embankments or walls with varying standards of service. Tidal flood risk and proposals for how this should be managed for the next 100 years has been set out in the draft Severn Estuary Flood Risk Management Strategy, published in May 2013.

There are also a number of communities and urban areas within the catchment that are at risk of surface water, ordinary watercourse and sewer flooding.

In July 2007, many of the 5,000+ properties that flooded in Gloucestershire from main river, ordinary watercourse and surface water flooding were in this catchment.

Recent flood risk management work

Since 2007, flooding has been alleviated for a number of communities by constructing or improving a number of flood defence schemes within the catchment. These include Kempsey, Upton upon Severn, Uckinghall, Deerhurst, The Leigh, Deerhurst Walton, Station Road Lydney, Prestbury, Cheltenham and parts of Gloucester associated with Horsbere and Daniels Brooks. Some of these have been community led schemes. Many of these schemes protected properties in subsequent flooding in 2012 and 2014.

Following the high tide events of early 2014 a full assessment was undertaken of all the tidal defences down the estuary. Repair and improvement works were then scheduled over the summer/autumn of 2014 to rectify any issues.

Key statistics

Table 12.6.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Severn Vale catchment.

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	501901	2585	4063	12318	4267
Number of services:	1076	34	13	33	18
Risk to economic activity:					
Number of non-residential properties:	75727	1200	1141	3051	1032
Number of airports:	1	0	0	0	0
Length of roads (km):	400	8	5	14	9
Length of railway (km):	118	3	6	8	2
Agricultural land (ha):	106151	5696	2920	2688	1115
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	34	4	2	2	2
Area of SAC within area (ha):	1090	286	4	4	0
Area of SPA within area (ha):	482	282	194	4	0
Area of RAMSAR site within area (ha):	482	282	194	4	0
Area of World Heritage Site within area (ha):	0	0	0	0	0
Area of SSSI within area (ha):	3909	553	245	13	11
Area of Parks and Gardens within area (ha):	1728	54	11	10	24
Area of Scheduled Ancient Monument within area (ha):	555	7	1	13	1
Number of Listed Buildings within area:	7530	179	80	351	75
Number of Licensed water abstractions within the area:	314	74	19	17	5

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency.

Table 12.6.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Severn Vale catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	501901	16419
Number of services:	1071	29
Risk to economic activity:		
Number of non-residential properties:	75727	2414
Number of airports:	1	0
Length of roads (km):	400	26
Length of railway (km):	118	1
Agricultural land (ha):	106151	1983
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	34	2
Area of SAC within area (ha):	1090	19
Area of SPA within area (ha):	482	48
Area of RAMSAR site within area (ha):	482	48
Area of World Heritage Site within area (ha):	0	0
Area of SSSI within area (ha):	3909	129
Area of Parks and Gardens within area (ha):	1728	86
Area of Scheduled Ancient Monument within area (ha):	555	2
Number of Listed Buildings within area:	7530	248
Number of Licensed water abstractions within the area:	314	27

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The reservoirs flood map has been developed and published by the Environment Agency.

Conclusions and objectives for the Severn Vale catchment

We have set out the following for the Severn Vale catchment:

Conclusions

The Severn Vale has a wide variation of flooding issues ranging from extended periods of elevated levels within the River Severn Valley that affect many rural communities, watercourses which respond rapidly to rainfall and tidal flooding from the Severn Estuary.

Flooding from the River Severn between Gloucester and Worcester occurs regularly. While the more commonly occurring events are disruptive to local communities, the number of properties directly affected is relatively low.

During larger events such as that experienced in 2007 there are significant numbers of properties affected throughout the catchment. National and regional infrastructure, including utility sub stations and major transport routes, are also affected. Flood risk is likely to increase with climate change.

There are a number of rivers that can respond quickly to rainfall that affect rural and some urban communities such as Lydney, Cinderford, Cheltenham, Gloucester and the Stroud Valleys. Flood levels on these watercourses may rise suddenly and in the rapidly responding rivers result in a risk to life. It is difficult to provide accurate and timely warnings in such locations and these events may become more common as a result of climate change.

There are also a number of communities and urban areas within the catchment that are at risk of surface water, ordinary watercourse and sewer flooding. It is likely that these issues will become more pronounced and regular as a result of climate change where it is difficult to upgrade current infrastructure.

Tidal flood risk will increase as sea levels rise with climate change.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will alleviate flooding from multiple sources, as well as providing wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development.

Objectives

The following objectives apply to this management catchment, where possible.

Social:

- reduce or prevent an increase in harm to life as a result of flooding
- improve flood warning services on catchments that react rapidly to rainfall
- minimise community disruption by reducing impact of flooding by increasing preparedness through improved flood warning service and public awareness
- locate development in areas at lowest risk of flooding
- increased understanding and management of flood risk impacts
- continue to work with utility providers to improve resilience of infrastructure and services
- continue to work with other bodies to improve resilience to the communication network and transport links
- contribute to recreational amenity & cultural heritage conservation through managing flood risk
- maintain existing assets that protect people where economically viable or find suitable alternatives by working in partnership with communities

Economic:

- reduce economic damage to commercial properties
- reduce flood risk to private properties
- reduce flood risk to agricultural land
- reduce risk of flooding to major infrastructure
- ensure current and future investment in the catchment is proportional to flood risk
- contribute to integrated catchment water management &/or sustainable drainage approach

Environmental:

- take opportunities to restore sustainable natural storage of floodwater in the upstream area, in order to offset increasing flood risk from trends including climate change
- improve water environment through flood risk management activities
- improve hydro-morphology of rivers

- minimise impacts of flooding on designated sites or areas of environmental interest
- create habitat through flood risk management activities
- achieve WFD objectives through flood risk management

Measures in the Severn Vale catchment

Measures that are relevant to this catchment are included in the RBD and Severn England level measures shown in Sections 9 and 10. In addition, there are measures specific to this catchment as follows:

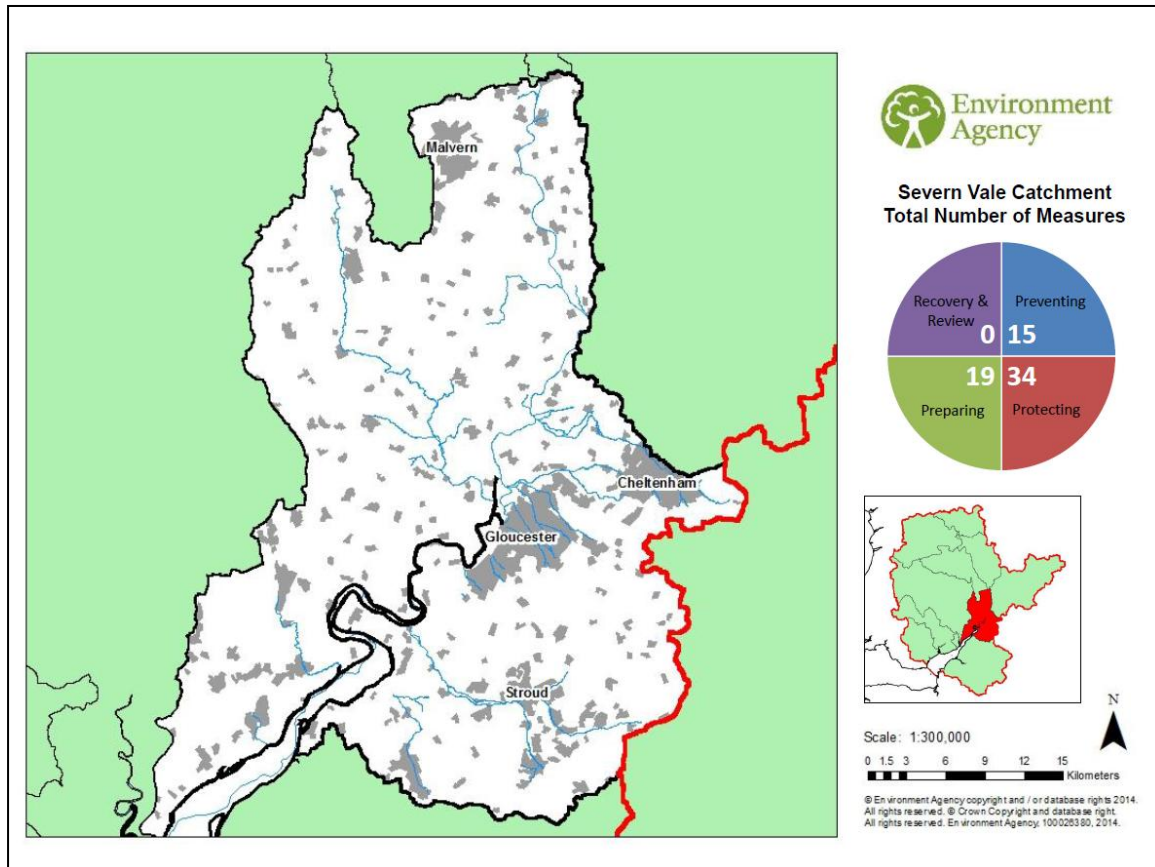


Figure 12.6.1 Total number of specific measures in the Severn Vale catchment

These can be further broken down into on-going, agreed and proposed measures as set out below.

Ongoing measures specific to the Severn Vale catchment

Across the Severn Vale catchment there are 55 on-going measures to manage flood risk. These include;

Preventing risk: There are 14 measures already in place to prevent flood risk in the catchment.

- ensure planning authorities are aware of CFMP policy 3 in the Severn Vale catchment;
- continue with maintenance and warning at Deerhurst;
- maximise opportunities to advise and support land use allocation in the Frome catchment;

- The Shoreline Management Plan is taken into account in Strategic Flood Risk Assessments for council development/land use plans;
- A number of measures relate to the Severn Estuary, which have been taken from the Severn Estuary Flood Risk Management Strategy (10 measures in various locations along the Estuary);

Preparing for risk: There are 17 measures already in place to prepare for flood risk that are specific to this catchment.

- measures to encourage communities to take action to prepare for flooding in Gloucester (including the Saintbridge area) and along the Severn Estuary (3 measures);
- work with communities in Kempsey, Charlton Kings, Ruspidge, Lydney and along the Slad Brook, to raise awareness of flood risk and produce flood plans (5 measures);
- improve communications with stakeholders in Gloucester;
- work with communities in Gloucester to promote property level protection measures;
- and also to take opportunities where possible to ensure that the impact of current restrictions across the Alney Island floodplain can be reduced, and that new developments do not exacerbate the situation;
- On the Severn Estuary there are a number of measures taken from the Severn Estuary Flood Risk Management Strategy. These relate to a number of locations along the estuary (6 measures).

Protecting from risk: There are 22 measures already in place that protect from flood risk that are specific to this catchment. These include

- measures to continue the maintenance of the Gloucester Streams;
- review maintenance operations;
- review the effectiveness of raised defences within the catchment;
- determine the impacts of removal of defences in the Chelt basin;
- maintain current conveyance;
- agree a vision for the redevelopment of the river channel to inform planners;
- ensure environmental issues are taken into account in the management and maintenance of defences;
- continue discussion about the possible future removal of agricultural defences;
- reconnect rivers to the floodplains for flood storage in the catchment;
- On the Severn Estuary there are measures that have been taken from the Severn Estuary Flood Risk Management Strategy. These relate to a number of locations along the estuary (13 measures).

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Agreed measures specific to the Severn Vale catchment

Across the Severn Vale catchment there are 10 agreed measures to manage flood risk. These include:

Preventing risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Preparing for risk: There are 2 measures that are agreed to prepare for flood risk that are specific to this catchment.

- understand the feasibility of providing a flood warning service to the Gloucester Streams;
- incorporate data from existing tidal gauges between Sharpness and Gloucester into the long term monitoring of sea level rise;

Protecting from risk: There are 8 measures that are agreed that protect from flood risk that are specific to this catchment.

- work with the community at Alney Island to assess the feasibility of raising the existing defences;
- investigate measures to protect the defences at Minsterworth from erosion;
- promote the use of rural sustainable drainage systems in the Frome catchment (Stroud Valleys);
- determine the benefit of the defences in the Leadon catchment
- There are also a number of measures relating to the Cotswolds, including implementing ways of holding more water in the upper catchment and reviewing the maintenance regimes with a view to holding more water upstream; working in partnership with Natural England to seek opportunities to increase storage in the upper catchment; and working with Cotswold AONB to encourage appropriate land use change to reduce the impacts of flooding (4 measures).

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures specific to the Severn Vale catchment

In the Severn Vale catchment there are 5 measures proposed to manage flood risk from 2015 and beyond. These include:

Preventing risk: There is 1 measure proposed to prevent flood risk that is specific to this catchment.

- working with communities along the River Cam to raise awareness of flood risk;

Preparing for risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Protecting from risk: There are 4 measures proposed that protect from flood risk that are specific to this catchment.

- work with the communities to assess the feasibility of increasing the standard of protection of defences at Westbury on Severn and Upper Framilode (2 measures);
- assess the feasibility of constructing a flood alleviation scheme at Severn Stoke;
- investigate opportunities for the improvement of existing defences in the Hempsted and The Rea area of Gloucester.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Other measures to manage risk specific to the Severn Vale catchment

There are 2 other measures in the FRMP which do not fall within the above four categories.

- reduce flood risk by working with the Stroud Water Canal restoration project;
- ensure environmental issues are taken into account in the design and construction of new defences on the Severn Estuary.

More detail on the specific objectives and measures is included in table 12.6.3.

Table 12.6.3. The Severn Vale catchment – measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Community engagement - Saintbridge	Saintbridge community engagement. Work with Gloucester City Council to encourage taking action to prepare for flooding within the community.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Moderate	On going
Community engagement - Gloucester	Gloucester community engagement. Work with the communities within Gloucester to encourage taking action to prepare for flooding within the city.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Moderate	On going
Community engagement - Severn Estuary	Severn Estuary community engagement. Work with communities along the Severn Estuary to encourage taking action to prepare for flooding.	Y	N	N	Y	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	High	On going
Community flood plan - Kempsey	Kempsey community flood plan. Work with the community to produce a community flood plan.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	High	On going
Rapid response catchment awareness - Slad Brook	Rapid response catchment awareness in Slad Brook. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Rapid response catchment awareness - Charlton Kings	Rapid response catchment awareness in Charlton Kings. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Flood defence Improvements - Alney Island	Work with the community to assess the technical, environmental, and economic feasibility of using public money to raise the standard of protection of the Alney Island defences. Implement scheme with contribution from public funding if meets criteria and funding is available. Seek partnership funding contributions as necessary.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - agreed
Rapid response catchment awareness - Ruspidge	Rapid response catchment awareness in Ruspidge. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Very High	On going
Flood defence improvements - Westbury-on-Severn	Work with the community to assess the technical, environmental, and economic feasibility of using public money to increase the standard of protection of the Westbury on Severn estuary defences within the next 10 years. Implement scheme with contribution from public funding if meets criteria. Seek partnership funding contributions as necessary.	Y	N	N	Y	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Flood Alleviation Scheme - Severn Stoke	Work with the community to assess the technical, environmental, and economic feasibility of using public money to construct a flood alleviation scheme at Severn Stoke. Implement scheme with contribution from public funding if meets criteria. Seek partnership funding contributions as necessary.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Flood defence improvements - Upper Framilode	Work with the community to assess the technical, environmental, and economic feasibility of using public money to increase the standard of protection of the Upper Framilode estuary defences within the next 10 years. Implement scheme with contribution from public funding if meets criteria. Seek partnership funding contributions as necessary.	Y	N	N	Y	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Identify measures to reduce flood risk - Cam	Work with communities along the River Cam to raise awareness of flood risk and to identify measures to reduce flood risk/improve resilience.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M2 - Prevention	2015 - 2021	Moderate	Not started - proposed
Erosion Protection - Minsterworth	Investigate sustainable and cost effective measures to protect the existing Minsterworth flood defences from erosion. Implement measures (subject to funding).	N	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Very High	Not started - agreed
Flood defence improvements - Hempsted and Rea	Investigate opportunities for the improvement of existing defences to reduce flood risk to properties and businesses in the Hempsted and Rea area of Gloucester.	N	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure								
Rural SuDS Pilot - River Frome Stroud Valleys	Promote the use of Rural Sustainable Drainage Systems (RSuDS) in the Frome catchment, Stroud Valleys to help reduce flood risk, control sediment and improve water quality. Work with partners and communities to carry out measures on demonstration sites.	Y	N	N	N	N	N	N	N	N	Sediment management strategies (develop / revise and implement)	N	Y	Y	Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture. Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M3 - Protection	2015 - 2021	Moderate	Not started - agreed
Rapid response catchment awareness - Lydney	Rapid response catchment awareness in Lydney. Work with communities and LRF partners to encourage community to prepare for flooding by setting a trigger and creating a plan so they can respond to flooding.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Moderate	On going
Promote PLP measures - Gloucester	Work with communities in Gloucester to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	N	N	Y	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M4 - Preparedness	2015 - 2021	High	On going
Reduce impact of restrictions across Alney Island	Take opportunities where possible to ensure that the impact of current restrictions across the Alney Island floodplain can be reduced, and that new developments do not exacerbate the situation	N	N	Y	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M4 - Preparedness	2015 - 2021	High	On going
Discuss future removal of agricultural defences	Continue discussions about the possible future removal of the downstream agricultural defences, e.g. at Minsterworth Ham.	Y	N	N	N	N	N	N	N	N		Y	Y	Y	Ensure current and existing investment in the catchment is proportional to flood risk. Reduce the number of properties affected by flooding. Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M3 - Protection	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Determine benefit of existing defences - Leadon	Determine the benefit of existing raised defences within the Leadon catchment	Y	N	N	N	N	N	N	N	N	Removal or modification of engineering structure	N	Y	Y	Ensure current and existing investment in the catchment is proportional to flood risk. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status.	M3 - Protection	2015 - 2021	Low	Agreed
Improve communication with stakeholders Gloucester	Continue with and further improve communications with stakeholders, especially other flood management operation authorities in Gloucester. Encourage the establishment of fluvial consultation groups, to improve communications	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M4 - Preparedness	2015 - 2021	Moderate	On going
Improve flood warning service - Gloucester Streams	Understanding feasibility of providing flood warning service to Gloucester Streams	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life as a result of flooding. Reduce or prevent an increase in flood risk to critical infrastructure communication and transport links.	M4 - Preparedness	2015 - 2021	Moderate	Agreed
Reconnect rivers to floodplains for flood storage	Reconnect rivers to the floodplains for flood storage whilst incorporating benefits for the environment	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures. Protect and enhance, where possible naturally functioning rivers and floodplains. Help maintain and enhance priority habitats and species in line with BAP targets.	M3 - Protection	2015 - 2021	Moderate	On going
Holding more water in upper catchment - Cotswolds	Implement ways of holding more water in the upper catchment and demonstrate the feasibility and funding of these methods. Methods considered should include installation of SuDS and retaining existing capacity of undersized culverts in upper catchments where appropriate	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Help maintain and enhance priority habitats and species in line with BAP targets	M3 - Protection	2015 - 2021	Moderate	Agreed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Review maintenance regimes - Cotswolds	Review maintenance regimes to hold more water upstream	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Help maintain and enhance priority habitats and species in line with BAP targets	M3 - Protection	2039 +	Moderate	Agreed
Work with NE to increase storage - Cotswolds	Work with Natural England to seek opportunities to increase storage in the upper catchment through detention basins that benefit the environment, encouraging activities that may have potential to reduce runoff rates to downstream areas, whilst contributing wider benefits (biodiversity, soil conservation and water quality improvements)	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Help maintain and enhance priority habitats and species in line with BAP targets	M3 - Protection	2015 - 2021	Moderate	Agreed
Vision for redevelopment of river channel	Agree a vision for the redevelopment of the river channel to inform planners, developers and riparian owners. The Strategic Flood Risk Assessment is an agreed approach between the Local Planning Authority and Environment Agency for allocating the location of future development and should be a living document.	N	N	Y	N	N	N	N	N	N	1.Modify channel	N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent and increase in harm to life, as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure.	M3 - Protection	2015 - 2021	High	On going
Continue maintenance - Gloucester Streams	Continue existing programme of maintenance in the Gloucester Streams. Efficiencies and improvements should be sought to maintain existing flood risk into the future.	Y	N	N	N	N	N	N	N	N		Y	Y	N	Reduce or prevent an increase in harm to life as a result of flooding. Protect and enhance, where possible, naturally functioning rivers and floodplains.	M3 - Protection	2015 - 2021	Low	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Ensure planning authorities aware of CFMP policy 3 - Severn Vale	Ensure planning authorities are aware of the implications of the adoption of CFMP policy 3 in this area. Policy 3 is: Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase overtime from this baseline).	N	N	Y	N	N	N	N	N	N		N	N	Y	Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment. Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures. Protect and enhance, where possible, naturally functioning rivers and floodplains.	M2 - Prevention	2015 - 2021	High	On going
Continue maintenance and warning - Deerhurst	Continue with defence and channel maintenance and flood warning at Deerhurst	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M2 - Prevention	2015 - 2021	High	On going
Continue maintenance and warning - Severn Vale	Continue with channel maintenance and flood warning in Kempsey, Severn Stoke, Hanley Castle, Upton on Severn, Bushley, Tewkesbury, Chaceley, Apperley, Tirley, The Haw, Leigh, Wainlode, Ashleworth, Longridge	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so.	M3 - Protection	2015 - 2021	High	On going
Maintain current conveyance	Maintain current conveyance by keeping channels clear and free from obstructions. Reflect importance of WFD by retaining woody debris, gravel riffles etc in watercourse	Y	N	N	N	N	N	N	N	N	40.Woody debris	N	Y	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Encourage a more natural management of the river and its floodplain to help deliver WFD target of good ecological status.	M3 - Protection	2015 - 2021	Moderate	On going
Work with Cotswolds AONB for appropriate land use	Work with the Cotswolds AONB to encourage appropriate land use change	N	N	Y	N	N	N	N	N	N		N	Y	N	Help maintain and enhance priority habitats and species in line with BAP targets	M3 - Protection	2039 +	Moderate	Agreed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Restoration project - Stroud Water Canal	Maximise opportunities to reduce flood risk by working with the Stroud Water Canal restoration project.	N	N	Y	N	N	N	N	N	N		Y	Y	Y	Reduce disruption resulting from flooding to key services and critical infrastructure. Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment Protect and enhance, where possible, naturally functioning rivers and floodplains.	M6 - Other	2015 - 2021	Moderate	On going
Development within Frome catchment	Ongoing work with regeneration and development within Frome catchment. Maximise opportunities to advise and support land use allocation / development control in the Frome catchment	N	N	Y	N	N	N	N	N	N		Y	Y	Y	Reduce disruption resulting from flooding to key services and critical infrastructure. Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment Protect and enhance, where possible, naturally functioning rivers and floodplains.	M2 - Prevention	2015 - 2021	Moderate	On going
Review maintenance operations	Review maintenance operations. Work with land owners and land managers to identify opportunities for reducing the intensity of our maintenance operations. Review maintenance operations in line with the findings of Defra's R and D Technical Report FD1920/TR.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Review effectiveness of raised defences	Review the effectiveness of all raised defences (including use of temporary defences, where applicable). Determine the impact of removal / non-maintenance of defences on flooding in this catchment and elsewhere. High value agricultural assets should be included in the economic assessment of the ongoing viability of the defences. Undertake a study to determine the impact of removal / non-replacement of defences. Work with landowners that maintain private defences to ensure	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	N	Y	Protect and enhance, where possible, naturally functioning rivers and floodplains. Ensure current and existing investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
	that our management aims are complementary																		
Impacts of reduction of defences in Chelt basin	Undertake study to determine the impacts of removal or reduction of flood defences in the Chelt basin on flood risk downstream. Depending on the outcome of the study, longer-term actions may include: Reduce maintenance of agricultural defences (non-replacement after they have reached their design life). Work with local land owners to determine future management of agricultural defences.	Y	N	N	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	N	Y	Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture. Ensure current and existing investment in the catchment is proportional to flood risk	M3 - Protection	2015 - 2021	Low	On going
Shoreline Management Plan included in strategic planning	The Shoreline Management Plan is taken into account in Strategic Flood Risk Assessments for council development / land use plans	Y	N	N	Y	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce or prevent and increase in harm to life, as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	High	On going
Environmental consideration for defences	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. To	Y	N	N	Y	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland	N	Y	N	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures. Help maintain and enhance priority habitats	M3 - Protection	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
	prevent disturbance to birds										habitats				and species in line with BAP targets.				
Encourage resilience of utilities - Severn Estuary	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding from Severn Estuary. Develop a flood resilience and adaptation plan as appropriate.	Y	N	N	Y	N	N	N	N	N		Y	N	N	Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	Moderate	On going
Encourage resilience of railway line - Severn Estuary	Encourage Network Rail to undertake an assessment of the current and future risks and resilience to flooding of the railway line on Severn Estuary. Develop a flood resilience and adaptation plan as appropriate	Y	N	N	Y	N	N	N	N	N		Y	N	N	Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	Moderate	On going
Environmental consideration new defences – Severn Estuary	Ensure environmental Issues are taken into account in the design/construction of new defences on Severn Estuary	Y	N	N	Y	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures.	M6 - Other	2015 - 2021	High	On going
Engage with English Heritage on defences - Severn Estuary	Engage with English Heritage/County Archaeologist on replacement of defences/flood risk management on Severn Estuary	Y	N	N	Y	N	N	N	N	N		N	Y	N	Sustain and protect sites of historic and cultural value from flooding.	M2 - Prevention	2015 - 2021	High	On going
Maintain & sustain defences - Minsterworth	Maintain and then sustain the current standard of protection by raising the defence at Minsterworth in response to climate change. Subject to availability of funding.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Maintenance - Minsterworth Ham	Carry out maintenance at Minsterworth Ham as long as the economic benefits outweigh the costs of doing the work. Subject to availability of funding.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going
Alternative flood risk options – Minsterworth Ham	If a point is reached when EA is unable to continue to maintain the Minsterworth Ham defence and/or a tipping point reached in terms of increased flood frequency, options include: Landowners taking on responsibility for the maintenance of defences; Do nothing and allow standard of protection to reduce; Explore a voluntary managed realignment scheme; Adapt properties and farming activities to become more resilient to flooding. Continue to discuss potential options for future flood risk management on Minsterworth Ham with landowners.	Y	N	N	N	N	N	N	N	N	13.Realign flood defence	N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Maintain & sustain defences - Newnham & Westbury	At Newnham and Westbury the EA intends to continue to maintain and repair defences (as funds allow) and to then sustain the current standard of protection by raising the defence in response to climate change (as funds allow).	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Flood Risk management - Westbury Court Gardens	The National Trust is currently considering flood risk management options for Westbury Court Gardens. The EA will work with the NT to secure flood risk and environmental benefits for the area.	N	N	Y	N	N	N	N	N	N	Improvement to condition of riparian zone and/or wetland habitats	N	Y	N	Sustain and protect sites of historic and cultural value from flooding.	M3 - Protection	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Maintain & sustain defences - between Cleeve and Rodley, and at the Noards	Continue to maintain the embankments between Cleeve and Rodley and at the Noards (as funds allow) and to then sustain the current standard of protection if sea level rises over 0.3m (as funds allow). Raising the height of the defences on their existing line or realigning them inland are both options that could be considered with landowners at that time. Earlier managed realignment of defences may be an option should landowners wish to consider this.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Prolong life of defence with landowners - Awre	EA to work with landowners at Awre to prolong the life of the existing defences through a 'make-do' option where each carries out agreed maintenance activities to ensure the necessary level and frequency of maintenance continues. EA activities are subject to funding. This option recognises that tide, storm or overtopping may result in the flood defences not functioning effectively and land flooding. It does not include any non-routine repair or refurbishment that may be needed in the future. If a tipping point is reached in terms of increased flood frequency, options include: Landowners taking on responsibility for the maintenance of the defences; Do nothing and allow standard of protection to reduce; Explore a voluntary managed realignment scheme; Adapting farming activities to become more resilient to flooding.	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce or prevent an increase in the economic losses from flooding to agricultural land in the catchment. Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	Moderate	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Maintain & sustain defences - Lydney & Ayleburton	The EA intends to maintain the defences (as funds allow), and then sustain the current standard of protection by raising defences at Lydney and Ayleburton New Grounds in response to climate change. The Lydney and Ayleburton defences are not expected to need to be raised until towards the end of the century. This depends on the ongoing condition of the defences and how much actual sea level rise is experienced. At that time strengthening the existing defences or realigning them inland could be considered. Earlier managed realignment of defences may be an option, should landowners wish to consider this.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Maintain & sustain defences - Quedgeley, Rea & Hempsted	EA intends to continue to maintain the defences (as funds allow) and to sustain the current level of protection by raising the defences in response to climate change (as funds allow).	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Maintain defence - Elmore Back	The EA intends to continue maintenance of the existing defences into the medium to long term (about 40 to 50 years, depending on actual sea level rise experienced and the amount of damage to defences in overtopping events). This is subject to funding. Defences are in good condition so are likely to require minimal maintenance in the short term.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Maintain and sustain current defences - Weir Green	The EA intends to continue to maintain the defences as funds allow. Measures to sustain the current standard of protection by raising the defence in response to climate change may be required after 2030.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Work with Elmore to optimise maintenance funding	The EA, landowners, community in Elmore and other organisations will seek to explore further what could be achieved by working in partnership to maximise maintenance with the funding that is available each year.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2015 - 2021	High	On going
Work with Elmore community regarding erosion	The EA will seek to work with the community to address concerns about erosion of the river bank and damage to flood defences from stock and vehicle traffic.	Y	N	N	N	N	N	N	N	N		N	N	Y	Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture. Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going
Maintain defence - Longney	The EA intends to continue to maintain the existing defences well into the medium to long term future, depending on actual sea level rise experienced (as funds allow).	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going
Work with Longney to optimise maintenance funding	The EA, landowners, community in Longney and other organisations will seek to explore further what could be achieved by working in partnership to maximise maintenance with the funding that is available each year.	Y	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2015 - 2021	High	On going
Work with Longney community regarding erosion	The EA will seek to work with the community and landowners to address concerns about erosion at Longney Crib.	Y	N	N	N	N	N	N	N	N		N	N	Y	Support the agricultural sector to manage catchment flood risk and ongoing improvements in sustainable agriculture. Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Maintain and sustain defences - Epney/Fretherne	The EA intends to maintain and then raise the defences in phases to sustain the current standard of protection in response to climate change (as funds allow). The aim is to raise defences before flood risk becomes greater than a 1 in 75 chance in any year.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going
Maintain mechanisms associated with outfalls - Epney/Fretherne	The EA intends to continue to maintain the mechanisms associated with the outfalls to ensure the successful discharge of surface water.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going
Improve understanding of processes - Severn Estuary	The EA is working to improve understanding of the fluvial and coastal processes that influence the upper estuary into the future. This may include extending the regional coastal monitoring programme to take in the upper estuary. We are working with the local community to incorporate local monitoring.	Y	N	N	Y	N	N	N	N	N		N	Y	Y	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures. Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2015 - 2021	High	On going
Monitor sea levels between Sharpness and Gloucester	Work with the Proudman Oceanographic laboratory, who provide the national tidal and sea level monitoring facility, to incorporate data from existing tidal gauges between Sharpness and Gloucester into long term monitoring of sea level rise.	Y	N	N	Y	N	N	N	N	N		N	Y	Y	Protect and where possible enhance internationally and nationally designated sites through appropriate flood risk management procedures. Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2039 +	Moderate	Agreed
Maintain current defence - Arlingham defence	The EA intends to continue maintenance of the existing defences well into the medium to long term future (as funds allow). With routine maintenance, the existing flood defences that protect Arlingham are currently forecast to remain functional until at least 2060.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Work with Arlingham to optimise maintenance	The EA, landowners, community in Arlingham and other organisations will seek to explore further what could be achieved by working in partnership to maximise maintenance with the funding that is available each year.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2015 - 2021	High	On going
Maintain defence - Frampton	The earth embankments at Slimbridge and Saul Warth are in good condition and should provide a high standard of protection into the long term. The EA intend to carry out maintenance as needed on the embankment (as funds allow) to ensure continued protection to properties at Frampton on Severn.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M2 - Prevention	2015 - 2021	High	On going
Continued inspection of Gloucester and Sharpness Canal	The EA and the Canal and River Trust (CRT) intend to continue to regularly inspect the length of canal that acts as a formal tidal flood defence. If any issues are identified that may result in increased flood risk to Frampton on Severn, the EA and CRT will work together to address the concern. Inspection reports will be made available to Frampton on Severn Parish Council.	N	N	N	N	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2015 - 2021	High	On going
Monitoring of impact of more frequent inundation on integrity of canal bank	The potentially more frequent inundation of the inner warth land will be monitored to ensure it does not impact on the integrity of the western canal bank acting as a formal tidal flood defence or the discharge of surface water from Frampton on Severn.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M4 - Preparedness	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Maintain defences - Slimbridge	The EA intends to continue to carry out maintenance as needed on the embankment to protect properties at Slimbridge. Managed realignment of the defences on the estuary side of the canal may be an option should landowners wish to consider this.	Y	N	N	Y	N	N	N	N	N		N	N	Y	Ensure current and existing investment in the catchment is proportional to flood risk.	M3 - Protection	2015 - 2021	High	On going

12.7. The Wye catchment

Introduction to the catchment

The Wye catchment extends from Chepstow in the south east up to Rhayader in the north west covering an area of 4,180 km².

The landscape is mainly rural, made up of a mixture of woodland and open farmland varying from the steep upland of the Cambrian Mountains in the upper part of the catchment. Below Hay on Wye the landscape changes to a flatter lowland characteristic as the River Wye floodplain widens. Letton Lakes provides natural water storage that helps attenuate river flows and during flood events reduces peak flow downstream in Hereford. Past Ross on Wye the floodplain begins to narrow again as the Wye cuts through the surrounding limestone to form a steep sided gorge/valley from Symonds Yat all the way to Chepstow where the Wye joins the Severn Estuary.

Land use and management

The land use within the catchment is mainly agricultural, with a mixture of arable managed grassland and rough grassland farming. Much of the upper area of the catchment above Rhayader is covered by heath land and scrub with some forestry. Within the lowland areas of the Wye Valley between Leominster, Ross on Wye and Hay on Wye the land use is mostly intensive agriculture with some market gardening.

There are a number of urban centres including Hereford, Leominster, Ross on Wye, Monmouth and Chepstow. Elsewhere tourism is key to the financial well being of smaller rural communities especially in the lower reaches of the Wye Valley from Symonds Yat to Chepstow.

Watercourses within the catchment are used for a variety of activities including recreation, public water supply, fisheries and conservation. The area is rich in landscape and wildlife.

Geology

Geology in the Wye catchment is dominated by Old Red Sandstone. Within the Upper Wye catchment fine grained siltstones and mudstones/shales are also present. Along the eastern boundary and at the very southern extent there are areas of limestone and measures of coal (the western edge of the Forest of Dean).

Within the upper catchment soils are relatively poorly drained which can result in rapid runoff.

National and international designations

There are a number of designated areas of nature conservation importance located within the catchment, including two Special Protection Areas (SPA), Elenydd-Mallaen and Severn Estuary. The latter is also a Ramsar site.

There are a number of Special Areas of Conservation (SAC) within the catchment along with numerous Sites of Special Scientific Interest (SSSIs) and some National Nature Reserves (NNR). These designated sites are located throughout the catchment and the way in which they are managed can have an effect on the risk of flooding (by affecting the surface run-off into the River Severn and its tributaries).

The Wye catchment includes the Wye Valley Area of Outstanding Natural Beauty (AONB) and is partially within the Brecon Beacons National Park.

Partnership working

Within the Wye catchment the Environment Agency and Natural Resources Wales have developed good working relationship with our partners. These include, but are not limited to, local councils. The catchment is covered by four unitary authorities and part of two local councils, including Herefordshire Council, Powys, Monmouthshire, Newport, Forest of Dean District and Malvern Hills District.

We also work closely with the Regional Flood and Coastal Committees, Local Resilience Fora, Severn Trent Water plc, Dwr Cymru\Welsh Water and Natural England.

Historic flooding

There is a long history of fluvial flooding within the catchment. The most significant flooding event recorded occurred in 1947 affecting large numbers of properties in Hereford and isolating the town of Monmouth. This was catchment wide in its impacts. More recently flooding has occurred to varying degrees in 2012, 2007 and 2000 impacting on many communities including Lydbrook, Ross on Wye and Hampton Bishop, though the extents were not so great. Other notable events happened in 1929, 1960, 1979 and 1998.

In the lower reaches of the River Wye tidal flooding has also impacted on communities around Chepstow such as Brockweir and Tintern. The most recent events occurred in 2014 with the previous highest recorded event occurring in December 1981.

Fluvial flooding from the Wye or its tributaries has also affected communities including Ewylas Harold, Presteigne, Kington, Knighton, Eardisland, Pontrails, Mordiford and Five Bridges.

A number of communities have flooded from surface water and ordinary watercourses in the catchment, including most recently in 2012.

Current flood risk

There is frequent, low level flooding in the Wye Valley, with agricultural and rural floodplain affected. Flooding from the River Wye between Letton Lakes near Hay on Wye and Monmouth is a regular occurrence and while the more commonly occurring events are disruptive to local communities, the number of properties directly affected is relatively low.

During larger events such as that experienced in 1947 there are significant numbers of properties affected throughout the catchment. National and regional infrastructure, including utility sub stations and major transport routes, are also affected resulting in many rural communities becoming isolated. The main fluvial flood risks on the Wye are in Hereford and lower downstream at Monmouth. Other towns on the River Wye with some flood risk include Builth Wells, Glasbury, Hay and Ross on Wye. Parts of Leominster on the River Lugg are also at risk of flooding. A number of small communities are at risk of fluvial flooding from

main river tributaries of the River Wye, including at Ewylas Harold, Presteigne, Kington, Knighton, Eardisland, Pontrailis, Mordiford and Five Bridges.

There are a number of watercourses in the catchment that respond quickly to rainfall. These include the River Dore affecting Dorestone and Peterchurch and an unnamed watercourse affecting Pontshill. Flood levels in these flashier catchments can rise suddenly increasing risk to life.

The highest areas of tidal risk are at Chepstow, Tintern and the Caldicot Levels. A number of properties flood and the main road at Tintern is closed for the hours around high tide. Chepstow is at risk from high tides at Elmdale on the English side of the Wye and the area upstream of the railway bridge on the Welsh side. The Caldicot Levels are an area of very flat reclaimed land served by flood defences that would become compromised should there be any overtopping, and the effect would be similar to those experienced elsewhere in the country, such as the Somerset Levels during the winter of 2013/14.

Surface water and sewer flooding occurs throughout the catchment, most commonly in the urban areas such as Hereford, Monmouth, Leominster and Ross on Wye. A number of communities are also at risk from ordinary watercourse flooding.

Most of the main population centres along the Wye have flood alleviation measures in place which reduce flood risk to property and infrastructure. This includes at Monmouth, in part of Hereford and at Hampton Bishop (The Stank). There is also a flood alleviation scheme at Leominster to alleviate flooding for parts of the town from the River Lugg.

Recent flood risk management work

There are a small number of flood alleviation schemes that have been constructed along the River Wye in the last decade. These include demountable temporary defences through Hereford. A local council led scheme on the Yazor Brook in Hereford was constructed to reduce flood risk in this part of the city as part of a general regeneration programme. Permanent flood defences have also been constructed downstream of Hereford around the village of Hampton Bishop. Flood defences have also been constructed in Ross on Wye to protect properties from a number of urban watercourse including the Rudhall Brook that are tributaries of the River Wye

The upper Wye, in Wales, has a new flood forecasting model in development which will benefit all the communities which have a flood warning service and will also help improve the forecasting for the mid and lower parts of the Wye catchment. In addition to these flood risk management actions, there has also been a great deal of flood awareness work in the catchment consisting of door knocking, drop in sessions in conjunction with partner organisations and development of personal, community, school and business flood plans. We have also worked on increasing the sign-up for our free flood warning service to ensure the correct actions can be taken to protect people and property.

Key statistics

Table 12.7.1. Summary of flood risk from rivers and the sea to people, economic activity and the natural and historic environment across the Wye catchment.

River & Sea	Total in Catchment	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	261392	3940	5167	10483	4018
Number of services:	1253	76	22	56	7
Risk to economic activity:					
Number of non-residential properties:	87808	1884	1597	2633	796
Number of airports:	0	0	0	0	0
Length of roads (km):	532	16	19	24	7
Length of railway (km):	134	8	5	6	3
Agricultural land (ha):	176539	10108	3280	3358	1468
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	0	0	0	0	0
Number of EPR installations within 50m:	84	4	2	3	1
Area of SAC within area (ha):	10388	1983	279	66	12
Area of SPA within area (ha):	19970	231	130	25	4
Area of RAMSAR site within area (ha):	99	93	0	1	3
Area of World Heritage Site within area (ha):	0	0	0	0	0
Area of SSSI within area (ha):	35755	2319	458	124	45
Area of parks and gardens within area (ha):	5152	85	62	48	12
Area of Scheduled Ancient Monument within area (ha):	977	28	17	16	4
Number of listed buildings within area:	7579	287	183	376	75
Number of licensed water abstractions within the area:	774	320	45	20	6

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The rivers and sea flood map has been developed and published by the Environment Agency.

Table 12.7.2. Summary of flood risk from reservoirs to people, economic activity and the natural and historic environment across the Wye catchment.

Reservoirs	Total in Catchment	Maximum extent of flooding
Risk to people:		
Number of people in area:	261392	4208
Number of services:	1244	45
Risk to economic activity:		
Number of non-residential properties:	87808	1604
Number of airports:	0	0
Length of roads (km):	532	28
Length of railway (km):	134	2
Agricultural land (ha):	176539	5644
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	0	0
Number of EPR installations within 50m:	84	1
Area of SAC within area (ha):	10388	1442
Area of SPA within area (ha):	19970	215
Area of RAMSAR site within area (ha):	99	4
Area of World Heritage Site within area (ha):	0	0
Area of SSSI within area (ha):	35755	1716
Area of parks and gardens within area (ha):	5152	120
Area of Scheduled Ancient Monument within area (ha):	977	8
Number of listed buildings within area:	7579	265
Number of licensed water abstractions within the area:	774	132

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

The reservoirs flood map has been developed and published by the Environment Agency.

Conclusions and objectives for the Wye catchment

We have set out the following for the Wye catchment:

Conclusions

The Wye catchment has a wide variation of fluvial flooding issues ranging from extended periods of elevated levels within the River Wye Valley that affect many rural communities, flooding from tributaries of the River Wye that run through some smaller urban areas, flooding from quickly responding catchments and tidal flooding from the Severn Estuary.

In the future, the increased frequency and intensity of rainfall events in combination with fast responding catchments will be the greatest threat to the upper areas and some tributaries where a relatively large number of small to medium sized communities are distributed over a wide area. It is difficult to provide accurate and timely warnings in the rapidly responding catchments. In addition climate change is likely to increase the pressure on existing locations where surface water/sewer flooding occurs.

The greatest threat to the lower catchment is from sea level rise which could increase flood risk significantly in Chepstow and surrounding low-lying areas, potentially changing the

character of low-lying land which is currently designated as three separate SSSIs across the Caldicot Levels.

There is a continued need to work in partnership with others, where possible, to achieve flood risk management measures which will alleviate flooding from multiple sources, as well as providing wider environmental and other benefits to improve the natural, rural and built environment consistent with the principles of sustainable development.

Objectives

The following objectives apply to this management catchment, where possible:

Social:

- reduce or prevent an increase in harm to life as a result of flooding
- improve flood warning services on catchments that react rapidly to rainfall
- minimise community disruption by reducing impact of flooding by increasing preparedness through improved flood warning service and public awareness
- locate development in areas at lowest risk of flooding
- increased understanding and management of flood risk impacts
- continue to work with utility providers to improve resilience of infrastructure and services
- continue to work with other bodies to improve resilience to the communication network and transport links
- contribute to recreational amenity & cultural heritage conservation through managing flood risk
- maintain existing assets where economically viable that protect people or find suitable alternatives by working in partnership with communities

Economic:

- reduce economic damage to commercial properties
- reduce flood risk to private properties
- reduce flood risk to agricultural land
- reduce risk of flooding to major infrastructure
- ensure current and future investment in the catchment is proportional to flood risk
- contribute to integrated catchment water management &/or sustainable drainage approach

Environmental:

- take opportunities to restore sustainable natural storage of floodwater in the upstream area, in order to offset increasing flood risk from trends including climate change
- improve water environment through flood risk management activities
- improve hydro-morphology of rivers
- minimise impacts of flooding on designated sites or areas of environmental interest
- create habitat through flood risk management activities
- achieve WFD objectives through flood risk management

Measures specific to the Wye catchment

Measures that are relevant to this catchment are included in the RBD, Severn England and Severn Wales level measures shown in Sections 9, 10 and 11. In addition, there are measures specific to this catchment as follows:

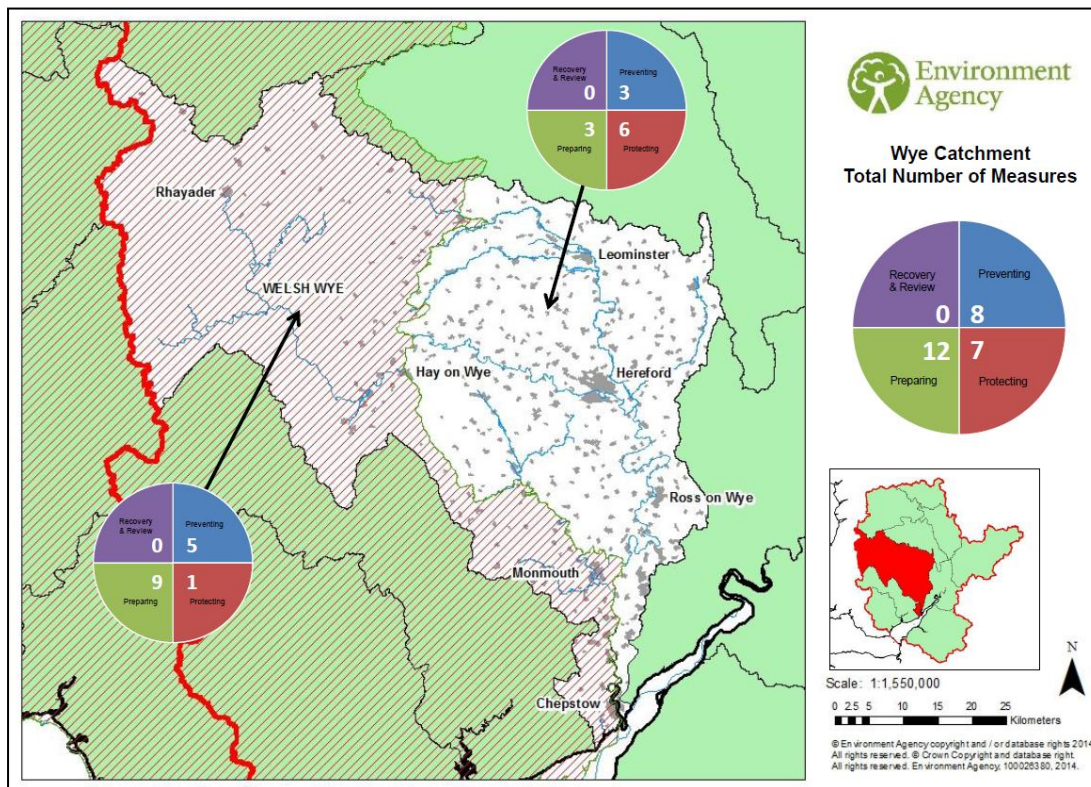


Figure 12.7.1 Total number of specific measures in the Wye catchment with England/Wales split

These can be further broken down into ongoing, agreed and proposed measures as set out below

More detail on the specific objectives and measures is included in tables 12.7.3 and 12.7.4.

Ongoing measures specific to the Wye catchment

Across the Wye catchment there are 13 on-going measures to manage flood risk. These include;

Preventing risk: There is 1 measure already in place to prevent flood risk in the catchment.

- continue to support the development of flood risk management schemes in Hereford.

Preparing for risk: There are 9 measures already in place to prepare for flood risk that are specific to this catchment.

- work with communities at Bodenham and on the Wye Estuary to encourage action to prepare for flooding (2 measures);
- develop a flood awareness plan for the Lower Wye;

- improve the existing flood warning service at Monmouth;
- maintain the completed community flood plan at Monmouth;
- undertake hydrometry and telemetry improvements at Chepstow and Tintern Parva (2 measures);
- develop a new flood forecasting model at Builth Wells;
- engage with the community to establish a community flood plan at Talgarth.

Protecting from risk: There are 3 measures already in place that protect from flood risk that are specific to this catchment.

- continue with watercourse maintenance on the Lower Wye;
- Maintain the existing level of defences and drainage network on the Lower Wye and Hereford (2 measures).

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Agreed measures specific to the Wye catchment

Across the Wye catchment there are 3 agreed measures to manage flood risk. These include:

Preventing risk: there is 1 measure that is agreed to prevent flood risk that is specific to this catchment.

- upgrade the hydrological model for Glasbury.

Preparing for risk: there is 1 measure that is agreed to prepare for flood risk that is specific to this catchment.

- undertake hydrometry and telemetry improvements in Chepstow.

Protecting from risk: There is 1 measure that is agreed to protect from flood risk that is specific to this catchment.

- investigate measures to optimise the standard of protection provided by the Leominster Flood Alleviation Scheme.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures specific to the English Wye catchment

In the English Wye catchment there are 4 measures proposed to manage flood risk from 2015 and beyond. These include:

Preventing risk: there are 2 measures proposed to prevent flood risk in the catchment.

- work with communities along the Wye Estuary and at Bishops Frome to promote property level protection (2 measures).

Preparing for risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Protecting from risk: there are 2 measures proposed that protect from flood risk that are specific to this catchment.

- provide guidance for a landowner-led proposal to raise the defences at Hampton Bishop;
- work with the community at Ewyas Harold to assess the feasibility of measures to reduce flood risk.

Recovery and review of risk: There are no specific measures in this category, over and above those included in sections 9, 10 and 11 of this document and the flood risk activities described in section 7.

Proposed measures to manage risk in the Welsh Wye catchment

In the Welsh Wye catchment there are 15 measures proposed to manage flood risk from 2015 and beyond. These include:

Preventing risk: there are 9 measures proposed to prevent flood risk that are specific to this catchment. These are to undertake an initial assessment for reducing flood risk at Monmouth, to carry out an assessment on existing structures at Chepstow, design and construct flood risk asset improvements at Llanwrtyd Wells and at Mathern

Preparing for risk: there are 5 measures proposed to prepare for flood risk that are specific to this catchment. These are to improve the flood warning service at Builth Wells, review hydrology at Llyswen and to improve the existing flood warning service at Builth Wells.

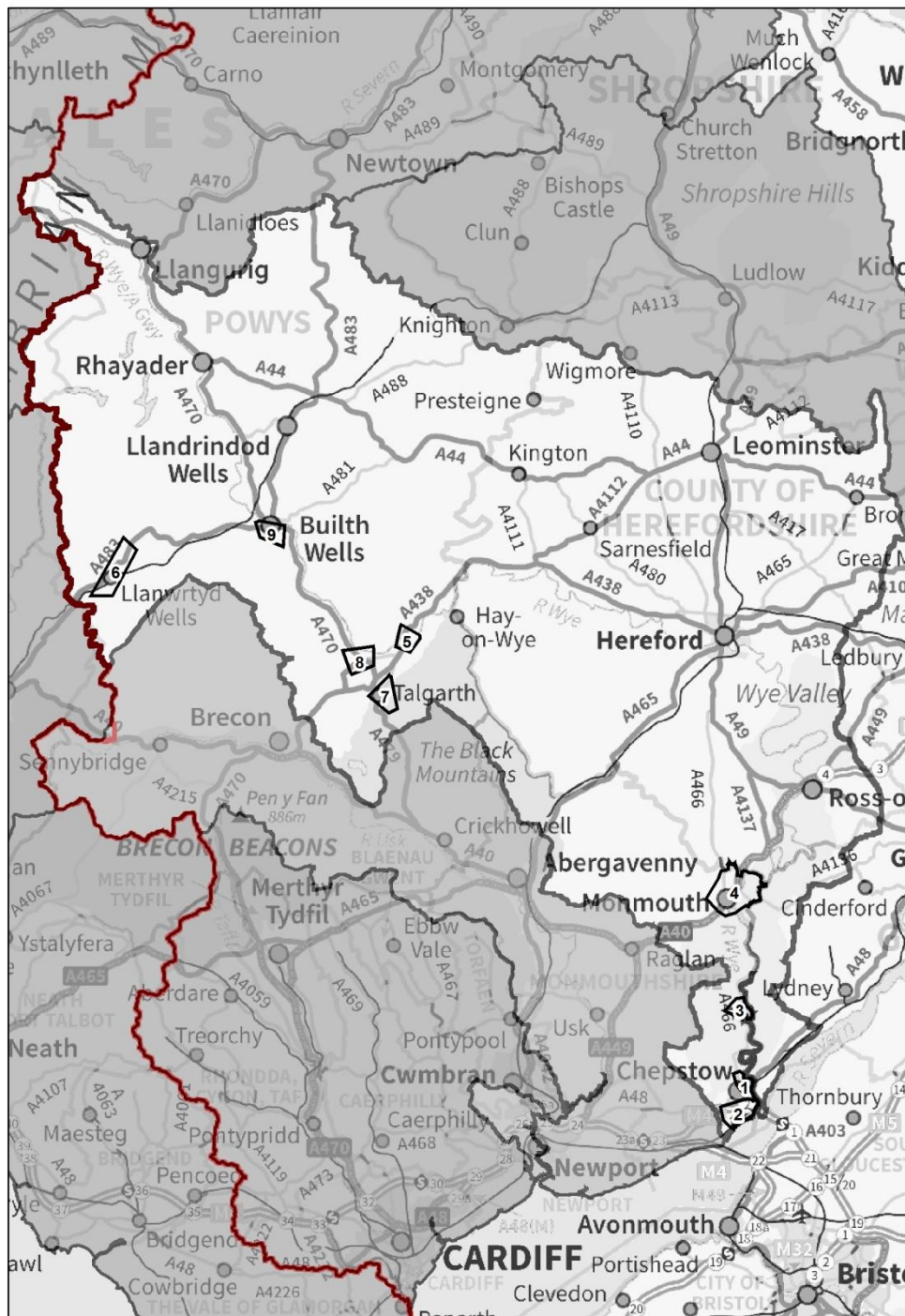
Protecting from risk: there is 1 measure proposed that protects from flood risk that is specific to this catchment. This is for the design and construction of flood risk asset improvements at Chepstow.

Recovery and review of risk: there are no measures proposed for recover and review following flooding that are specific to this catchment

Key communities where we are planning actions (Bold Communities are in Top 50 Wales)

There are a number of communities within the catchment where we feel there is still more to be done to manage and reduce the risk of flooding. Section 3 of this report sets out how we prioritise our work on a risk basis so that those communities that are most at risk are addressed first.

Label	Community	Label	Community
1	Chepstow	6	Llanwrtyd Wells
2	Mathern	7	Talgarth
3	Tintern Parva	8	Llyswen
4	Monmouth	9	Builth Wells
5	Glasbury		



Legend




-  Communities
-  Management Catchments
-  River Basin District

Table 12.7.3. The English Wye catchment – Measures

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Community engagement - Bodenham	Bodenham community engagement. Work with the community group to encourage taking action to prepare for flooding and to produce a plan to reduce impact of flooding within the village.	Y	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Moderate	On going
Community engagement - Wye Estuary	Wye Estuary community engagement. Work with communities along the Wye Estuary to encourage taking action to prepare for flooding.	N	N	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	High	On going
Work with others to improve defence - Hampton Bishop	Provide guidance and contribute to the assessment of the impacts and benefits of a landowner-led proposal to raise the existing Hampton Bishop defences to reduce flood risk to properties in the village.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Moderate	Not started - proposed
Measures to reduce flood risk-Ewyas Harold	Work with the community to assess the technical feasibility, environmental acceptability and economic justification of using public money to carry out measures to reduce flood risk at Ewyas Harold. Implement measures with contribution from public funding if meets criteria. Seek partnership funding contributions as necessary.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	High	Not started - proposed

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
											River Basin Management Plan Measure					Prevention, protection, preparedness etc	FRMP Planning Cycles e.g. 2015 - 2021; 2021 - 2027 etc	Critical, Very High, High, Moderate, Low	On-going, agreed or proposed
Property Level Protection - River Wye	Work with communities along the River Wye estuary to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	High	Not started - proposed
Property Level Protection - Bishops Frome	Work with the community at Bishops Frome to promote property level protection measures to reduce flood risk. Seek funding to carry out property surveys to determine suitable property level protection measures and to implement measures.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding.	M2 - Prevention	2015 - 2021	High	Not started - proposed
Flood defence improvements - Leominster	Investigate measures to optimise the standard of protection provided by the Leominster Flood Alleviation Scheme (River Lugg). Implement refurbishment or improvement works if necessary and meet technical, environmental and economic criteria for public funding. Seek partnership funding contributions as necessary.	Y	N	N	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce the number of properties affected by flooding. Reduce or prevent an increase in harm to life, as a result of flooding.	M3 - Protection	2015 - 2021	Very High	Not started - agreed
Continue to support ESG development - Hereford	Continue to support the development of flood risk management schemes such as the Edgar Street Grid project (ESG) which are currently being developed in Hereford.	N	N	Y	N	N	N	N	N	N		Y	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Reduce disruption resulting from flooding to key services and critical infrastructure.	M2 - Prevention	2015 - 2021	High	On going

Action Name	Action Details	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Category of objective			Describe objective	Measures	Timing	Priority	Type of measure
		Flooding from rivers (main river)	Flooding from Rivers (ordinary watercourses)	Flooding from Rivers (main river plus ordinary watercourses)	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding		River Basin Management Plan Measure	Social	Environment					
Continue with watercourse maintenance - Lower Wye	Continue with existing level of maintenance of watercourses. Efficiencies and improvements should be sought to maintain existing flood risk into the future.	N	Y	N	N	N	N	N	N	N		Y	N	N	Reduce or prevent and increase in harm to life, as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure. Reduce the number of properties affected by flooding.	M3 - Protection	2015 - 2021	Moderate	On going
Develop a Flood Awareness Plan - Lower Wye	Develop a Flood Awareness Plan to encourage people to sign up to and respond to flood warnings as well as self help methods to protect themselves and their properties.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent and increase in harm to life, as a result of flooding. Improve community awareness and resilience to flooding.	M4 - Preparedness	2015 - 2021	Moderate	On going
Maintain defence & drainage network - Lower Wye	Maintain existing level of flood defence and drainage network maintenance within Ross-on-Wye, Hay-on-Wye, Monmouth, Leominster and Pembridge where current flood defences exist. Efficiencies and improvements should be sought to maintain existing flood risk to these communities into the future.	N	N	Y	N	N	N	N	N	N		Y	N	N	Reduce or prevent an increase in harm to life, as a result of flooding. Reduce disruption resulting from flooding to key services and critical infrastructure. Reduce the number of properties affected by flooding.	M3 - Protection	2015 - 2021	High	On going
Maintain defence and watercourse - Hereford	Maintain existing level of flood defence and watercourse maintenance within communities where current flood defences exist (raised embankments along the River Wye, downstream of the urban area to Hampton Bishop).	Y	N	N	N	N	N	N	N	N		N	N	Y	Reduce the cost of flood damage for residential and commercial properties where it is economically viable to do so. Ensure current and existing investment in the catchment is proportional to flood risk. Reduce disruption resulting from flooding to key services and critical infrastructure.	M3 - Protection	2015 - 2021	High	On going

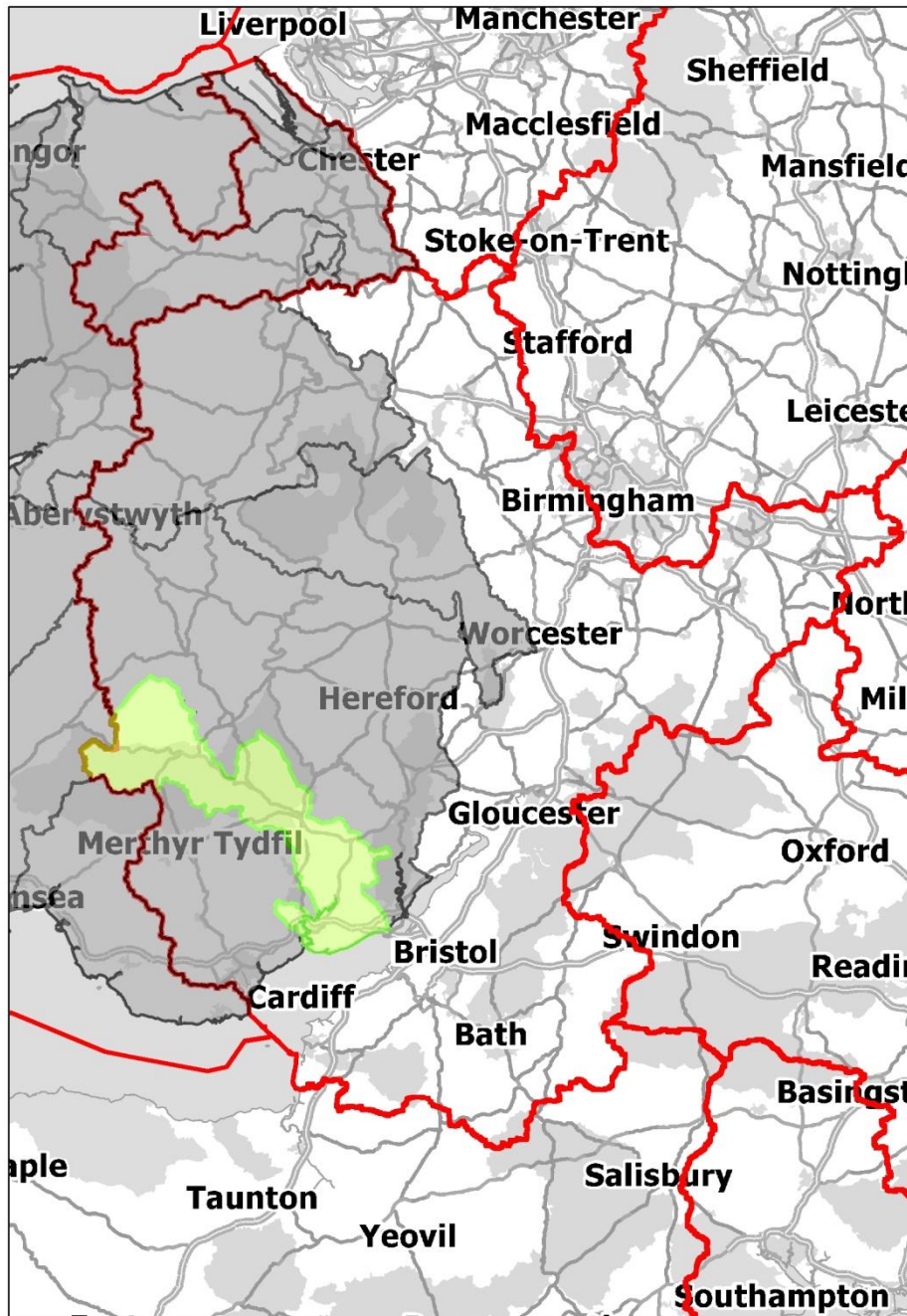
Table 12.7.4. The Welsh Wye catchment – measures

The following catchment delivery plan sets out on a community basis, the measures that we have already undertaken; are in the process of undertaking; or plan to undertake to help manage the risk of flooding to that community. This provides a list of measures we intend to undertake within this catchment over the coming years, subject to assessment and funding justification.



Location	Source	Measure Name	Measures	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Monmouth	Main River	Improve existing flood warning service	M4 - Preparedness	1 2 4	Current	High	On-going	Natural Resources Wales
		Maintain completed community flood plan	M4 - Preparedness	1 4 5	Current	High	On-going	Natural Resources Wales
		Undertake initial assessment and feasibility work for reducing flood risk.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
Chepstow	Main River / Sea	Design and construction of flood risk asset improvements.	M3 - Protection	1 2	Current	Very High	Not Started Proposed	Natural Resources Wales
		Carry out assessment on existing structures to ensure they are fit for purpose.	M2 - Prevention	1 2 3	Current	Very High	Not Started Proposed	Natural Resources Wales
		Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	High	On-going	Natural Resources Wales
Glasbury	Main River	Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	High	Not Started Agreed	Natural Resources Wales
Glasbury	Main River	Upgrade hydraulic model	M2 - Prevention	3	Current	High	Not Started Agreed	Natural Resources Wales
Llanwrtyd Wells	Main River	Design and construction of flood risk asset improvements.	M2 - Prevention	1 2	Current	Medium	Not Started Proposed	Natural Resources Wales
Builth Wells	Main River	Improve existing flood warning service	M4 - Preparedness	1 2 4	Current	Medium	Not Started Proposed	Natural Resources Wales

Location	Source	Measure Name	Measures	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Builth Wells	Main River	Develop new flood forecasting model	M4 - Preparedness	1 2 3 4	Current	Medium	On-going	Natural Resources Wales
Llyswen	Main River	Review hydrology	M4 - Preparedness	1 4 5	Current	Medium	Not Started	Natural Resources Wales
Talgarth	Ordinary Watercourse	Engage with community to establish community flood plan	M4 - Preparedness	1 4 5	Current	High	On-going	Powys CC
Mathern	Main River / Sea	Design and construction of flood risk asset improvements.	M2 - Prevention	1 2	Current	High	Not Started Proposed	Natural Resources Wales
Tintern Parva	Main River / Sea	Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	High	On-going	Natural Resources Wales

12.8. The Usk catchment



Legend

-  Usk Management Catchment
-  River Basin District

Catchment description / overview

The River Usk rises on the northern slopes of the Black Mountains and flows in a long narrow catchment of great scenic beauty for approximately 125km south easterly through the towns of Brecon, Crickhowell, Abergavenny and Usk, before discharging to the Usk estuary at Newbridge and then to the Severn estuary at Newport. The catchment includes the Gwent Levels to the south; a large area of reclaimed coastal grasslands of historical and nature conservation importance. Tourism is important to the local economy, with the Brecon Beacons National Park and the Monmouthshire and Brecon Canal attracting visitors in search of outdoor recreation. The Usk catchment is rich in wildlife, including three species of lamprey and bullhead and a variety of habitats. This high ecological value is recognised through national and international designations.

Land is predominantly used for agriculture, with sheep farming in the northern and western uplands, and beef, dairy, mixed and arable farming in the lowlands of the south and east. As a result, pollution from rural sources is a major threat to the quality of wildlife and plants living in the water environment. There is some limited industry in the major towns, and Newport has a commercial port. Pollution from sewage and contaminated run-off is a pressure in the urban areas.

The headwaters and some of its tributaries are modified by dams to create the Usk, Crai, Talybont and Grwyne Fawr reservoirs. At Brecon some of the river's flow is diverted to feed the Monmouthshire and Brecon Canal and water from the lower River Usk is pumped to Llandegfedd water storage reservoir. On the Gwent Levels flows are regulated by the Caldicot and Wentlooge Internal Drainage Board. Water is taken from rivers and underground sources to use in agriculture, industry, hydropower and fish farms. It is necessary to continue work with Dwr Cymru Welsh Water and others to minimise the impact on the natural environment caused by the physical modifications and abstraction, while securing this valuable resource and maintaining flow levels.

Historical flooding in the catchment

- January 1925: Brecon was flooded by the Usk
- May 1931: Abergavenny suffered with flooding from the Usk causing one recorded death. In the same flood event there was flooding experienced at Malpas, Caerleon Road and Maindee in Newport
- 1979 saw flooding at Llanfaes and Brecon town centre to a depth of 1.5 metres, with damages estimated at greater than one million pounds. The water levels remain the highest on record in most locations along the Usk
- April 1998 saw the Usk flood the Elvicta Business Park in Crickhowell
- December 2000: the Malpas Brook in Newport flooded 130 properties with the Usk flooding an additional 9 properties
- February 2002 saw flooding at Crickhowell and Brecon causing 100 people to be isolated in Crickhowell and substantial road flooding along the A40 between Brecon and Llandovery
- Christmas 2013 saw the highest recorded level along the Usk in recent years, but there was very little recorded flooding to properties
- January 2014 saw the highest Tides recoded at Newport in several years and saw 6 properties flood in the Crindau area

Current flood risk in the catchment

The Flood risk in the Usk catchment varies as the topography and source of risk changes. The areas of highest hazard are in the Usk Estuary and the more developed towns such as Brecon, Usk and Crickhowell. 6 of the top 100 risk communities in Wales are to be found in the Usk catchment, these are predominantly at risk from tidal flooding, around the Newport area. The tidal risk in Newport is managed predominantly by a succession of flood alleviation schemes and the residual risk in the area is from the potential overtopping or failure of these schemes. The hazard in the aforementioned towns is similarly managed via schemes built from the 1960's through to recent times and the residual risk is from failure or overtopping. All key locations of high risk benefit from a flood warning service and have been targeted by flood awareness and other engagement activities.

Future flood risk and issues in the catchment

In the future, the increased frequency and intensity of rainfall events in combination with fast responding catchments will be the greatest threat to the upper areas where a relatively large number of small to medium sized communities are distributed over a wide area.

The greatest threat to the lower catchment is from sea level rise which could increase flood risk significantly in Newport and surrounding low-lying areas, and potentially change the character of more than 2,000 hectares of low-lying land which is currently designated as three separate SSSIs across the Caldicot Levels.

Recent flood risk management activity in the catchment

A flood forecasting model was delivered for the Usk catchment in early 2014. In addition to this a major data collection exercise during and after the floods experienced over the Christmas and new year of 2013/4 has generated a major calibration and threshold review for the flood warning service in the Usk catchment.

In the Maindee and Riverside communities in Newport a new flood alleviation scheme was constructed in 2012. The scheme was a new flood wall of sheet piled retaining walls with cantilevered re-enforced concrete wall tied into an existing brick wall.

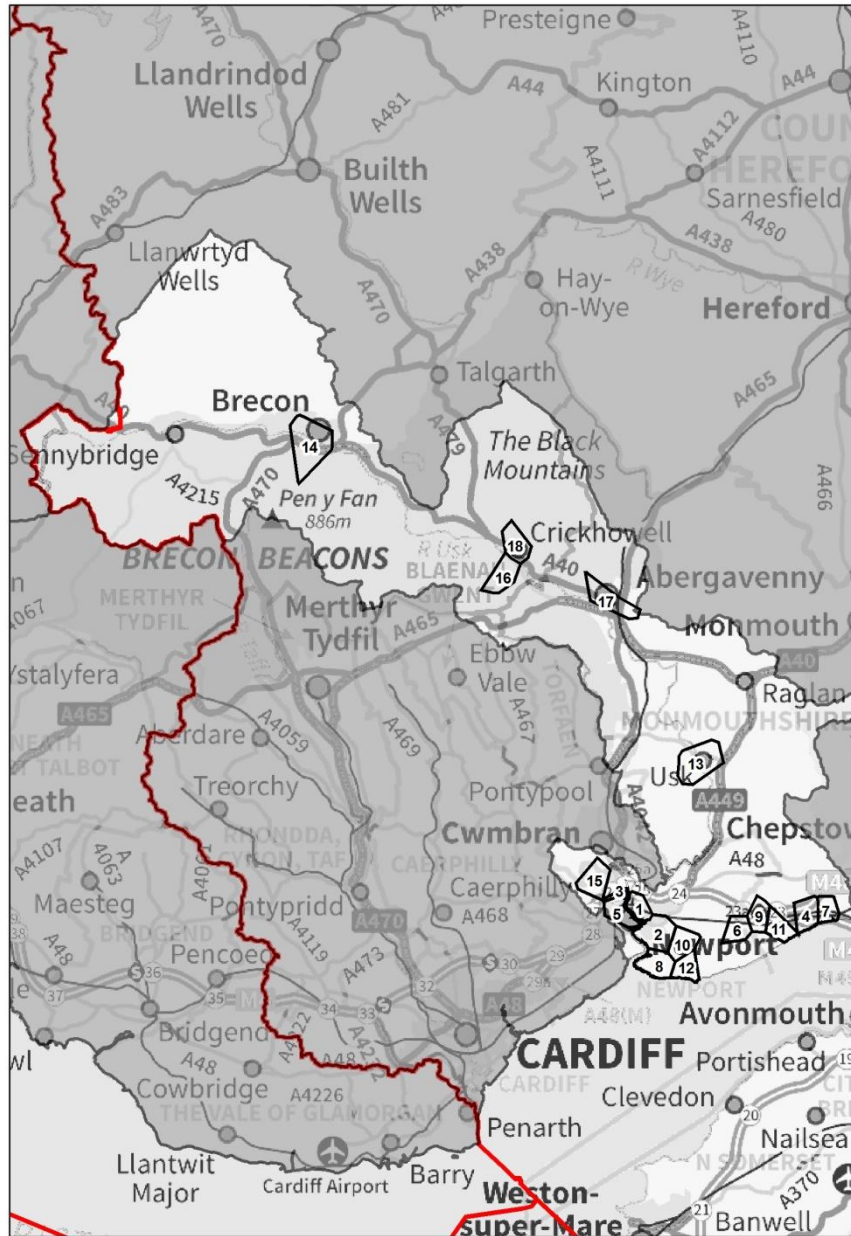
There is a major modelling exercise being undertaken that will look to improve our knowledge of all the coastal risk along the South East of Wales, this includes all tidal risk along the Usk coastal reaches.

Rogiet, Caldicot and Nash communities all benefited from recent sea door CCTV surveys that have helped inform the sea door maintenance programme.

Brecon has recently had a flood wall repaired near the Brecon medical Centre, which has ensured the community retains an acceptable standard of flood risk.

Table 12.8.1. Key communities where we are planning actions (Bold Communities are in Top 50 Wales)

Label	Community	Label	Community
1	Maindee	10	Broadstreet Common
2	Liswerry	11	Undy
3	Crindau	12	Goldcliff
4	Rogiet	13	USK
5	NEWPORT/ CASNEWYDD	14	BRECON/ ABERHONDDU
6	Llandeenny	15	Bettws
7	Caldicot	16	Llangattock
8	Nash	17	ABERGAVENNY
9	Magor	18	Crickhowell



Legend

- Communities
- Management Catchments
- River Basin District

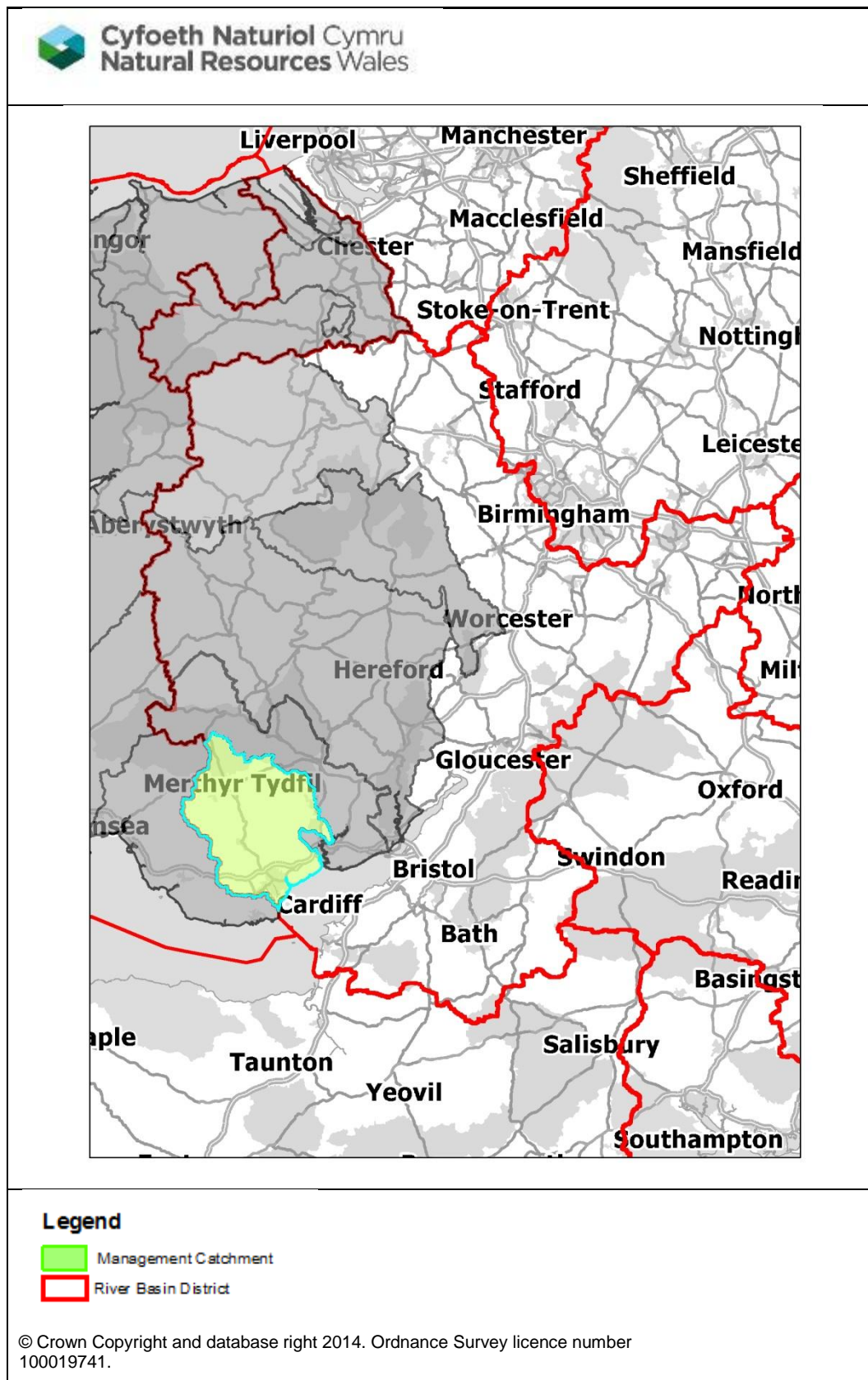
Table 12.8.2. Catchment delivery plan

Location	Source	Measure Name	Measures	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Maindee	Sea	Raise flood awareness within the community	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales
Liswerry	Sea	Develop scheme appraisal for flood alleviation scheme.	M2 - Prevention	1 2	Current	High	On-going	Natural Resources Wales
Crindau	Sea	Develop scheme appraisal for flood alleviation scheme.	M2 - Prevention	1 2	Current	Very High	On-going	Natural Resources Wales
		Raise flood awareness within the community	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales
Rogiet	Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	High	On-going	Natural Resources Wales
		Design and construction of flood risk asset improvements.	M3 - Protection	1 2	Current	Very High	Not Started Proposed	Natural Resources Wales
Croesyceiliog	Main river	Undertake initial assessment and feasibility work for reducing flood risk.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
Usk	Main river	Undertake initial assessment and feasibility work for reducing flood risk.	M2 - Prevention	1 2 3	Current	Very High	Not Started Agreed	Natural Resources Wales

Location	Source	Measure Name	Measures	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Newport / Casnewydd	Sea	Develop scheme appraisal for flood alleviation scheme.	M3 - Protection	1 2	Current	Critical	On-going	Natural Resources Wales
Llandeenny	Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	High	On-going	Natural Resources Wales
Caldicot	Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	High	On-going	Natural Resources Wales
Brecon / Aberhonddu	Main river	Assess conveyance requirements and implement maintenance.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
Cwm Ffrwd-oer	Main river	Build Hydraulic Model	M2 - Prevention	3	Current	Very High	On-going	Natural Resources Wales
Caerleon	Sea/Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M2 - Prevention	1 2 3	Current	Very High	On-going	Natural Resources Wales
Nash	Sea	Design and construction of flood risk asset improvements.	M3 - Protection	1 2	Current	Very High	On-going	Natural Resources Wales
Magor	Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	High	On-going	Natural Resources Wales
Pontypool	Main river	Undertake initial assessment and feasibility work for reducing flood risk.	M2 - Prevention	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales

Location	Source	Measure Name	Measures	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Ponthir	Main river	Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	Very High	Not Started Proposed	Natural Resources Wales
		Build Hydraulic Model	M2 - Prevention	3	Current	Very High	On-going	Natural Resources Wales
Llangattock	Main river	Maintain completed community flood plan	M4 - Preparedness	1 4 5	Current	High	On-going	Natural Resources Wales
Broadstreet Common	Sea	Implement alternative risk reduction measures.	M2 - Prevention	1 2	Current	Low	Not Started Proposed	Natural Resources Wales

12.9. South East Valleys catchment



Catchment description / overview

The main rivers in the South East Valleys catchment are the Ebbw and Sirhowy, which flow into the Usk Estuary and the Rhymney, Taff and Ely, which discharge to the Severn Estuary. The major urban centres include Aberdare, Caerphilly, Merthyr Tydfil, Pontypridd and Cardiff, which has an important commercial port. The 'valleys' rivers begin high in the Brecon Beacons and flow through steep-sided valleys to the low-lying coastal areas of Cardiff and the Wentlooge and Caldicot Levels. The valley slopes have managed grassland and forest, while the narrow valley floors are extensively urbanised.

In the upper catchment, the headwaters of the Taff have been modified by a series of dams and reservoirs to supply water to the industries and residents of South Wales. The rivers have a flashy flow regime, many being classified as rapid response catchments, and due to the underlying geology some smaller tributaries can dry up in very dry summers.

The Ebbw and Sirhowy catchments are mostly rural, interspersed with urban areas that are constrained by the steep valley sides. All the other catchments are steep sided and heavily urbanised with associated infrastructure such as roads, rail and services which are all typically located close to the rivers. The steep valley topography of much of the catchment has meant that urban development has been constrained within the valley floors, adjacent to the rivers. As a result there are significant numbers of people and property close to a watercourse. Flood risk is thus concentrated in a number of main areas and is not widely dispersed across the catchments.

Cardiff Bay was created in 2000 by fully impounding the Rivers Taff and Ely, allowing redevelopment of Cardiff and Penarth and providing flood defence against the extreme tides of the Severn Estuary.

The coastal and estuarine environments in the South Eastern Valleys contain a number of important and diverse habitats and species, including three internationally designated conservation areas and numerous nationally designated areas. The Severn Estuary is an important Ramsar site, Special Protection Area (SPA) and a candidate Special Area of Conservation (cSAC).

Historical flooding in the catchment

The Taff catchment has experienced widespread flooding on a number of occasions over the last 60 years. The most notable flooding occurred in 1960 and 1979, when thousands of properties were affected. The most widespread flooding in the last 40 years happened on 27 and 28 December 1979. Several thousand properties flooded across South Wales and in many cases rivers reached levels that remain the highest on record. In contrast, the Ely catchment has only suffered from two significant events in the last few decades. These were a result of heavy rainfall falling on an already wet catchment in March 1998 and in October 2000. Only a small number of properties were affected.

Current flood risk in the catchment

There are 20 of the top 50 highest risk communities in Wales in this catchment, indicating that it's a very important catchment in flood risk terms. Most of the urban areas that are next to the main rivers are defended, but not all to a 1% Annual Exceedance Probability (AEP) standard of protection (SoP). The steep sided valleys are all prone to surface water flooding, with run-off from the slopes around and there is also a high risk from culvert blockage in the upper limits of these fast reacting catchments. The greatest flood risk to people and property is from overtopping or failure of defences, especially in some areas of the valleys where third

party defences may be of unknown condition. These types of events would be exceptional and likely to affect large swaths of South Wales.

Tidal risk in this catchment is low in terms of likelihood due to the Cardiff Bay Barrage which affords a significant protection against high tidal levels. The largest tidal risk to these catchments is on the Wentlooge Levels, although there is significant work ongoing and planned to assess and maintain defences.

Future flood risk and issues in the catchment

Future flood risk will be influenced primarily by climate change, but also by changes in land use and rural land management. Future increase in flood risk tends to be largest in towns located near the mouth of rivers, or where the tidal influence travels inland up an estuary. This is where the effects of sea level rise and increased rainfall combine, resulting in more frequent, deeper and more extensive flooding in the future. In future scenarios the heavily defended areas of this catchment will be more prone to overtopping and significant urban areas such as Cardiff, Pontypridd and Caerphilly may experience more surface water flooding.

Recent flood risk management activity in the catchment

There has been extensive mapping and modelling work undertaken in the Valleys area to better understand the risk and to assess the current standard of protection of the defences in key locations. This modelling will also help inform and improve the flood warning service.

The Rhondda valley has been chosen as a pilot study for Natural Resources Wales new ecosystem approach to managing all aspects of the environment including flood risk. There is a lot of work going on to restore large tracts of upland peat bog to assist in slowing down the run-off rates and controlling the speed that water can flow through the catchment before it reaches the river networks. There is also an ongoing review (Rhondda Asset Management Strategy) of the assets that assist our flood management of the area, including a wider review of the effects and benefits of dredging.

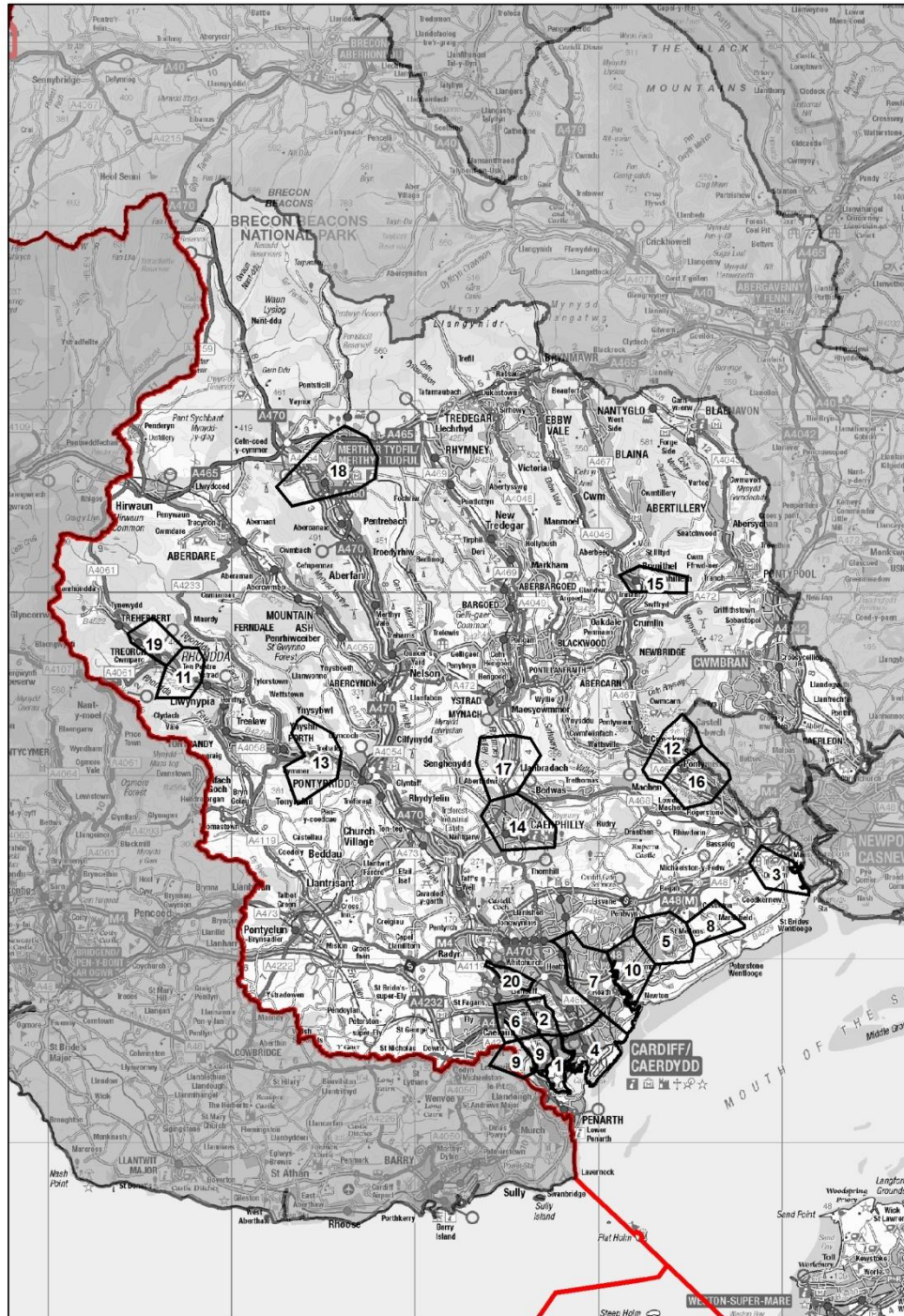
There has recently been a new flood forecasting service developed for the Taff Rivers which should assist with improving lead times for flood warnings in the catchment and allow people to take the appropriate actions to protect themselves and their property.

Key communities where we are planning actions (Bold Communities are in Top 50 Wales)




There are a number of communities within the catchment where we feel there is still more to be done to manage and reduce the risk of flooding. Section 3 of this report sets out how we prioritise our work on a risk basis so that those communities that are most at risk are addressed first.

Table 12.9.1. Key communities where we are planning actions

Label	Community	Label	Community
1	Grangetown	11	Rhondda
2	Riverside	12	Risca
3	Duffryn	13	Trehafod
4	Butetown	14	Caerphilly
5	St Mellons	15	Llanhilleth
6	Canton	16	Pontymister
7	Roath	17	Llanbradach
8	Marshfield	18	Merthyr Tydfil
9	Leckwith	19	Treorchy
10	Rumney	20	Llandaff North



Legend

-  Communities
-  Management Catchments
-  River Basin District

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Table 12.9.2. Catchment delivery plan

The following catchment delivery plan sets out on a community basis, the measures that we have already undertaken; are in the process of undertaking; or plan to undertake to help manage the risk of flooding to that community. This provides a list of measures we intend to undertake within this catchment over the coming years, subject to assessment and funding justification.

Table 1: Catchment delivery plan

Location	Source	Measures	Measure Type	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Grangetown	Main River	Assess conveyance requirements and implement maintenance.	M3 - Protection	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
		Upgrade Hydraulic Model	M3 - Protection	3	Current	Very High	On-going	Natural Resources Wales
		Raise flood awareness within the community	M4 - Preparedness	1 4 5	Current	Very High	Not Started Agreed	Natural Resources Wales

Location	Source	Measures	Measure Type	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Riverside	Main River	Assess conveyance requirements and implement maintenance.	M3 - Protection	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
		Upgrade Hydraulic Model	M3 - Protection	3	Current	Very High	On-going	Natural Resources Wales
		Maintain completed community flood plan	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales
Duffryn	Main River	Design and construction of flood risk asset improvements.	M3 - Protection	1 2	Current	High	Not Started Proposed	Natural Resources Wales
Canton	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M3 - Protection	1 2 3	Current	Very High	On-going	Natural Resources Wales
		Improve existing flood warning service	M4 - Preparedness	1 2 4	Current	Very High	Not Started Proposed	Natural Resources Wales
Butetown	Main River	Assess conveyance requirements and implement maintenance.	M3 - Protection	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales

Location	Source	Measures	Measure Type	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
		Improve existing flood warning service	M4 - Preparedness	1 2 4	Current	Very High	Not Started Proposed	Natural Resources Wales
Roath	Main River / Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	Very High	On-going	Natural Resources Wales
		Maintain completed community flood plan	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales
St Mellons	Main River / Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	Very High	On-going	Natural Resources Wales
Treorchy	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M3 - Protection	1 2	Current	Very High	Not Started Proposed	Natural Resources Wales
		Update Hydraulic Model	M3 - Protection	3	Current	Very High	On-going	Natural Resources Wales
Llandaff North	Main River	Assess conveyance requirements and implement maintenance.	M3 - Protection	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
		Raise flood awareness within the community	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales

Location	Source	Measures	Measure Type	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Rhondda	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M3 - Protection	1 2	Current	Very High	Not Started Proposed	Natural Resources Wales
		Update Hydraulic Model	M3 - Protection	3	Current	Very High	On-going	Natural Resources Wales
Leckwith	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M3 - Protection	1 2 3	Current	High	Not Started Proposed	Natural Resources Wales
		Raise flood awareness within the community	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales
Risca	Main River	Develop scheme appraisal for flood alleviation scheme.	M3 - Protection	1 2	Current	Very High	On-going	Natural Resources Wales
		Improve existing flood warning service	M4 - Preparedness	1 2 4	Current	Very High	Not Started Proposed	Natural Resources Wales
		Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	Very High	Not Started Agreed	Natural Resources Wales

Location	Source	Measures	Measure Type	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
Marshfield	Main River / Sea	Design and construction of flood risk asset improvements.	M3 - Protection	1 2	Current	High	Not Started Proposed	Natural Resources Wales
Rumney	Main River / Sea	Design and construction of flood alleviation scheme.	M3 - Protection	1 2	Current	Very High	On-going	Natural Resources Wales
Pontymister	Main River	Develop scheme appraisal for flood alleviation scheme.	M3 - Protection	1 2	Current	Very High	On-going	Natural Resources Wales
Trehafod	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M3 - Protection	1 2 3	Current	Very High	Not Started Proposed	Natural Resources Wales
		Update Hydraulic Model	M3 - Protection	3	Current	Very High	On-going	Natural Resources Wales
		Maintain completed community flood plan	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales
Llanhilleth	Main River	Carry out assessment on existing structures to ensure they are fit for purpose.	M3 - Protection	1 2 3	Current	Very High	Not Started Proposed	Natural Resources Wales

Location	Source	Measures	Measure Type	Link to FRMP objective	Timing	Priority	Measure Status	Responsible authority
		Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	Very High	Not Started Agreed	Natural Resources Wales
Caerphilly	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M3 - Protection	1 2 3	Current	Very High	On-going	Natural Resources Wales
		Undertake hydrometry and telemetry improvements	M4 - Preparedness	1 3 4	Current	Very High	Not Started Agreed	Natural Resources Wales
		Update Hydraulic Model	M3 - Protection	3	Current	Very High	On-going	Natural Resources Wales
Llanbradach	Main River	Implement alternative risk reduction measures.	M3 - Protection	1 2	Current	High	Not Started Proposed	Natural Resources Wales
Merthyr Tydfil	Main River	Undertake initial assessment and feasibility work for reducing flood risk.	M2 - Prevention	1 2 3	Current	Moderate	Not Started Proposed	Natural Resources Wales
		Raise flood awareness within the community	M4 - Preparedness	1 4 5	Current	Very High	On-going	Natural Resources Wales

12.10. The Bristol Avon and North Somerset Streams catchment

Introduction to the catchment

Lower Severn Vale (Little Avon and Bristol North Rhines):

The Lower Severn Vale Operational Catchment consists of the Bristol North Rhines and Little Avon catchments.

The North Bristol Rhines are a series of small catchments, draining west to the Severn Estuary. They start as springs or drainage from the higher land to the east, bordered approximately by the M5 and A38 roads. These watercourses are a mixture of natural and manmade systems mostly termed Rhines or Pills.

The Little Avon catchment comprises of the rivers: Little Avon, Ozleworth Brook, Tortworth Brook and Dovern Brook. The Little Avon rises from its source at Horton in the arable and grassland uplands of the Cotswold escarpment, before being joined by the Ozleworth and Tortworth Brooks. Then gently descends before slowly flowing through the open flat flood plains of the Berkeley Vale, where the Dovern Brook joins before discharging to the Severn Estuary via Berkeley Pill. The tributaries to the north arise from springs higher up on the Cotswold plateau, and have relatively steep, narrow short valleys before joining the main river.

The Severn Estuary and shoreline has very high conservation status and valuable habitats.

Bristol Avon:

The Bristol Avon is a large, complex catchment area of approximately 2,220 km² encompassing the 2 major cities of Bristol and Bath. The primary river flows south then west from its source upstream of Malmesbury, through gentle rural landscapes and towns such as Bradford-on-Avon, before flowing through Bristol City centre and the Clifton Gorge to Avonmouth and into the Severn Estuary.

The significant tributaries in the catchment include the Somerset Frome and River Chew (from the Mendips), the River Marden and Semington Brook (from Salisbury Plain), the Tetbury and Sherston Avon and the Bristol Frome (from the Cotswolds), the Ladden Brook, Bradley Brook and the River Boyd. There are more than 70 additional waterbodies that feed into the Bristol Avon operational catchment, either directly or via a network of a dozen associated clusters.

North Somerset Streams:

The North Somerset Streams Operational Catchment starts at Brean Down in the south and extends east to just beyond Blagdon Lake and then north to the mouth of the Avon.

The greater part of the population is concentrated in the coastal towns of Clevedon and Portishead. Inland, the larger settlements are Nailsea, Yatton and Congresbury.

This catchment combines the smaller catchments of the rivers Oldbridge, Yeo, Kenn, Blind Yeo and Land Yeo, as well as the Drove Rhine and the Portbury Ditch.

The rivers are characterised by having short upland and long lowland reaches with very low gradients. Much of the area is low-lying levels and moors, where water is managed by Internal Drainage Boards.

Land use and management

Rural land cover, consisting mostly of managed grassland and arable farming is scattered widely throughout the catchment. There are also smaller areas of shrub, orchard and deciduous woodland, occurring most extensively along the By Brook. The extent of urban areas has a notable effect on flood risk. Approximately 10% of the Bristol Avon and North Somerset Streams catchment is urban. The main settlements include Bristol and Avonmouth, Bath, Trowbridge, Melksham, Chippenham, Portishead and Clevedon. There are many modified watercourses and flood defence systems throughout the catchment.

Geology

The geology of the Bristol Avon catchment exhibits significant variability and spans a large geological timescale (approximately 300 million years). Typically strata exposed at the surface increases in age from east to west; from Cretaceous Lower Chalk in the east to Carboniferous, Devonian and Silurian strata in the west.

The geology along the coastal areas of the catchment consists of estuarine alluvial deposits. The clays and mudstones of the valley lie close to the groundwater table for much of the year and are frequently saturated with standing water across the floodplain. When this happens, rainfall is slow to drain away and may lead to localised flooding even when the River Severn is not in flood.

There are permeable uplands in the catchment, consisting of a wide range of limestones, sandstone and mudstones. Groundwater seeping out through springs in the limestone hills of the Mendips forms the headwaters of the Congresbury Yeo.

National and international designations

The North Somerset Levels and Moors support some nationally important areas of high nature conservation value including one National Nature Reserve at Gordano Valley.

Partnership working

We have developed good working relationships with all our RMA partners. In future cycles of planning we intend to include information on measures taken by other authorities, however in this first plan we have only included information provided by those Lead Local Flood Authorities who have a statutory duty to create a FRMP or that have chosen to contribute to this plan on a voluntary basis. The catchment is covered by 7 Lead Local Flood Authorities, 4 of which are contributing to a joint FRMP for the Severn RBD. These are South Gloucestershire Council, Bristol City Council, North Somerset Council and Bath and North East Somerset Council. This information is covered in section 13 of this plan.

Historic flooding

This catchment has a long history of flooding, which resulted in many flood defence schemes being built, particularly in the period 1935 to 2000. Since then, high flows on the River Avon in 2000 and 2008 which would have caused widespread flooding resulted in little damage. There have been flood events more recently in Chew Magna, Wrington, Malmesbury, Keynsham and Bradford on Avon.

Current flood risk

The Bristol Avon catchment has areas of both tidal and fluvial flood risk. Much of the catchment benefits from flood defences, however there remain a large number of properties still at high risk of flooding. This is due to the nature of the floodplain, which is widely dispersed throughout the catchment and the large number of people living in the catchment. The River Avon corridor runs through some large urban areas including Malmesbury, Chippenham, Melksham, and Bradford on Avon, Bath, Keynsham, Bristol and Avonmouth. There is a large strip of land at risk from tidal flooding, relying on engineered defences for flood alleviation. The remainder of the flood risk is scattered throughout the catchment along the river corridors. We are currently managing flood risk

in many ways including working on several schemes to mitigate against the effects of flooding in communities such as Wrington, Chew Magna and Radstock.

Key statistics

Table 12.10.1. Summary flood risk from rivers & sea to people, economic activity and the natural and historic environment across the Bristol Avon & North Somerset Streams catchment.

River & Sea	Total in RBD	High risk	Medium risk	Low risk	Very low risk
Risk to people:					
Number of people in area:	1,355,724	11,458	9228	61,342	103
Number of services:	2440	86	33	124	1
Risk to economic activity:					
Number of non-residential properties:	161,136	4489	2240	9137	13
Number of airports:	1	0	0	0	0
Length of roads (km):	678	17	19	88	0
Length of railway (km):	323	12	8	28	0
Agricultural land (ha):	214,643	8704	2569	8460	12
Risk to the natural and historic environment:					
Number of EU designated bathing waters within 50m:	1	1	0	0	0
Number of EPR installations within 50m:	75	7	4	16	0
Area of SAC within area (ha):	1407	334	6	17	0
Area of SPA within area (ha):	1499	848	19	27	0
Area of RAMSAR site within area (ha):	472	398	9	18	0
Area of World Heritage Site within area (ha):	2900	0	0	0	0
Area of SSSI within area (ha):	5967	1338	52	200	0
Area of Parks and Gardens within area (ha):	6909	93	73	53	0
Area of Scheduled Ancient Monument within area (ha):	918	14	3	20	0
Number of Listed Buildings within area:	17,503	438	231	511	2
Number of Licensed water abstractions within the area:	360	104	24	8	0

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

Table 12.10.2. Summary flood risk from reservoirs to people, economic activity and the natural and historic environment across the Bristol Avon & North Somerset Streams catchment.

Reservoirs	Total in RBD	Maximum extent of flooding
Risk to people:		
Number of people in area:	1,355,724	23,356
Number of services:	2434	73
Risk to economic activity:		
Number of non-residential properties:	161,136	5556
Number of airports:	1	0
Length of roads (km):	678	21
Length of railway (km):	323	18
Agricultural land (ha):	214,643	5509
Risk to the natural and historic environment:		
Number of EU designated bathing waters within 50m:	1	0
Number of EPR installations within 50m:	75	3
Area of SAC within area (ha):	1407	1
Area of SPA within area (ha):	1499	418
Area of RAMSAR site within area (ha):	472	0
Area of World Heritage Site within area (ha):	2900	0
Area of SSSI within area (ha):	5967	579
Area of Parks and Gardens within area (ha):	6909	64
Area of Scheduled Ancient Monument within area (ha):	918	11
Number of Listed Buildings within area:	17,503	481
Number of Licensed water abstractions within the area:	360	58

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

For a summary of flood risk from surface water to people, economic activity and the natural and historic environment across the Bristol Flood Risk Area see section 13 of this plan.

Conclusions and objectives for the Bristol Avon and North Somerset Streams catchment

Conclusions

Bristol City is the largest urban area in the catchment, which is on the UK's eight Core Cities and is the most significant economic hub in the southwest. The city is built on a hilly landscape resulting in fast surface water run-off. Several watercourses are also subject to tidelocking, causing an increased fluvial flood risk during high tides. Bristol also has many deprived areas and heavily modified watercourses. However it is surrounded by rural areas that would benefit from better catchment management. The city is at risk from tidal and fluvial flooding and in particular is at risk from rising sea levels due to climate change, particularly in the Avonmouth area.

Bath is a major tourism centre with a recent history of flooding. The main challenge is the re-development of the River Avon corridor through the city.

The Chew Valley and Brislington are both high risk rapid response catchments, which could see fast flowing water that could pose a risk to life. Measures to improve preparedness in the community are of particular importance in these locations.

Properties at risk are dispersed throughout the catchment creating funding challenges and due to the complexity of the flooding mechanisms and sources throughout the catchment, there are locations where we need to understand these better so we can identify the best way to manage it. There are therefore several studies included in our proposed measures.

Objectives

Social:

- reduce risk to life
- improved flood warning service
- minimise community disruption by reducing impact of flooding - improve resilience of infrastructure and services and community preparedness through improved flood warning service and increased public awareness
- take a sequential approach to locating development
- reduce flood risk to historic environment
- understand the effects of coastal erosion
- increased understanding and management of flood risk impacts

Economic:

- reduce economic damage to commercial properties
- reduce flood risk to private properties
- reduce flood risk to agricultural land
- support tourism by reducing flood risk and enhancing river corridors
- reduce risk of flooding to major infrastructure
- encourage sustainable development that manages flood risk appropriately

Environmental:

- work with natural processes wherever possible to achieve WFD objectives
- improve water environment through flood risk management activities
- improve hydromorphology of rivers
- minimise impacts of flooding on designated sites or areas of environmental interest
- create habitat through flood risk management activities

Measures across the Bristol Avon and North Somerset Streams catchment

The following section describes the measures put in place by the Environment Agency to manage flood risk in the Bristol Avon and North Somerset Streams catchment.

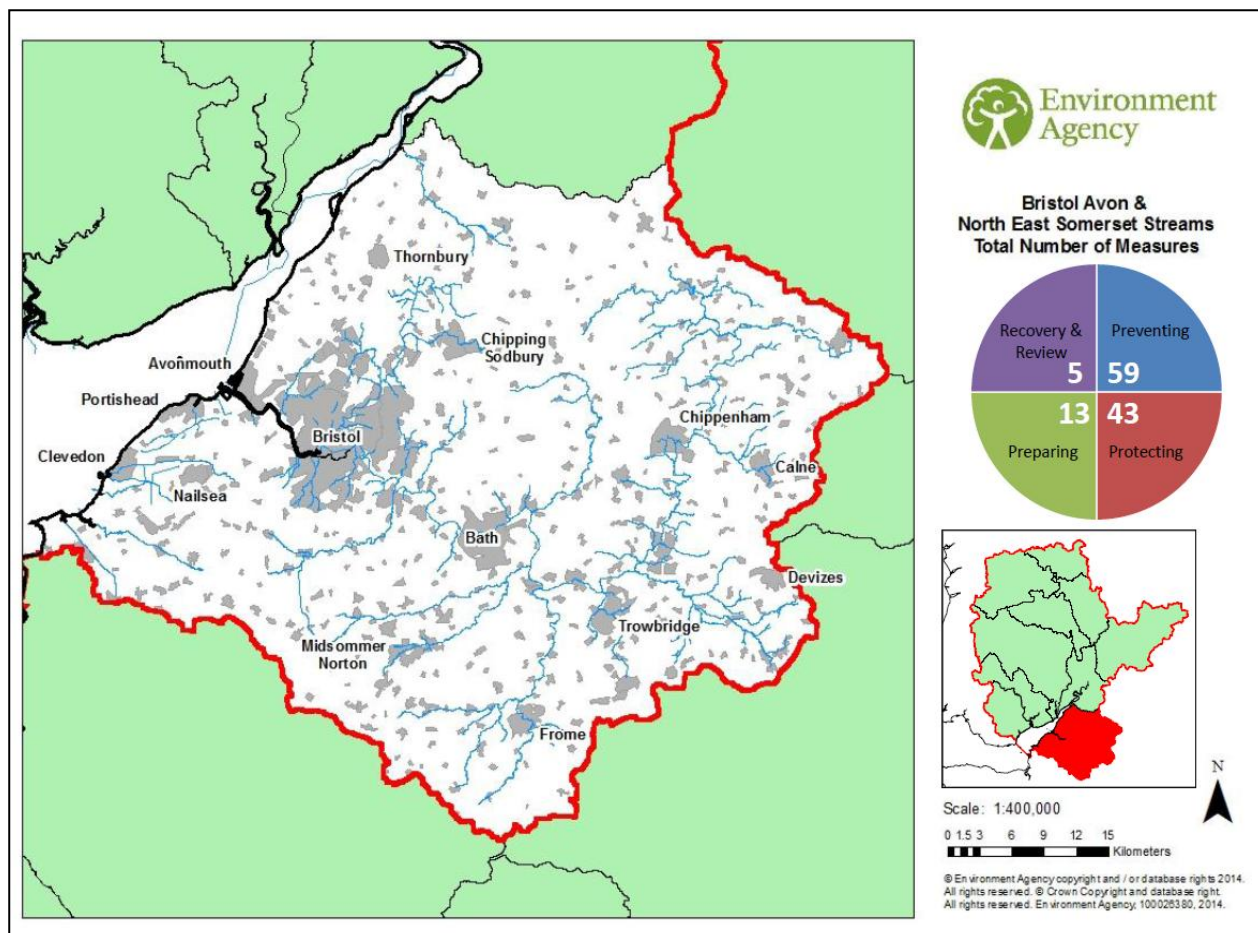


Figure 12.10.1 Total Number of Measures in the Bristol Avon and North Somerset Streams catchment

These measures have been taken from the Shoreline Management Plans (SMP), Catchment Flood Management Plans (CFMP) and some other unpublished plans or programmes. Only actions where the Environment Agency has been identified as having a delivery role have been included in this consultation document.

Please refer to the relevant SMP for your area of interest for additional information. The SMP for the Bristol Avon and North Somerset Streams catchment can be found at the SevernEstuary.net website. Select the relevant coastal group, the Bristol Channel Coastal Advisory Group or Severn Estuary Coastal Group from the Home menu and navigate to the current SMP documents.

The measures can be further broken down into on-going, agreed and proposed measures as set out below

Ongoing measures across the Bristol Avon and North Somerset Streams catchment

Across the Bristol Avon and North Somerset Streams catchment the ongoing measures to manage flood risk include:

- **Preventing risk:** there are 25 measures already in place to prevent flood risk in the catchment.
 - 21 measures from the SMP to encourage utility providers to undertake an assessment of resilience to flooding of their assets at various locations.
 - A beach monitoring programme
 - Improvements to trash screens and installing webcams to monitor assets.
 - Engaging with Local Enterprise Partnerships to ensure development is safe from flooding.
- **Preparing for risk:** there are 4 measures already in place to prepare for flood risk in the catchment.
 - Flood warning improvements
 - Carry out community engagement
 - Implement CATMAX alarms
 - Deliver property level protection at various communities
- **Protecting from risk:** there are 14 measures already in place, that protect from flood risk.
 - Support the implementation of water level management plans
 - Work in partnership with the LEP.
 - Develop an integrated drainage plan for the Royal Portbury Docks
 - Research and develop plans for where managed realignment may be undertaken.
 - Various asset improvements
 - Work with partners to ensure effective management of the drainage network.
 - Investigate options for a strategic flood defence solution in Bristol
 - Explore opportunities for floodplain restoration in rural areas.
- **Recovery and review of risk:** there are 5 measures already in place to recover and review following flooding. These include improvements to flood warning, telemetry, procedures and asset inspections
- **Other:** There are also 25 measures listed in table 12.10.3 already in place that do not fit in any of these categories.

Agreed measures across the Bristol Avon and North Somerset Streams catchment

Across the Bristol Avon and North Somerset Streams catchment the agreed measures to manage flood risk include:

- **Preventing risk:** there are 9 measures that are agreed to prevent coastal erosion risk across the catchment, by monitoring the rate of erosion
- **Preparing for risk:** there are 4 measures agreed to prepare for risk.
 - Flood warning improvements

- Individual property resilience
- **Protecting from risk:** there are 10 measures agreed to protect from risk
 - 6 measures to undertake a study into opportunities to remove flood embankments.
 - Carry out a structural survey of a flood defence scheme
 - Investigate improvements to flood alleviation schemes
 - Review our modelling and assess options to mitigate flood risk
- **Recovery and review of risk:** there are no measures agreed to recover and review following flooding, over and above existing flood risk work.

Proposed measures to manage risk in the Bristol Avon and North Somerset Streams catchment

In the Bristol Avon and North Somerset Streams Catchment there are 24 measures proposed to manage risk from 2015 and beyond. There are no catchment-wide measures proposed, but the following measures are proposed for specific locations:

- **Preventing risk:** 2 measures are proposed in this catchment to prevent flood and coastal erosion risk.
 - Improve or maintain assets
 - Pursue development opportunities to address climate change
- **Preparing for risk:** 5 measures are proposed to prepare for flood risk.
 - Better gauging of a watercourse
 - Raising awareness of flood risk in communities
 - Carrying out engagement and implementing property level protection
- **Protecting from risk:** 17 measures are proposed in this catchment to protect from flood risk.
 - 10 measures to improve outfalls, gates, tunnels or other assets
 - 2 measures to work with partners to identify new ways to protect communities in the catchment
 - 5 measures to review existing information and identify further actions to reduce flood risk
- **Recovery and review of risk:** there are no measures proposed to recover and review following flooding, over and above existing flood risk work.

More specific objectives and measures are included in tables 12.10.3. to 12.10.5.

Table 12.10.3. The Bristol Avon and North Somerset Streams catchment – ongoing measures

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Gordano Valley, North Somerset	N	N	Y	N	N	N	N	N	N	N		Enhanced biodiversity	N	Y	N	"Continue to support the implementation of water level management plans by: - ensuring that those responsible for managing water responsible parties are identified and aware of their actions; and - working with key stakeholders to seek improvements in the efficiency of water level management operations."	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Puxton, Kenn, Tickenham, North Somerset	N	N	Y	N	N	N	N	N	N	N		Enhanced biodiversity	N	Y	N	"Continue to support the implementation of water level management plans by: - ensuring that those responsible for managing water responsible parties are identified and aware of their actions; and - working with key stakeholders to seek improvements in the efficiency of water level management operations."	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Avonmouth, Bristol	N	N	N	Y	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	We will work in partnership with the LEP, BCC and wider groups to identify a viable scheme to protect Local Enterprise Area from climate change	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SH AR1	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M2 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SH AR1	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SHA R2	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SHA R2	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHA R3	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SHA R3	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SHA R4	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SHA R4	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHA R5	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SHA R6	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SHA R6	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHA R7	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SHA R7	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency
SMP19/SHA R7	N	N	N	Y	N	N	N	N	N	Y		Historic environment is protected	N	Y	N	Engage with English Heritage / County Archaeologist on replacement of defences / flood risk management	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHA R7	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SHA R8	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SEV 1	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SEV 1	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SEV 2	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, EH	Statutory FRMP	Environment Agency
SMP19/SEV 2	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SEV 3	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council / South Gloucestershire	Statutory FRMP	Environment Agency
SMP19/SEV 3	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SEV 4	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, South Gloucestershire Council, EH	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SEV 4	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency
SMP19/SEV 5	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, South Gloucestershire Council, EH	Statutory FRMP	Environment Agency
SMP19/SEV 5	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks, Severn Trent	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SEV 6	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Central Networks/Western Power Distribution, Sever	Statutory FRMP	Environment Agency
SMP19/BRI S1	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution / Central Networks, Wes	Statutory FRMP	Environment Agency
SMP19/BRI S2	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, South Gloucestershire Council, EH	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/BRI S2	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution / Central Networks, Wes	Statutory FRMP	Environment Agency
SMP19/BRI S3	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Bristol City Council, Bristol Docks	Statutory FRMP	Environment Agency
SMP19/BRI S3	N	N	N	Y	N	N	N	N	N	Y		Historic environment is protected	N	Y	N	Engage with English Heritage / County Archaeologist on replacement of defences / flood risk management	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Bristol City Council, EH	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/BRI S3	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution / Central Networks, Wes	Statutory FRMP	Environment Agency
SMP19/BRI S4	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Bristol City Council, Bristol Docks, EH	Statutory FRMP	Environment Agency
SMP19/BRI S4	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution / Central Networks, Wes	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/BRI S5	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , EA, NE, Bristol City Council, Bristol Docks, EH	Statutory FRMP	Environment Agency
SMP19/BRI S5	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution / Central Networks, Wes	Statutory FRMP	Environment Agency
SMP19/BRI S6	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M2 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , EA, NE, North Somerset Council, Bristol Docks	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/BRI S6	N	N	N	Y	N	N	N	N	N	Y		Historic environment is protected	N	Y	N	Engage with English Heritage / County Archaeologist on replacement of defences / flood risk management	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Bristol City Council, EH	Statutory FRMP	Environment Agency
SMP19/BRI S6	N	N	N	Y	N	N	N	N	N	Y		Reduced flood risk to the docks	N	N	Y	Develop an integrated drainage plan (surface water /sewer/river flooding) for the Royal Portbury Docks	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Bristol Docks, Wessex Water, North Somerset Council	Statutory FRMP	Environment Agency
SMP19/BRI S6	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution, Wessex Water	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/POR T4	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, EH	Statutory FRMP	Environment Agency
SMP19/KIN1	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, EH	Statutory FRMP	Environment Agency
SMP19/KIN1	N	N	N	Y	N	N	N	N	N	Y		We will understand where managed realignment can take place	N	N	Y	Undertake research involving stakeholders to identify where (and when) MR could take place within the Policy Unit in the Moderate and longer terms. Study should look at minor, staged and larger, long term MR options	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, IDB, EH, stakeholders	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/KIN1	N	N	N	Y	N	N	N	N	N	Y		We will have plans in place	N	N	Y	Develop plans to implement the CAPE approach to areas where MR may be undertaken	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, IDB, EH, stakeholders	Statutory FRMP	Environment Agency
SMP19/KIN1	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the design / construction of new defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, IDB, EH	Statutory FRMP	Environment Agency
SMP19/KIN1	N	N	N	Y	N	N	N	N	N	Y		Historic environment is protected	N	Y	N	Engage with English Heritage / County Archaeologist on replacement of defences / flood risk management	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, EH	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
SMP19/KIN1	N	N	N	Y	N	N	N	N	N	Y		Major utility infrastructure will be more resilient to flooding	Y	N	N	Encourage utility providers (water and electricity) to undertake an assessment of the current and future risks and resilience of their assets to flooding. Develop a flood resilience and adaptation plan as appropriate.	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , Western Power Distribution, Wessex Water	Statutory FRMP	Environment Agency
SMP19/KIN3	N	N	N	Y	N	N	N	N	N	Y		Environment is not adversely affected by maintenance of defences	N	Y	N	Ensure environmental issues are taken into account in the management and maintenance of defences. Ensure any works adhere to agreed working practices e.g. to prevent disturbance to birds	M6 - Other	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, North Somerset Council, EH	Statutory FRMP	Environment Agency
SMP19/KIN3	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of beach levels, dunes and erosion rates	M2 - Prevention	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , North Somerset Council	Non statutory FRMP	Environment Agency
Coombend, Radstock, BANES	Y	N	N	N	N	N	N	N	N	Y		Reduce flood risk to homes near Coombend Culvert	Y	N	N	Improvements to the coombend culvert	M3 - Protection	Pre 2015	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Congresbury village, North Somerset	N	N	N	N	N	N	N	N	N	Y		Reduce flood risk to agricultural land along Congresbury Yeo	N	N	Y	Improve Congresbury Yeo Tidal Banks	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Congresbury tidal defences, North Somerset	Y	N	N	N	N	N	N	N	N	Y		Reduce flood risk to main road (A370) through Congresbury	Y	N	N	Implement Congresbury FAS (localised bank raising)	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Cribbs Causeway, South Glos	N	N	N	N	N	Y	N	N	N	N		Reduce flood risk to businesses	N	N	Y	Implement Section 10 recommendations	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Tubbs Bottom, South Glos	N	N	N	N	N	Y	N	N	N	N		Reduce flood risk to businesses	N	N	Y	Implement Section 10 recommendations	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
	Y	N	N	N	N	N	N	N	N	N		Improve safety of trash screens across Wessex	N	N	Y	Updating 15 trash screens to improve safety	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
	Y	N	N	N	N	N	N	N	N	N		Reduce frequency of blockage	Y	N	N	Installation of GPRS Webcams to monitor the state of an asset and to provide visual inspections without the need to send resources.	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
	N	N	Y	N	N	N	N	N	N	N		Improved protection and resilience of properties at risk of flooding	Y	N	N	Deliver PLP protection to approximately 100 properties.	M4 - Preparedness	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
	N	N	N	N	N	N	N	N	N	N		Reduce flooding to agricultural land	N	N	Y	Work with partners to ensure effective management of drainage network in the low-lying area around the Severn Estuary. We maintain the tidal outfalls, the LSIDB manage the fluvial ditch network. Use the NFU Severn Estuary Stakeholder group to convey messages to local landowners regarding their riparian responsibilities.	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Bristol City tidal flood zone	N	N	N	Y	N	N	N	N	N	N		Protect businesses from flooding Any potential options for reducing flood risk to houses will be identified	Y	N	Y	Assess evidence and investigate options for a strategic flood defence solution and pursue opportunities to address low spots along Avon Crescent, the Portway and St. Philips Marsh to protect the city from current and future tidal flood risk. This work will complement BCC Avon Strategic Defence Study.	M3 - Protection	2015 - 2021	Very High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Bristol Temple Quarter Local Enterprise Zone	N	N	N	N	N	N	N	N	N	N		Businesses are safe from flooding Houses are safe from flooding	Y	N	Y	We will engage with the Local Enterprise Partnership, BCC and wider groups to ensure development within the Temple Quarter Enterprise Zone is safe from flood risk.	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol Frome upper catchment rural areas	Y	N	N	N	N	N	N	N	N	N	12.Floodplain connectivity	habitat improvement through floodplain restoration Reduce risk to properties with improved catchment management	Y	Y	N	Work with partners to explore floodplain restoration opportunities in line with the River Basin Management Plan and investigate the benefits of planting wet woodlands to hold water back. Reduce maintenance activities and maintain links with Local Nature Partnerships. Improve land management to reduce agricultural run-off and promote the use of SUDS to hold water back (restrict discharge to Qbar).	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Chew Magna, BANES	Y	N	N	N	N	N	N	N	N	N		Risk to life will be reduced by giving warning of a potential flash flood	Y	N	N	Continue to implement CATMAX alarms for rapid response catchments. Continue to investigate options to update flood warning service on the Winford Brook to improve lead time. Investigate options for improving telemetry and securing additional sites	M4 - Preparedness	Pre 2015	Very High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Chew Magna, BANES	Y	N	N	N	N	N	N	N	N	N		Reduce risk to residential properties flooding	Y	N	N	Carry out community engagement, work in partnership with BandNES to improve PLP scheme and provide advice to residents to allow them to take ownership of PLP measures	M4 - Preparedness	Pre 2015	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol City tidal flood zone	N	N	N	Y	N	N	N	N	N	N		Increased awareness of flood risk to businesses Increased awareness of flood risk to houses	Y	N	Y	Develop Tidal flood warning service for Bristol City Centre	M4 - Preparedness	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

* for detail of location of Shoreline Management Plan policy units, please refer to Shoreline Management Plan19 (Anchor Head to Lavernock Point)

Table 12.10.4. The Bristol Avon and North Somerset Streams catchment – agreed measures

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHAR1	N	N	N	Y	N	N	N	N	N	Y		hydromorphology is improved	N	Y	N	Undertake a study into opportunities to remove flood embankments	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency
SMP19/SHAR2	N	N	N	Y	N	N	N	N	N	Y		hydromorphology is improved	N	Y	N	Undertake a study into opportunities to remove flood embankments	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHAR3	N	N	N	Y	N	N	N	N	N	Y		hydromorphology is improved	N	Y	N	Undertake a study into opportunities to remove flood embankments	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency
SMP19/SHAR4	N	N	N	Y	N	N	N	N	N	Y		hydromorphology is improved	N	Y	N	Undertake a study into opportunities to remove flood embankments	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency
SMP19/SHAR6	N	N	N	Y	N	N	N	N	N	Y		hydromorphology is improved	N	Y	N	Undertake a study into opportunities to remove flood embankments	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/SHAR7	N	N	N	Y	N	N	N	N	N	Y		hydromorphology is improved	N	Y	N	Undertake a study into opportunities to remove flood embankments	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency Coastal Group , NE, Stroud District Council, IDB, stakeholders	Statutory FRMP	Environment Agency
SMP19/BRIS1	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates and salt marsh levels/extent	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE	Non statutory FRMP	Environment Agency
SMP19/BRIS2	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates and salt marsh levels/extent	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE	Non statutory FRMP	Environment Agency
SMP19/BRIS3	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates and salt marsh levels/extent	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE	Non statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/BRIS6	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates and salt marsh levels/extent	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency Coastal Group , NE, Bristol Docks	Non statutory FRMP	Environment Agency
SMP19/PORT1	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency Coastal Group , North Somerset Council	Non statutory FRMP	Environment Agency
SMP19/PORT2	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency Coastal Group , North Somerset Council	Non statutory FRMP	Environment Agency
SMP19/PORT3	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency Coastal Group , North Somerset Council	Non statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
SMP19/PORT4	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency Coastal Group , North Somerset Council	Non statutory FRMP	Environment Agency
SMP19/HOL2	N	N	N	N	Y	N	N	N	N	Y		We will understand where coastal erosion may affect vulnerable communities	Y	N	N	Put in place monitoring programme of erosion rates	M2 - Prevention	2015 - 2021	High	Environment Agency Environment Agency Coastal Group , North Somerset Council	Non statutory FRMP	Environment Agency
Brislington, Bristol	Y	N	N	N	N	N	N	N	N	N		Reduce flood risk to homes along Brislington Brook	Y	N	N	Carry out a full structural survey of the flood defence scheme at Brislington and review options to repair or replace sheet piles.	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Wallbridge, Frome, Somerset	Y	N	N	N	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	Frome FAS - investigate improvements at Wallbridge	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Yate /Chipping Sodbury, South Glos	Y	N	N	N	N	N	N	N	N	N		Reduce flood risk to homes along Bristol Frome in Yate and Chipping Sodbury	Y	N	N	To identify and carry out improvements to the standard of protection on the Bristol Frome through Yate and Chipping Sodbury	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Wessex	N	N	N	N	N	N	N	N	N	N		Improved resilience of residential properties across Wessex	Y	N	N	Provide contribution towards individual property resilience	M4 - Preparedness	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Bradford on Avon, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Identify the best way to protect historic town from flooding	N	Y	N	Review existing modelling and assess options for potential scheme	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Netham to Twerton, Bristol to Bath	Y	N	N	N	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	Improve flood warning lead times on the Avon from Twerton to Bristol.	M4 - Preparedness	Pre 2015	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Malmesbury, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Improved flood warning service to Malmesbury	Y	N	N	Improve flood warning lead times on the Sherston Avon at Malmesbury	M4 - Preparedness	Pre 2015	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Melksham, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Improved flood warning service	Y	N	N	Develop flood warning procedures at Melksham to improve thresholds and lead times.	M4 - Preparedness	Pre 2015	Low	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

* for detail of location of Shoreline Management Plan policy units, please refer to Shoreline Management Plan19 (Anchor Head to Lavernock Point)

Table 12.10.5. The Bristol Avon and North Somerset Streams catchment – proposed measures

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from all watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Oldbury, South Glos	N	N	N	N	N	N	N	N	N	N		Protect agricultural land from flooding	N	N	Y	Investigate development opportunities to increase the discharge into the Estuary by raising outfalls in line with climate change and reduce tide locking of the Oldbury Pill.	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Little Avon, South Glos	N	N	Y	N	N	N	N	N	N	N		Improved knowledge and potentially flood warning service to properties within the Little Avon catchment	Y	N	N	Investigate flood risk by carrying out modelling and gauging the river.	M4 - Preparedness	2015 - 2021	Low	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Berkeley, South Glos	N	N	Y	N	N	N	N	N	N	N		Identify if there are any options to reduce flood risk	Y	N	N	Review pre-feasibility information available for Berkeley to identify if any action is required.	M3 - Protection	2015 - 2021	Low	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Avonmouth, Bristol	N	N	N	Y	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	Work with Network Rail to explore the possibility of improving railway line as flood defence. Defences are below standard and there is a need to improve them in line with climate change.	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from all watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
River Avon, Bath to Bristol	Y	N	N	N	N	N	N	N	N	N		Reduce flood risk to homes along the River Avon	Y	N	N	Investigate options to reduce flood risk along River Avon between Bath and Bristol.	M3 - Protection	2021 - 2027	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Eastville, Bristol	Y	N	N	N	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	Investigate options for replacing Eastville flood alleviation scheme. Pursue partnership funding opportunities.	M3 - Protection	2021 - 2027	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Bristol Frome River catchment	Y	N	N	N	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	Assess evidence and investigate options to reduce flood risk on the Bristol Frome in line with climate change	M3 - Protection	2021 - 2027	Low	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Pill, North Somerset	N	N	N	N	N	N	N	N	N	N		Protect properties from flooding	Y	N	N	Assess evidence and investigate options for improving SOP in line with climate change	M3 - Protection	2021 - 2027	Low	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Bristol, Ashton Vale	N	N	N	N	N	N	N	N	N	N		Protect businesses from flooding	N	N	Y	Investigate options to improve discharge from Ashton Vale FD Scheme during tide locking and improve SOP (currently 1 in 50 due to tide locking)	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Keynsham, BANES	Y	N	N	N	N	N	N	N	N	N		Prepare businesses from flooding	N	N	Y	Establish awareness of flood risk, ensure flood warnings sign up, and identify potential for PLP scheme.	M4 - Preparedness	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from all watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Brislington, Bristol	Y	N	N	N	N	N	N	N	N	N		Increased understanding of risk in community	Y	N	N	Raise awareness of Brislington rapid response catchment. Consider improving flood warning service. Identify, promote and help to implement potential PLP scheme.	M4 - Preparedness	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Brislington, Bristol	Y	N	N	N	N	N	N	N	N	N		Increased understanding of risk in community	Y	N	N	Review modelling of Brislington Brook and investigate opportunities to reduce flood risk.	M3 - Protection	2015 - 2021	Very High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Bath Local Enterprise Zone	Y	N	N	N	N	N	N	N	N	N		Reduce risk to properties in Bath	Y	N	N	We will work in partnership with the LEP, BANES and wider groups to carry out improvements through development opportunities in the Local Enterprise Area	M3 - Protection	2015 - 2021	Very High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Twerton, Bath	Y	N	N	N	N	N	N	N	N	N		Reduce flood risk to lying properties in bath and those downstream at risk from gate failure. Maintain water levels through Bath to protect historic environment	Y	Y	N	Determine the long term plan for Twerton gate	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Pulteney, Bath	Y	N	N	N	N	N	N	N	N	N		Maintain water over Pulteney Weir and maintain water through Bath to protect historic environment	N	Y	N	Determine the interim and long term plans for Pulteney Radial gate	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from all watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Midsomer Norton, BANES	Y	N	N	N	N	N	N	N	N	N		Reduce risk to properties	Y	N	N	Investigate feasibility of improving the Mid Somer Norton Flood Relief Tunnel and pursue partnership funding through development opportunities.	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Wootton Bassett, Wiltshire	N	N	N	N	N	Y	N	N	N	N		Reduced risk to life from reservoir	Y	N	N	Pursue partnership funding opportunities to improve or maintain the reservoir and trash screens protecting the railway line	M2 - Prevention	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Dauntsey, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Increased understanding of risk in community	Y	N	N	Carry out community engagement and help implement a PLP scheme	M4 - Preparedness	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Malmesbury, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Protect historic town from flooding	N	Y	N	Improve our knowledge of flooding mechanisms in and around Malmesbury and investigate potential schemes.	M3 - Protection	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Chippenham, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Any potential options for flood risk management will be identified	Y	N	N	Investigate options for replacing radial gate	M3 - Protection	2021 - 2027	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Trowbridge, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Flood risk to businesses will not increase with climate change	N	N	Y	Pursue development opportunities to manage flood risk and address climate change	M2 - Prevention	2021 - 2027	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Melksham, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Any potential options for flood risk management will be identified	Y	N	N	Investigate options for replacing floodgate	M3 - Protection	2021 - 2027	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from all watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bradford on Avon, Wiltshire	Y	N	N	N	N	N	N	N	N	N		Improved awareness and preparation for flooding	Y	N	N	Carry out community engagement and help implement a PLP scheme	M4 - Preparedness	2015 - 2021	Moderate	Environment Agency Environment Agency	Statutory FRMP	Environment Agency
Clevedon, North Somerset	N	N	N	N	N	N	N	N	N	N		Reduce flood risk to Clevedon	Y	N	N	Investigate the feasibility of automating Cooks Clyse	M3 - Protection	2015 - 2021	High	Environment Agency Environment Agency	Statutory FRMP	Environment Agency

13. Conclusions, objectives and measures to manage risk for the Bristol Flood Risk Area and surrounding LLFA areas

Introduction to the Bristol Flood Risk Area

The Bristol Flood Risk Area (BFRA) extends beyond the Bristol City Council boundary and into 3 neighbouring Lead Local Flood Authority (LLFA) areas. This is shown in Figure 13.1, which identifies the position of other Flood Risk Areas across England and Wales, as well as the setting of the study area with regards to the relevant Severn River Basin District boundary.

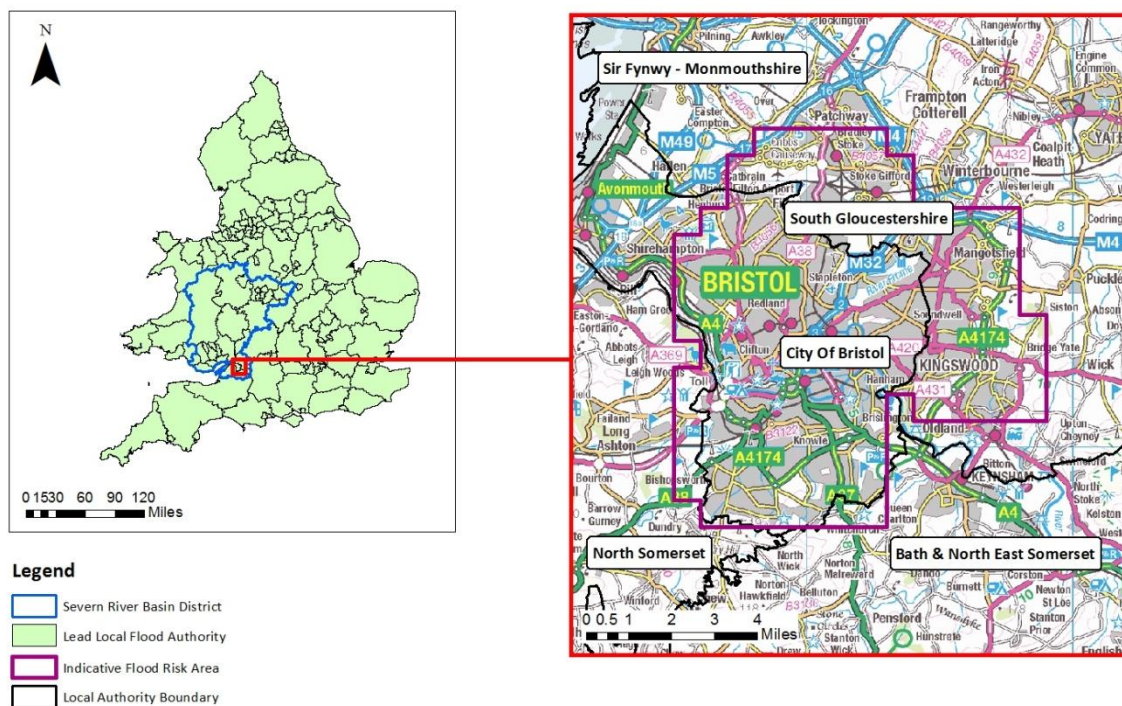


Figure 13.1. Location Plan showing indicative Flood Risk Area and Severn River Basin District boundary.

Unemployment is below the national average and some areas are among the least deprived in the country, although these lie adjacent to some of the most deprived in the country.

Bristol City is characterised by a great richness in its historic environment encompassing both areas such as the medieval centre, historic dockland and individual structures such as the Clifton Suspension Bridge. Its urban areas contain nearly 4,500 listed buildings and over 30 conservation areas. This, along with Bristol's heritage in the arts, culture and education has been credited with being a major factor in the attraction of inward investment. There has been a growing consensus around the need to protect Bristol's open spaces, and to balance the value of wildlife and nature conservation against the need for development.

Key statistics

Table. 13.1. Summary flood risk from surface water to people, economic activity and the natural and historic environment across the Bristol Flood Risk Area

Surface Water	Total in RBD	High risk	Medium risk	Low risk
Risk to people:				
Number of people in area:	573063	12900	0	29200
Number of services:	611	100	0	200
Risk to economic activity:				
Number of non-residential properties:	32376	293	306	801
Number of airports:	0	0	0	0
Length of roads (km):	109	7	5	14
Length of railway (km):	48	5	3	3
Agricultural land (ha):	3562	89	73	249
Risk to the natural and historic environment:				
Number of EU designated bathing waters within 50m:	0	0	0	0
Number of EPR installations within 50m:	7	3	0	1
Area of SAC within area (ha):	98	0	1	1
Area of SPA within area (ha):	0	0	0	0
Area of RAMSAR site within area (ha):	0	0	0	0
Area of World Heritage Site within area (ha):	2900	0	0	0
Area of SSSI within area (ha):	241	3	2	7
Area of Parks and Gardens within area (ha):	498	19	8	15
Area of Scheduled Ancient Monument within area (ha):	14	0	0	0
Number of Listed Buildings within area:	2302	41	10	12
Number of Licensed water abstractions within the area:	20	2	0	0

Note:

SAC - Special Area of Conservation

SPA - Special Protection Area

SSSI - Site of Special Scientific Interest

Ramsar - wetland site of international importance

EPR installations - those registered under the Environmental Permitting Regulations

Conclusions and objectives for the Bristol Flood Risk Area

Conclusions:

The Bristol Preliminary Flood Risk Assessment (which was based on evidence provided by the Bristol Surface Water Management Plan) quantified the risk posed to the Bristol FRA from surface water flooding. The Surface Water Management Plan (SWMP) utilised an Integrated Urban Drainage hydraulic modelling approach to simulate surface water flooding in the Bristol FRA. The SWMP indicated that approximately 31,600 residential properties, 5,700 non-residential and 200 critical infrastructure sites are at risk from surface water flooding in the Bristol FRA. The SWMP also used a multi-criteria analysis to identify a number of High Risk Areas within the Bristol FRA that are at particular high risk of surface water flooding, notably Ashton, Henbury, Southmead, St George and Dundry Hills.

The outputs from the PFRA and SWMP have been used by this FRMP and the local Flood Risk Management Strategies to promote a risk-based and data-led approach to managing flood risk within the catchment, work with communities and utilise resources in the most efficient manner.

South Gloucestershire Council is presently preparing its Local Flood Risk Management Strategy. It is anticipated that this will be completed and approved by the end of 2014.

The Strategy objectives will be important to provide a formalised approach to flood risk management across South Gloucestershire. The proposed measures and accompanying Action Plan will build on and enhance South Gloucestershire Council's present policies/strategies, procedures (work streams) and programmed activities to further manage the likelihood and impact of flooding to deliver improved social, economic and environmental benefits within and beyond the district.

Objectives:

Social:

- reduce risk to life
- improved flood warning service
- minimise community disruption by reducing impact of flooding - improve resilience of infrastructure and services and community preparedness through improved flood warning service and increased public awareness
- improve resilience through proactive management of potential impacts of climate change
- take a sequential approach to locating development
- reduce flood risk to historic environment
- increased understanding and management of flood risk impacts

Economic:

- reduce economic damage to commercial properties
- reduce flood risk to private properties
- reduce flood risk to agricultural and horticultural land
- support tourism by reducing flood risk and enhancing river and 'green' corridors
- reduce risk of flooding to major infrastructure
- encourage sustainable development that manages flood risk appropriately

Environmental:

- work with natural processes wherever possible to achieve WFD objectives

- improve water environment through flood risk management activities
- improve hydromorphology of rivers
- minimise impacts of flooding on designated sites or areas of environmental interest
- create habitat through flood risk management activities
- take climate change projections into account for all objectives

Proposed measures to manage flood risk in South Gloucestershire, including within the BFRA, are based on 6 draft LFRMS objectives as follows:

LFRMS Objectives:

- improve our understanding of flood risk and how climate change will influence future flood risk
- prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to communities, businesses and the environment of South Gloucestershire
- increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property
- ensure future development considers all known flood risks and climate change projections for South Gloucestershire
- actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire
- contribute to wider social, economic and environmental benefits by encouraging sustainable multi-benefit solutions and maximising use of resources.

These are consistent and align with the National Flood and Coastal Erosion Risk Management Strategy objectives for flood risk management.

More specific objectives and measures are included in the following tables.

Ongoing measures across the Bristol Flood Risk Area

Across the Bristol Flood Risk Area the on-going measures to manage flood risk include

Preventing risk: 17 measures.

- progress ongoing flood alleviation projects to reduce the risk to existing land and infrastructure and promote sustainable development, taking account of climate change
- manage existing infrastructure and watercourses to help manage flood risk
- continue to implement minor schemes to reduce the risk of flooding to people and property
- promote sustainable drainage and flood alleviation to reduce the risk of flooding

Preparing for risk: 5 measures

- utilise existing data and information to improve processes and preparations
- improve catchment understanding through improved monitoring and flood warning
- work with communities at risk to improve resilience and preparedness

Protecting from risk: 4 measures

- investigate and manage existing infrastructure

Recovery and review of risk: 1 measure

- develop procedures for recording flood events to aid rapid recovery

Agreed measures across the Bristol Flood Risk Area

Across the Bristol Flood Risk Area the agreed measures to manage flood risk include:

Preventing risk: 6 measures

- progress ongoing flood alleviation projects to reduce the risk to existing land and infrastructure and promote sustainable development, taking account of climate change
- manage existing infrastructure and watercourses to help manage flood risk
- continue to implement minor schemes to reduce the risk of flooding to people and property
- promote sustainable drainage and flood alleviation to reduce the risk of flooding

Preparing for risk: 2 measures

- utilise existing data and information to improve processes and preparations
- improve catchment understanding through improved monitoring and flood warning
- work with communities at risk to improve resilience and preparedness

Protecting from risk: 7 measures

- investigate and manage existing infrastructure

Recovery and review of risk: across the Bristol Flood Risk Area, there are no agreed measures to recover and review following flooding.

Proposed measures to manage risk in the Bristol Flood Risk Area

In Bristol City Council there are no measures proposed to manage risk from 2015 and beyond. This is because these measures have been taken from the Bristol City Council Local Flood Risk Management Strategies, which have all been consulted on and previously agreed.

Across the South Gloucestershire part of the Bristol Flood Risk Area the proposed measures to manage flood risk include:

Preventing risk: 36 measures. These cover a large range of work streams including: Assessing climate change effect on catchment river flooding and possible mitigation measures; developing systems and procedures to record flooding incidents and associated action plan to address specific local issues; ensure a programme is followed to update South Gloucestershire's flood risk documents in conjunction with RMA Partner's catchment documentation; map and register flood risk assets and prioritise maintenance of vulnerable infrastructure based on available resources and funding; through Flood Risk Partnership Operational Working Group agree potential FRM schemes and funding sources; review asset maintenance planning with RMA Partners and adjacent LLFAs and work collaboratively; liaise with RMAs regarding potential flood risk management measures, priorities and shared funding; ensure funding sources are investigated for flood relief and water management gains; advertise ordinary watercourse riparian responsibility on website and the Council's RMA role to landowners; upskill new staff for SAB duties using e-learning modules; collaborative working with Highways Agency and Network Rail to ensure active flood risk management of critical transport links; liaise with RMAs to deliver flood risk works combined with other schemes to provide wider environmental and economic benefits.

Preparing for Risk: 11 measures. Further contact with Parish Councils and businesses to obtain recent locally held flood data plus engagement regarding flood protection measures; use mobile apps to record flooding incidents; review both the Multi Agency Flood Plan and SGC's Severe

Weather Plan; signpost information on council's website relating to flood risk sources, high flood risk areas and self help; provide schools with educational presentations regarding flood resilience training linked to other environmental issues; support Parishes with Flood Plans or groups.

Protecting from Risk: 11 measures. Review council policies regarding drainage infrastructure for new development; work with Environment Agency and adjacent LLFAs to agree strategic options for improving flood storage capacity in River Frome and River Avon catchments to safeguard against climate change projected impact; set up SAB team including policy and process training to accord with national guidance and local criteria; support planning department regarding pre-application discussion to ensure development is 'SuDS fit' and drainage design satisfies extreme rainfall and climate change criteria; brief council officers and members on SuDS benefits as well as assess and advise cost comparison with traditional development surface water drainage.

Recovery and review of risk: 3 measures. Review flood investigation criteria for significant flooding incidents at agreed intervals; review emergency response strategy and procedures for present flooding incident process; input to South West Flood Managers Group flood event lessons learnt and management initiatives.

Table 13.2. The Bristol Flood Risk Area – measures: ongoing

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	N	N		Work with community resilience groups to raise awareness of flood risks	Y	N	N	Work with the school to raise awareness of potential flood risk, identify feasible mitigation measures and ensure a flood emergency plan is in place	M4 - Preparedness	Pre 2015	High	North Somerset Unitary Authority North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	N	N	N	N	N	N	N	N	N		Reduction of flood risk to existing properties at moderate risk (approx 1000) and very significant risk (approx 300). Project also proactively investigating the need to protect against future flood risk, which could result in approx. 3,000 properties at moderate risk and approx 2,000 at very significant risk Reduction of flood risk to existing properties at moderate risk (approx 500) and very significant risk (110). Project also proactively investigating the need to protect against future flood risk, which could result in approx. 1500	Y	N	Y	Investigation and hydraulic modelling assessment into the need, justification and outline design of a strategic flood mitigation solution for central Bristol. Primary source of flood risk to be mitigate against is tidal flooding	M2 - Prevention	2015 - 2021	Critical	City of Bristol Unitary Authority City of Bristol Unitary Authority Environment Agency , Local Enterprise Partnership , Wessex Water	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
											properties at moderate risk and approx. 800 at very significant risk Flood risk posed to the centre of Bristol is significant and likely to increase substantially by the end of the century. The Centre of Bristol is a nationally important tourism venue and economic hub, with significant infrastructure and regeneration areas such as the SS Great Britain and Local Enterprise Zone at risk of flooding. Therefore safeguarding these areas and regeneration zones is in the national interest											
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N	Register of flood risk assets as a basis to implement a proactive asset management regime	Y	N	N	Establish and publish Flood Risk Asset Register	M2 - Prevention	Pre 2015	Critical	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority	
Bristol FRA	N	N	N	N	N	N	N	N	N	N	Maintain the standard of protection provided to existing commercial properties through replacement of a tide flap on a branch of the River Malago in south Bristol	N	N	Y	Replacement of existing tide flap to maintain the standard of protection to existing commercial properties	M3 - Protection	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority Environment Agency , Wessex Water	Statutory FRMP	City of Bristol Unitary Authority	

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	N	N		Reduction of flood risk to existing properties	Y	N	N	Flood alleviation scheme to reduce the risk of surface water flooding to a community in north Bristol	M3 - Protection	2015 - 2021	Very High	City of Bristol Unitary Authority City of Bristol Unitary Authority Environment Agency , South Gloucestershire Council , Wessex Water	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Reduction of flood risk to existing properties Improvements in water quality of the nearby receiving watercourse, the River Trym by encouraging green infrastructure Project aims to achieve multiple benefits to the streetscape and biodiversity by encouraging green infrastructure	Y	Y	N	Pilot SuDS scheme to reduce the risk of surface water flooding to a community in north Bristol, improve the streetscape and showcase SuDS in anticipation of the SAB role	M3 - Protection	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority Environment Agency , Wessex Water , Local community	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	Y	N	N	N	Y	N	N	N		Establish the SAB role to improve the management of surface water from new developments	N	N	Y	Establish the SAB role for Bristol City Council as LLFA	M2 - Prevention	Pre 2015	Critical	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	N	N		Work with community resilience groups to raise awareness of flood risks	Y	N	N	Work with the school to raise awareness of potential flood risk, identify feasible mitigation measures and ensure a flood emergency plan is in place	M4 - Preparedness	Pre 2015	Moderate	North Somerset Unitary Authority North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	N	Y	N	N	N	Y	N	Y	N		Improvement in analysis of flood risk data to best identify at-risk communities	Y	N	N	Continue to utilise and revise the SWMP to inform flood risk activities, response to planning applications and emergency response. Includes the action to revise the vulnerability mapping results of the SWMP	M4 - Preparedness	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority Environment Agency , Wessex Water	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Pro-active management and maintenance of flood assets	N	N	Y	Undertake comprehensive surveys of flood risk assets, such as those completed in Southmead and Southville to populate the Asset Register and improve our proactive management and maintenance of flood risk assets	M2 - Prevention	2015 - 2021	Moderate	City of Bristol Unitary Authority City of Bristol Unitary Authority Wessex Water	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	Y	N	N	N	Y	N	N	N		Improved flood warning and improved knowledge of catchment responses	N	N	Y	Installation of hygrometry monitors and gauges to help improve understanding of catchment responses, emergency responses as well as inform our studies and mitigation schemes	M2 - Prevention	2015 - 2021	Moderate	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	Y	N	N		Event recording, verification of studies	N	N	Y	Develop our procedure for recording flood events to assist with historical records, verification of study results, knowledge of catchment responses as well as proactive and more efficient flood risk management	M5 - Recovery and Review	2015 - 2021	Moderate	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	Y	N	N	N	N	N	N	N		Managing the risk of flooding from ordinary watercourses and main rivers (where BCC are the riparian owner)	Y	N	N	To discharge our duties under the Flood and Water Management Act and Land Drainage Act, we will continue our maintenance regime of ordinary watercourses and associated structures. This will include ongoing management and improvement of associated contracts. This may include management on Main Rivers, where BCC are riparian owner	M2 - Prevention	2015 - 2021	Critical	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	Y	N	N	N	N	N	N	N		Pro-active management and maintenance of flood assets	Y	N	N	Identify and prioritise watercourse structural improvements to ensure proactive asset management and maintenance, as well as improved HandS and access improvements	M2 - Prevention	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
Bristol FRA	N	N	Y	N	N	N	Y	N	Y	N		Reduce the risk of flooding by implementing minor works and schemes	Y	N	N	Identify and undertake minor land drainage and flood mitigation schemes, in accordance with the risk-based approach advocated by the LFRMS	M2 - Prevention	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	N	N		Reduce the risk of flooding to adopted highway	Y	N	N	Deliver an appropriate scheme to reduce flood risk to Scotland Lane. Works to be led by the Highways Authority	M2 - Prevention	2015 - 2021	Moderate	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Ensure sustainable drainage good practice is embedded within schemes promoted by RMAs and internal clients	N	N	Y	For schemes led by the various RMAs in the Bristol area, we will identify opportunities for including SuDS measures to encourage wider benefits from the schemes. This includes a process of education of internal clients to recognise the benefit of SuDS so they become more widely accepted as part of scheme designs	M3 - Protection	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	N	N	N	N		Proactive management of flood risk assets in the Floating Harbour Managing tidal and fluvial flood risk through proactive asset management	Y	N	N	Complete an asset management report for Floating Harbour assets, including those that have a flood risk function. Action to be completed by the Harbour Authority team in the LLFA. This will implement a more proactive asset management regime for the Harbour	M2 - Prevention	2015 - 2021	Very High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Proactive management of flood risk assets on the highway network Managing surface water and sewer flooding through proactive asset management	Y	N	N	Develop a risk based and data-led approach to highway drainage maintenance.	M2 - Prevention	2015 - 2021	Very High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Discharging duty under the Flood and Water Management Act by completing Land Drainage and Flood Defence Consents, as required	N	N	Y	Follow established procedures for consenting works to ordinary watercourses	M2 - Prevention	2015 - 2021	Critical	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Improving community liaison and action by producing a programme of ongoing community engagement to assist communities to manage the risk of flooding together with RMAs	Y	N	N	Produce a programme of community engagement activities to enable communities to be more prepared and actively manage their own risk	M4 - Preparedness	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Improved awareness of flooding and flood risk management through improved communication tools	N	N	Y	Improve and publish the BCC website to include LLFA activities and projects to improve awareness and community resilience	M2 - Prevention	2015 - 2021	Moderate	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Discharging our duty under the Flood and Water Management Act by enabling sustainable development	N	N	Y	Follow and revise procedures for responding to development planning applications to ensure sustainable development	M2 - Prevention	Pre 2015	High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Discharging our duty under the Flood and Water Management Act by enabling sustainable development	N	N	Y	Ensure that flood considerations are involved in the distribution of Community Infrastructure Levy to benefit at-risk communities	M2 - Prevention	2015 - 2021	Moderate	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Improving flood preparedness and emergency response	N	N	Y	In line with the requirements of the Bristol City Council Flood Plan, the Flood Risk and Asset Management Team are to continue to provide advice and actions from flood and weather warnings to the wider authority and stakeholders	M2 - Prevention	2015 - 2021	Low	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Discharging statutory duty by investigating flood events	N	N	Y	Undertake formal Section 19 flood investigations as required	M2 - Prevention	2015 - 2021	Critical	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Improving flood preparedness and emergency response	N	N	Y	Establish and utilise the LLFA working group to promote and co-ordinate flood response and preparedness across key teams within the authority	M4 - Preparedness	2015 - 2021	High	City of Bristol Unitary Authority City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Table 13.3. The Bristol Flood Risk Area – measures: agreed

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	Assess the risk of flooding from the Long Ashton Brook, as the Brook is predicted to present a significant flood risk to properties,	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	N	N	N		Operational measures to enhance maintenance of gullies	Y	N	N	Investigate the performance of the highway drainage network and enhance maintenance/undertake improvements where necessary	M3 - Protection	2015 - 2021	Moderate	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Ashton area identified as being within High Risk Area from the SWMP. Also at risk from fluvial and tidal flooding so require further study to understand the flooding mechanisms and investigate potential solutions to alleviate flood risk Ashton area identified as being within High Risk Area from the SWMP. Also at risk from fluvial and tidal flooding so require further study to understand the flooding mechanisms and investigate potential solutions to alleviate flood risk Ashton area identified as being within High Risk Area from the SWMP. Also at risk from fluvial and tidal flooding so require further study to understand the flooding mechanisms and investigate potential solutions to alleviate flood risk	Y	N	Y	Investigation and assessment into the need, justification and outline design of a flood mitigation solution for the Ashton area. Numerous flood sources affect the area - fluvial, tidal, groundwater and surface water	M2 - Prevention	2015 - 2021	High	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Reduction of flood risk to existing properties	Y	N	N	Flood alleviation scheme to reduce the risk of surface water flooding to a community in south Bristol	M3 - Protection	2015 - 2021	Moderate	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	Y	N	N	N	Y	N	N	N		Reduction of flood risk to existing properties	Y	N	N	Flood alleviation scheme to reduce the risk of surface water flooding to a community in north Bristol	M3 - Protection	2015 - 2021	Moderate	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	Assess the risk of flooding from the Long Ashton Brook, as the Brook is predicted to present a significant flood risk to properties,	M3 - Protection	2015 - 2021	Moderate	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	N	N	N		Operational measures to enhance maintenance of gullies	Y	N	N	Investigate the performance of the highway drainage network and enhance maintenance/undertake improvements where necessary	M3 - Protection	2015 - 2021	Moderate	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	The operation of the surface water pump will be assessed by the Environment Agency and NSC	M3 - Protection	2027 - 2033	Moderate	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	We will investigate the existing condition of the highway drainage network and evaluate any improvements to the maintenance regime required.	M2 - Prevention	2015 - 2021	Moderate	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	N	N	N	N	Y	N	N	N		Operational measures to improve the gullies and the drainage network and watercourses	Y	N	N	A CCTV survey of the culverted watercourse should be undertaken to establish the condition and capacity of the watercourse.	M2 - Prevention	2027 - 2033	Moderate	North Somerset Unitary Authority	Statutory FRMP	North Somerset Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	Y	N	N		Improvement to community liaison and management of flood risk	Y	N	N	Identify local groups and communities that we can work with to improve community engagement and commence projects, schemes and plans to achieve the actions of the LFRMS	M4 - Preparedness	2015 - 2021	Moderate	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Discharging our duty under the Flood and Water Management Act by enabling sustainable development	N	N	Y	Update the SFRA document to reflect recent study outputs.	M2 - Prevention	2015 - 2021	High	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	N	N	N	N	N	Y	N	Y	N		Discharging our duty under the Flood and Water Management Act by enabling sustainable development	N	N	Y	Produce a best practice guide on enabling Water Sensitive Urban Design (WaSUD) for new development in Bristol. Will develop on the procedures established as part of the SAB and assist with discharging the statutory duty of encouraging sustainable development	M2 - Prevention	2015 - 2021	Moderate	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Discharging our duty under the Flood and Water Management Act by enabling sustainable development	N	N	Y	Ensure efficient and consistent approach to LLFA response to planning applications by establishing and undertaking internal audits of planning application procedures and responses	M2 - Prevention	2015 - 2021	Low	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority
Bristol FRA	N	Y	N	N	N	N	N	N	N	N		Improving community resilience and preparedness	Y	N	N	Attend flood plan meetings with the EA to improve community engagement and community action to help manage the risk of flooding	M4 - Preparedness	2015 - 2021	High	City of Bristol Unitary Authority	Statutory FRMP	City of Bristol Unitary Authority

Table 13.4. The Bristol Flood Risk Area – measures: proposed

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that River Basin Management Plan Measure	Social	Environment								Economic
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Target Parish Councils and large businesses for any locally held information and to engage about local protection measures	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Investigate how climate change is predicted to affect flood risk to inform long-term planning, mitigation and decision-making at the catchment level	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Identify where the main risks from climate change will impact council services and flood risk management and develop action plan to address specific local issues	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Establish and maintain a centralised database or system for recording historic and reported flooding incidents	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Collate and incorporate historical information and customer call centre records into the SGC Flood Database	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Develop a pro-forma for Call Centre staff to record correct information when taking calls about flooding incidents from the public	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review flood investigation criteria for significant' flooding incidents in accordance with agreed protocol on a yearly basis or following a significant flooding event	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M5 - Recovery and Review	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Develop new technology such as mobile apps to record and report flooding information	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M4 - Preparedness	2015 - 2021	Low	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review the programme for updating South Gloucestershire flood risk documents and align these with updates to Risk	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
												Management Authority documents, e.g. CFMP and RBMP to ensure catchment approach										
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Update the South Gloucestershire Preliminary Flood Risk Assessment.	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Update the South Gloucestershire Strategic Flood Risk Assessment.	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review South Gloucestershire Local Flood Risk Management Strategy	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review Flood Risk Management Plan	N	N	Y	Improve our understanding of flood risk and how climate change will influence future flood risk	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review and formalise inspection and maintenance of drainage infrastructure including gullies and trash screens	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Transfer paper-based inspection reporting procedure to electronic format	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Low	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Map locations and conditions of council drainage assets, as part of South Gloucestershire Asset Register	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Use the South Gloucestershire Asset Register to identify and establish priorities for vulnerable infrastructure and prioritise maintenance regimes based on available funding	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review maintenance plans for different risk management authority and council assets and identify where responsibilities and maintenance targets overlap	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review existing and emerging Council policies with regards to drainage infrastructure for new development	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review the emergency response strategy and procedures for dealing with flooding alerts / incidents and response to residents, businesses, and other agencies following the Winter 2013/14 flooding	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M5 - Recovery and Review	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review and share outcomes from the South Gloucestershire Multi-Agency Flood Plan	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review and share outcomes from the South Gloucestershire Severe Weather Plan	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	N	Y	N	N	N	N	N	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Work with West of England Partnership to agree strategy for improving flood storage capacity in the Frome catchment and tributaries to cope with the projected impacts of climate change	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	N	Y	N	N	N	N	N	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Work with Bath and NE Somerset to review opportunities for measures and funding for River Avon Corridor (Bristol to Bath)	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Liaise with Risk Management Authorities to produce a list of on-going and potential flood risk management schemes in South Gloucestershire and funding provisions / requirements for these	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Develop list of all potential funding sources for flood or water management, with application deadlines, and review quarterly	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review funding available to undertake Local Flood Risk Management activities post March-2015.	N	N	Y	Prioritise and implement improvements to local flood infrastructure to reduce the likelihood of flooding causing harm to the communities, businesses and the environment of South Gloucestershire	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Improve available information and sign posting on the council website about all sources of flood risk in South Gloucestershire	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control	Distribute SGC emergency planning leaflets to identified communities and	N	N	Y	Increase public awareness of the level of flood risk affecting communities	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority					
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment	Economic	Prevention, protection, preparedness etc	FRMP Planning Cycles	Critical, Very High, High, Moderate Low
											entry to water environment)	businesses at highest risk of flooding in South Gloucestershire				and businesses and how they can better protect themselves and their property										
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Improve available information and sign posting on the council website about how residents and businesses can help themselves	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority				
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Encourage residents and businesses to use online tools available from the Environment Agency and National Flood Forum to produce risk assessments, action plans and continuity plans	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority				
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Work with schools to identify educational opportunities for resilience training or talks as part of the Climate Change, Sustainability and Emergency Planning Initiative	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority				

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Develop initiatives to encourage businesses and householders to take action to reduce risk (e.g. depave)	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Support Parish Councils who want to set up local flood plans or groups	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M4 - Preparedness	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Where possible, identify ownership for ordinary watercourses and record in a centralised database	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	54.Educate landowners	Improve information on the website about riparian responsibilities of ordinary watercourse maintenance	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	54.Educate landowners	Contact landowners outlining South Gloucestershire Council responsibilities as a Risk Management Authority and their rights and responsibilities as landowners	N	N	Y	Increase public awareness of the level of flood risk affecting communities and businesses and how they can better protect themselves and their property	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Hold a presentation or face to face training for Elected Members about flood risk and management of this in South Gloucestershire	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Identify strategic flood risk management priorities and how future development can help deliver these	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Form an Internal Flood Group with representatives from planning, development control, asset maintenance and sustainability and meet quarterly	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control	Determine South Gloucestershire SAB protocol for receiving, approving,	N	N	Y	Ensure future development considers all known flood risks and	M3 - Protection	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
											entry to water environment)	adopting and maintaining SuDS				climate change projections for South Gloucestershire						
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Use available resources, e.g. Defra and Environment Agency e-learning modules, to up skill staff on SuDS and SAB requirements	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Identify the resources required to undertake the SAB role and which department will lead on the SAB	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M3 - Protection	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Undertake a 'dry run' of reviewing and approving SuDS applications in advance of the implementation of the legislation	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Produce a Developers SuDS Guidance Document specific to the local area, including guidelines on flood resilient buildings	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer	Is there a WFD assessment that			River Basin Management Plan Measure	Social	Environment							
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Provide clear information on the Council website about council expectations on drainage	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Proactively consider SuDS in early discussions about development design	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Ensure drainage infrastructure for new development is designed to accommodate levels of precipitation expected during its design life, including climate change	N	N	Y	Ensure future development considers all known flood risks and climate change projections for South Gloucestershire	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Use available datasets to identify areas where combined flood risk, e.g. surface water and sewer or river, could combine to exacerbate risk	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Improve communication with Highway Agency and Network Rail about joining up approach to flood management around major transport routes	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Continue to attend West of England Partnership Flood Group meetings	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Communicate with South West Flood Managers Group about lessons learnt from flooding events and flood management initiatives	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M5 - Recovery and Review	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that River Basin Management Plan Measure	Social	Environment								Economic
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Update the LFRMS Action Plan to incorporate recommendations of new studies	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Agree methods of sharing information and data amongst flood Risk Management Authorities	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Invite neighbouring LLFAs and Risk Management Authorities to sit on the Steering Group when updating flood risk documents	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Share findings of South Gloucestershire Local Flood Risk Management Strategy with the Environment Agency to inform the Flood Risk Management Plan	N	N	Y	Actively work with other Lead Local Flood Authorities and Risk Management Authorities to coordinate management and reduce flood risk across South Gloucestershire	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Review local planning policy following publication of new and updated flood risk reports, national policies and guidance	N	N	Y	Contribute to wider social, economic and environmental benefits by encouraging sustainable multi-benefit solutions and maximising use of resources	M2 - Prevention	2015 - 2021	High	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Maintain a list of projects or works being undertaken across council departments that have a flood risk management component, and identify any opportunities where works overlap and savings can be made, e.g. resurfacing of paths or roads	N	N	Y	Contribute to wider social, economic and environmental benefits by encouraging sustainable multi-benefit solutions and maximising use of resources	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Main river	Ordinary watercourses	From all rivers	Sea	Coastal erosion	Reservoirs	Surface water	Groundwater	Sewer			Is there a WFD assessment that	River Basin Management Plan Measure	Social								Environment
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Educate council officers on SuDS and potential benefits as an alternative to traditional drainage	N	N	Y	Contribute to wider social, economic and environmental benefits by encouraging sustainable multi-benefit solutions and maximising use of resources	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Understand costs of implementing SuDS over traditional drainage on the highway or public spaces	N	N	Y	Contribute to wider social, economic and environmental benefits by encouraging sustainable multi-benefit solutions and maximising use of resources	M3 - Protection	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority
Bristol FRA	N	Y	N	N	N	N	Y	Y	N	N	Reduce diffuse pollution pathways (i.e. control entry to water environment)	Liaise with Risk Management Authorities to identify opportunities where flood risk works can be aligned with other non-flood risk policies or plans to deliver wider benefits	N	N	Y	Contribute to wider social, economic and environmental benefits by encouraging sustainable multi-benefit solutions and maximising use of resources	M2 - Prevention	2015 - 2021	Moderate	South Gloucestershire Unitary Authority	Statutory FRMP	South Gloucestershire Unitary Authority

Introduction to the remaining LLFA areas outside of the Bristol Flood Risk Area (FRA)

The 4 LLFAs that are located inside the Bristol FRA have also chosen to contribute towards a joint FRMP for their entire council boundary area. The majority of Bristol City Council lies inside the FRA, except for Avonmouth and its surrounding areas. A large proportion of South Gloucestershire urban area also lies inside the boundary of the FRA. However, only small sections of North Somerset and Bath and North East Somerset lie inside the FRA. More information on these LLFAs is set out below:

Bath and North East Somerset

Bath and North East Somerset covers an area of approximately 35,000 hectares. Two thirds of the area is designated as a green belt. The largest urbanised areas within Bath and North East Somerset are Bath, Keynsham, Midsomer Norton and Radstock. The population of the area has been growing in recent decades and at the 2011 census the population was 176,000 with approximately half the population living in the City of Bath. There are numerous villages and hamlets spread across 49 rural parishes which accommodate a substantial rural population.

Approximately 1,800 residential and non-residential properties across the Bath & North East Somerset area are predicted to be at risk of surface water flooding during a rainfall event with a probability of occurrence of one in every 30 years, per year and approximately 10,000 residential and non-residential properties are predicted to be at risk of surface water flooding during a rainfall event with a probability of occurrence of one in every 200 years, per year.

Historically, significant flooding has occurred in the Chew Valley area, specifically in the towns of Chew Magna and Chew Stoke. Chew Magna lies within a rapid response catchment with a number of properties located within the flood plain. Flooding events in Chew Magna in 2012 led to the evacuation of many residents from their homes, with significant damage to possessions, property, services and infrastructure. Flood preparedness and protection work is ongoing in the Chew Valley. This work includes community flood planning and a large-scale Property Level Protection scheme.

The River Avon runs through the centre of the City of Bath. A major flood protection scheme was completed in Bath in the early 1970s. The scheme involved deepening and widening the main channel, and introduced a series of sluice gates to protect the city. Enabling the city of Bath to modernise and develop while ensuring flood protection has been a historical challenge for the city over the centuries and something that will continue for the foreseeable future.

North Somerset

North Somerset is located in the southwest of England and borders the local authority areas of Bristol, Sedgemoor, Mendip and Bath & North East Somerset. North Somerset Council (NSC) is a unitary authority which is approximately 375km² in size, and more than two thirds of the district is rural. The majority of residents live in the main urban centres of Weston-super-Mare, Portishead, Clevedon and Nailsea. There are many villages and hamlets spread across 40 rural parishes

which accommodate a substantial rural population. The population within the entire district is just over 200,000.

The Rivers Land Yeo, Kenn and Yeo all flow through the valleys between the limestone ridges then over the level moors areas to the Severn. As they progress through the valleys they generally have a natural river form sometimes with adjacent wetlands. As they reach the moors the channels are often more engineered and sometimes embanked, forming part of the system of numerous drainage ditches used to control the water levels on the wetlands of the Moors.

Flooding can threaten lives and cause substantial negative social and economic effects to people, property, infrastructure and agricultural land. Historical flooding within North Somerset has demonstrated these devastating effects. In addition to the Great Flood of 1607 which killed 2,000 people there have been a number of significant flooding incidents in North Somerset in 1968, 1981, 1989-90, 2007, 2008, and more recently in 2012 which was the second wettest year on record in the UK. Indeed, during 2012 it is estimated that approximately 340 properties flooded internally across North Somerset. Flooding in North Somerset arises from rivers, the sea, surface water runoff, exceedance from urban drainage networks, reservoirs, and groundwater. Flooding from the sea presents the most significant source of flood risk in North Somerset, although this is well managed by the presence of raised and natural sea defences along the majority of the coastline. A future increase in precipitation and sea level due to climate change is likely to cause further increases in flood risk for North Somerset, although the nature and extent of this increase remains uncertain.

Measures across the surrounding LLFA areas

The following section outlines on-going, agreed and proposed measures across the Lead Local Flood Authority areas, but outside of the Bristol Flood Risk Area:

On-going measures across the LLFA areas not in the BFRA

Across the remaining LLFA areas the on-going measures to manage flood risk include:

Preventing risk: 7 measures.

These include operation and maintenance of flood defences. Developing an implementation plan which sets out progress against the objectives of the LFRMS and the works programmed over the next two year period. Creating the Strategic Flood Board and Flood Risk Asset Register.

Preparing for risk: 2 measures including improving linkages with development management services to inform decisions on planning applications.

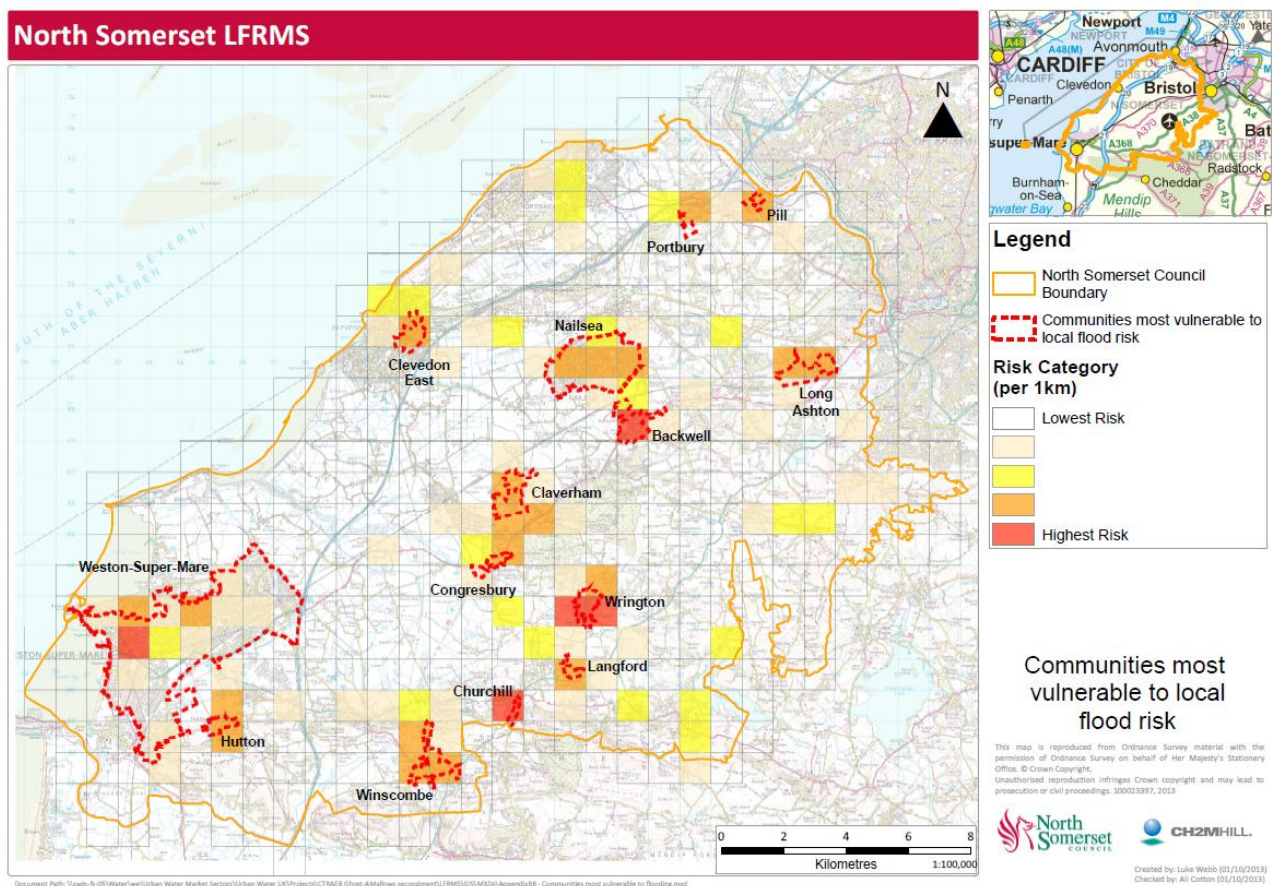
Protecting from risk: 14 measures such as developing action plans, property level protection schemes, highway schemes and land drainage engineering projects. We will develop our SuDS Approval Body protocols in time for commencement of the legislation. This will encourage and promote flood risk management activities which have multiple benefits for amenity, biodiversity or water quality.

Recovery and review of risk: 2 measures including developing protocols for the reporting and investigation of flooding incidents and a historic flood record database.

Agreed measures across the LLFA areas not in the BFRA

There are no measures agreed in Bath and North East Somerset (B&NES), to manage risk from 2015 and beyond. This is because all the measures will be taken from the B&NES Local Flood Risk Management Strategies, which have not yet been consulted on. These measures are therefore included in the proposed measures.

North Somerset LFRMS has been consulted on and measures to manage risk are agreed from 2015 and beyond. The 15 highest priority communities identified by the risk assessment and prioritisation exercise are identified in the Action Plan for further investigation and shown on the map below along with the Action Plan measures:



The agreed measures to manage flood risk in North Somerset (outside of the Bristol FRA) include:

Preventing risk: 7 measures

North Somerset will develop a risk-based approach to the maintenance of assets in the highest risk locations, using our 'asset register plus' as the platform to accomplish this. Improving our links with development management services will allow us to seek earlier engagement with developers. This will maximise the opportunities to influence the location and design of drainage in new development.

Preparing for risk: 1 measure

North Somerset will work with Community Resilience groups across North Somerset to build communities which can be more resilient to flooding. Recognising that resources are limited we will prioritise community resilience to flooding in those communities which are identified in this Strategy as being most vulnerable to flood risk.

Protecting from risk: 36 measures

North Somerset will encourage and promote investment in drainage and flood risk management infrastructure which achieves multiple benefits (e.g. green infrastructure). The Action Plans within the LFRMS outline types of measures and their timescales for the 15 most vulnerable communities in North Somerset. In many locations the Action Plan recommends investigation or survey in the first instance. This is necessary to fully understand flooding mechanisms impacts prior to the development of flood mitigation measures. Working with our Partners we will work towards improving our understanding of climate change by assessing the future implications of precipitation changes on flood risk from surface water, ordinary watercourses and groundwater. We have developed a funding strategy and funding guidance that identifies the primary sources of local flood risk management funding. The strategy also identifies how to maximise other non-flood related outputs to secure contributions from other secondary sources of funding.

Recovery and review of risk: 1 measure

North Somerset have been working closely with our internal partners to share information, establish common investment needs and manage flood risk more effectively.

Proposed measures to manage risk in the LLFA areas not in the BFRA

There are no new measures proposed in North Somerset to manage risk from 2015 and beyond. This is because all the measures have been taken from the North Somerset Local Flood Risk Management Strategies, which has been consulted on. These measures have therefore been agreed.

However, as B&NES have not yet consulted on their Local Flood Risk Management Strategy, these proposed measures are set out below:

Preventing risk: There are 10 measures proposed to prevent flood risk in Bath and North East Somerset, including preparation of the Surface Water Management Plan, SuDS Approval Body and the Local Flood Risk Management Strategy

Preparing for risk: There are no proposed measures to prepare for flood risk across Bath and North East Somerset

Protecting from risk: There are 3 measures to protect from flood risk in Bath and North East Somerset, such as property level protection scheme and land drainage engineering projects

Recovery and review of risk: There are no proposed measures to recover and review following flooding in Bath and North East Somerset.

Table 13.5. Measures: Ongoing. Outside of the Bristol Flood Risk Area.

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	Y	Y	N	N	Y	N	N	N		Establish Asset Register Plus - An interactive system and share data with partners on our most critical assets	N	N	Y	Establish Asset Register Plus - more comprehensive system available to partners, stakeholders and the public to view via our website Additional data will be gathered using a risk-based approach, focusing on the most vulnerable communities identified in the LFRMS.	M2 - Prevention	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	Y	N	N		Develop a protocol for investigating flooding incidents	Y	N	N	Under our leadership role we will develop a protocol in partnership with the relevant Risk Management Authorities which will clearly outline how we propose to approach investigating flood incidents.	M5 - Recovery and Review	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Develop a protocol for designating structures	N	N	Y	We will develop a collaborative protocol with the Environment Agency and Internal Drainage Boards. The protocol will set out how designating authorities should identify structures or features to be designated, and the process to designate a structure or feature.	M2 - Prevention	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	Y	N	N		Work with community resilience groups to raise awareness of flood risks	Y	N	N	Work with Community Resilience groups across North Somerset to build communities which can be more resilient to flooding. Recognising that resources are limited we will prioritise community resilience to flooding in those communities which are identified in LFRMS as being most vulnerable to flood risk	M5 - Recovery and Review	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	N	N	N	N		Develop a protocol for consenting and enforcement on ordinary watercourses	N	N	Y	We will develop a protocol for consenting and enforcement works on ordinary watercourses to ensure consistency and transparency.	M2 - Prevention	Pre 2015	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Develop two yearly implementation plan	N	N	Y	We will develop a rolling two-yearly implementation plan which will be reviewed and updated on an annual basis	M2 - Prevention	Pre 2015	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	Y	N	N	N	N	N	N		Manage stretch of coastline near Weston super Mare and Clevedon	Y	N	N	Tidal flood defence assets at Weston-super-Mare and Clevedon. We will operate and maintain the tidal flood defences where we are the operating authority, in partnership with the Environment Agency.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Develop risk based approach for maintaining assets	N	N	Y	The risk-based approach will seek to identify the assets whose performance will most significantly affect flood risk (e.g. where blockages to a culvert would cause property flooding). We will need to prioritise our maintenance programme for assets due to the availability of funding.	M2 - Prevention	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Develop the SuDS approval role within the council	Y	N	N	Develop local SUDS guidance in collaboration with our WEP partners , which will complement the national SUDS standards, are more bespoke to North Somerset and will consider how green infrastructure is considered as part of SUDS infrastructure.	M3 - Protection	Pre 2015	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	N	N	N	N		Develop information brochure to raise awareness of flooding	Y	N	N	We will produce an information brochure in collaboration with the community resilience team and will distribute it online and via parish councils	M2 - Prevention	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	Y		Reduce the number of properties at significant risk	Y	N	N	"Alleviate flooding from the watercourse at Wrington including:- upsizing of the watercourse at critical points.	M3 - Protection	Pre 2015	Very High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	N	N	N	Y		Reduce the number of properties at significant risk	Y	N	N	Alleviate flooding from the watercourse including: storage upstream of Wrington	M3 - Protection	Pre 2015	Very High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		SWMP and Action Plan to take forward measures to reduce flooding	Y	N	N	A Surface Water Management Plan is ongoing for the urbanised town centre of Weston-super-Mare (WsM) as well as the Weston Development Area 1) Milton Hill and Worle, 2) Central and West area.	M3 - Protection	Pre 2015	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Work with community resilience groups to raise awareness of flood risks	Y	N	N	NSC will work with the WsM infrastructure owners to raise their awareness of potential flood risk.	M4 - Preparedness	Pre 2015	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Work with community resilience groups to raise awareness of flood risks	Y	N	N	We will work with the Nailsea infrastructure owners to raise their awareness of potential flood risk.	M4 - Preparedness	Pre 2015	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	Y	N	N	N	N	N	N		Repair and and maintain the sea wall	N	Y	N	Repairs to Sea Wall to maintain the standard of protection at Clevedon	M3 - Protection	Pre 2015	Very High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Enhance maintenance of gullies and improve the drainage network both foul and surface	Y	N	N	In WsM Surface Water storage tanks and highways drainage improvements to alleviate flooding to property, partnership working with Wessex Water	M3 - Protection	2015 - 2021	Very High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Use SuDs to restrict runoff and volume control, on planning applications which are outside of the Superpond and Banwell schemes to allow future growth in Weston super Mare	Y	N	N	Implement SuDs to provide both restricted runoff and volume control, on planning applications which are outside of the Superpond and Banwell schemes to allow future growth in Weston super Mare	M3 - Protection	Pre 2015	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	Y	N	N	N	N	N		To ensure that the current level of flood defence provided by the sea wall is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	Long term trends of beach change monitored with annual LiDAR and air photography at WsM. Regular 6 monthly profile surveys carried out in order to monitor variation in beach response. Plymouth Coastal Observatory delivers this monitoring for the Coast Protection Authorities.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	Y	N	N	N	N	N		To ensure that the current level of flood defence provided by the sea wall is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	"Erect Trigger Posts at four locations near WsM to provide a reference point for regular and post storm monitoring at the toe of the defence structures. North Somerset Council co-ordination with Channel Coastal Observatory. Monitoring to be undertaken by NSC. Locations to be advised by RHDHV. Critical levels have been identified from an assessment of wall stability. If a 1m drop in beach level is observed an investigation will be undertaken into any requirements for improvement works to the sea wall. This monitoring would also provide a direct record of recycling operations and demonstrate subsequent change following recycling."	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	Y	N	N	N	N	N		To ensure that the current level of flood defence provided by the sea wall is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	North Somerset Council to maintain records of the volumes of beach recycling at WSM. To be carried out 6 monthly (every March and August) plus post storm event. This needs to be improved to allow understanding of the benefits of beach recycling. Forward recycling logs to Plymouth Coastal Observatory.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	Y	N	N	N	N	N		To ensure that the current level of flood defence provided by the sea wall is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	"Monitor the influence of the Tropicana on beach change, particularly in response to storms. Photographic monitoring using Tropicana as a reference level together with photographs taken either side along the defence by NSC. A study of beach levels will be undertaken should the Tropicana be demolished as the affect on beach levels is currently unknown. This study will be subject to future plans for the Tropicana and will be carried out as and when required. Potential review in 2018."	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	Y	N	N	N	N	N		To ensure that the current level of flood defence provided by the sea wall is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	Improve existing beach level in the north of the beach through the continuation of beach recycling at WsM. At present some 16,000m3 is typically recycled this will be reviewed subject to monitoring. Recharge on a yearly basis after the autumn beach race. This will be reviewed against monitoring after five years in 2018.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	Y	N	N	N	N	N		To ensure that the current level of flood defence provided by the sand dunes is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sand dunes is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sand dunes is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	Create a 3m buffer width to allow the development of the seaward toe of the dunes at WsM. Any beach cleaning will be done outside of this area which will allow for the development of the dune, increasing its resilience. Monitoring of the dune to be reviewed in 5 years. Future management of the dune will be based on the collected LiDAR and profile data from action: 2014/WBBandDMP/Beach Monitoring	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
City of Bristol Unitary Authority	N	N	N	N	N	N	N	N	N	N		Properties in Avonmouth, Severn beach and Pilning at current moderate risk of flooding, becoming very significant in the future Avonmouth Enterprise area at moderate risk of flooding, with significant threat posed by climate change	Y	N	Y	Flood defence proposals to protect the Avonmouth area now and into the future. Proposals would offer protection to existing residential and commercial properties as well as facilitate new economic growth and redevelopment in the area	M2 - Prevention	2015 - 2021	Critical	City of Bristol Unitary Authority	Non statutory FRMP	City of Bristol Unitary Authority

Table 13.6. Measures: Agreed. Outside of the Bristol Flood Risk Area.

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	N	N	N	N	N	N	N		Collate historic flood data from Parish Councils	N	Y	N	We will continue to liaise with parish councils and Community Resilience groups to identify any additional flood incident data from 2012 and preceding flooding incidents. Furthermore, we will also work with parish councils to establish mechanisms to facilitate data sharing in the event of future flooding.	M5 - Recovery and Review	2015 - 2021	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Investigate the cause of flooding and identify measures which can be taken to reduce the vulnerability of the community	Y	N	N	Surface Water study in the north of Wrington	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Work with community at Claverham resilience groups to raise awareness of flood risks	N	N	Y	Surface water mapping predicts several critical infrastructure at risk of flooding to depths Greater than 0.3m during a 3.33% annual probability event. We will work with the infrastructure owners to raise their awareness of potential flood risk.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Operational measures to enhance maintenance of gullies and the drainage network	Y	N	N	Investigation is required to understand the current maintenance of highway gullies in Nailsea and whether an enhanced maintenance regime is required. The outputs from the investigation will be linked to the asset register plus to ensure that the maintenance regime is appropriately captured in our asset management system.	M2 - Prevention	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Investigation and Action Plan to take forward measures to reduce flooding in Nailsea	Y	N	N	Surface Water Management Plan would enable us and our flood risk management partners to better understand the flooding	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	Establish a survey of the route in Nailsea, connectivity and location of historic watercourses. Liaison with the Town Council and Wessex Water will be key in gathering data	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		At Winscombe survey and modelling to investigate flooding	Y	N	N	A culvert capacity assessment of the culverted watercourses to establish their current capacity against expected peak flows from the catchment being drained. Should the culverts be under-sized capital works will be required to increase their capacity	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		At Winscombe survey and modelling to investigate flooding	Y	N	N	CCTV of the culverts listed above will also be undertaken to confirm the route and condition of the culverts. Should the culverts require maintenance this will be programmed	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	natural flood defence on the left and right bank of the watercourse which flows near the junction of Church Road / Barton Road Winscombe. Further investigation will be undertaken to establish the standard of protection of these flood defences, and whether the presence of the flood defences is sufficient to protect properties in this location from flooding	M3 - Protection	2021 - 2027	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		At Winscombe survey and modelling to investigate flooding	Y	N	N	Investigate the presence and location of existing culverts under the railway to ensure surface water will drain rather than backing up against the railway embankment causing flooding to a significant number of properties	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Operational measures and improvements to enhance and maintain gullies in Winscombe	Y	N	N	The flood risk management and highways teams will work together to identify the cause of flooding on roads and the mitigation measures required.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		SWMP and Action Plan to take forward measures to reduce flooding	Y	N	N	A Surface Water Management Plan at Claverham would be the approach to enable us and our its flood risk management partners to better understand the flooding mechanisms, and to identify feasible and cost-effective mitigation measures	M3 - Protection	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Property level protection to reduce flooding at Claverham	Y	N	N	NSC will work with these property owners to investigate whether property-level protection measures can be implemented.	M3 - Protection	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Operational measures and improvements to enhance and maintain gullies in Congresbury	Y	N	N	NSC flood risk management and highways teams will assess the current performance and maintenance of the drainage network and will enhance the network where needed. Partnership working with Wessex Water will be important.	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Operational measures to enhance maintenance of the watercourse drainage network	Y	N	N	NSC will work with the IDB and Wessex Water to ensure the rhyne network is adequately maintained to drain flood water around Congresbury	M3 - Protection	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Congresbury survey and modelling to investigate flooding	Y	N	N	We will investigate the cause of flooding to properties on several roads before recommending mitigation measures	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Work with community resilience groups in Congresbury to raise awareness of flood risks	Y	N	N	"Undertake a programme in the area through the community resilience group to encourage road users to take additional precautions when driving through flood water to avoid causing flooding to properties. Continue to raise awareness through the community resilience teams about actions local residents should take before, during and after a flood to mitigate the impacts of flooding "	M4 - Preparedness	2021 - 2027	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding in Backwell	Y	N	N	Understand the cause of flooding investigate and the source of runoff in order to identify mitigation measures	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Operational measures to improve the gullies and the drainage network in Backwell	Y	N	N	The flood risk management and highways teams will work together to identify the cause of flooding on the road network and the mitigation measures required.	M3 - Protection	2021 - 2027	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	There is significant flooding predicted to properties in the north of Backwell due to surface water runoff backing up against the railway embankment. This needs investigation to identify whether this risk could materialise because of the depth of flooding and number of properties potentially at risk	M2 - Prevention	2021 - 2027	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling, operational measures to increase the capacity of the urban drainage network in Churchill	Y	N	N	Uncertainty about the route of the watercourse in places, and a walkover / watercourse survey will be undertaken of the entire watercourse, including culverts.	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Operational measures to improve the gullies and the drainage network and watercourses	Y	N	N	Evidence from local residents from 2012 indicates that there is a collapsed culvert underneath the road (Doleberrow), and that there were blocked drains and gullies Any requirements to enhance the maintenance regime of highway drainage or watercourses will be recorded in asset register plus to ensure that the maintenance regime is appropriately captured which contributed to flooding	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding in Churchill	Y	N	N	We will undertake an investigation to identify whether there is a capacity issue associated with the watercourse and/or culverts within the area. This may involve simplified hydrological / hydraulic assessment or a detailed 1D-2D hydraulic model if necessary to support a business case for FDGiA funding.	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding in Langford	Y	N	N	A study will be undertaken to investigate the hydraulic capacity of the watercourse and the existing natural flood defences on the right and left bank	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding and the highways network in Langford	Y	N	N	An investigation is required to assess whether the existing highway drainage network could be improved to drain water off the highway or whether runoff could be managed at source	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	N	N	N	N		Operational measures to improve the gullies and the drainage network and watercourses	Y	N	N	We will investigate the existing condition of the highway drainage network and evaluate any improvements to the maintenance regime required.in Langford	M2 - Prevention	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding in Pill	Y	N	N	The operation of the surface water pump will be assessed by the Environment Agency and NSC	M3 - Protection	2027 - 2033	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding in Pill	Y	N	N	We will investigate the existing condition of the highway drainage network and evaluate any improvements to the maintenance regime required.	M2 - Prevention	2015 - 2021	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Operational measures to improve the gullies and the drainage network and watercourses	Y	N	N	A CCTV survey of the culverted watercourse should be undertaken to establish the condition and capacity of the watercourse.in Pill	M3 - Protection	2027 - 2033	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Operational measures to improve the gullies and the drainage network and watercourses	Y	N	N	Flooding to the north of Hutton appears to be the result of localised capacity issues in the highway drainage and/or sewer network, but there is also evidence of high groundwater levels causing flooding in this area.	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	There is a culverted watercourse which runs through Hutton although the route is unclear. A CCTV survey should be undertaken to establish the route, capacity and condition of the watercourse. If it is under capacity further mitigation measures may be required such as culvert upsizing or upstream storage.	M3 - Protection	2027 - 2033	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	A watercourse survey of the watercourse and ponds which run along the west of Portbury Lane to establish their capacity and condition needs to be completed	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Operational measures to improve drainage network and watercourses	Y	N	N	Flooding in Portbury is caused by pluvial runoff from the south flowing on Failand Lane and Mill Lane, before arriving in the village and causing property flooding. Options to intercept and divert pluvial runoff will be investigated	M3 - Protection	2027 - 2033	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding in Clevedon	Y	N	N	This area is natural susceptible to surface water flooding. Further work will be undertaken to establish the drainage within this area and the cause of flooding, which will result in a recommendation for mitigation measures.	M3 - Protection	2021 - 2027	Moderate	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Survey and modelling to investigate flooding	Y	N	N	There was recorded flooding in Kingston Avenue Clevedon in 2012, but the cause of this flooding is uncertain. Working with local communities NSC will investigate the cause of flooding and recommend suitable mitigation measures. There is some reported evidence of flooding due to elevated groundwater levels	M3 - Protection	2027 - 2033	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Improve the drainage within the area and the storage area and rhyne network	Y	N	N	Additional storage area to mitigate for flooding Summer Lane WsM	M3 - Protection	2015 - 2021	Very High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Enhance maintenance of gullies and improve the drainage network both foul and surface	N	N	Y	Surface Water flooding investigation into the highways drainage and retro fitting of a SuDs system to reduce the risk of flooding in WsM	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	N	N	N	N	N	Y	N		Enhance maintenance of gullies and improve the drainage network separating the foul and surface network	Y	N	N	Flooding of combined sewers requires separation work to provide additional capacity in a new surface water sewer network and above ground swales and ponds work to be carried out by Wessex Water in WsM	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	N	N	N	N		To ensure that the current level of flood defence provided by the embankments is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the embankments is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the embankments is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	Detailed survey of the flood embankments along Axe Estuary to establish current condition of defence. To be carried out by the Environment Agency before 2014.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
North Somerset Unitary Authority	N	N	N	Y	N	N	N	N	N	N		To ensure that the current level of flood defence provided by the sea wall is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that leisure and tourism interests will remain protected to the same standard. To ensure that the current level of flood defence provided by the sea wall is maintained and that commercial interests will remain protected to the same standard.	Y	N	Y	Undertake crest improvements as set out in the Severn Estuary Flood Risk Management Strategy. At present based on existing assessment of sea level rise this will be in around 25-50 years. This will be reviewed against monitoring of beach levels and sea level rise.	M3 - Protection	2039 +	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	N	N	N	N	N	N	N	N	N		To ensure that the current level of flood defence provided by the embankments is maintained and that residential properties will be protected to the existing standard. To ensure that the current level of flood defence provided by the embankments is maintained and that agricultural interests will remain protected to the same standard.	Y	N	Y	Potential low spot improvements to be incorporated in the EA asset management planning system. Maintenance of the flood embankments to be informed by the detailed survey (Action: 2014/WBBandDMP/AxeEmbankmentS survey)	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Describe objective	Category of objective	Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding											Is there a WFD assessment that covers this action
North Somerset Unitary Authority	N	N	N	N	N	N	N	N	N	N		To ensure that the current level of protection provided by flood defences is maintained. To ensure establish the possible affects of a managed realignment of the Axe Estuary upon the flood defence standards in Weston Bay to ensure the protection of leisure and tourism interests. To establish the possible affects of a managed realignment of the Axe Estuary upon the flood defence standards in Weston Bay and to ensure the protection of commercial interests.	Y N Y	Assess implications on long term managed realignment with respect to estuary and beach interactions. This study would be informed by LiDAR data and air photography collected (Action: 2014/WBBandDMP/Beach Monitoring). Severn Estuary Strategy recommends that managed realignment may be needed in 30-50 years.	M3 - Protection	2015 - 2021	High	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	N	N	N	N		Integrated Drainage Plan	Y N N	Develop an integrated drainage plan (surface water / sewer / river flooding) in Clevedon and Portishead which aims to maintain the same standard of protection into to the future allowing for potential increases in rainfall intensity and tide locking due to climate change	M2 - Prevention	2015 - 2021	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion										Contribution to WFD Outcomes	Describe objective	Category of objective			Action description	Measures	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river and ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding	Is there a WFD assessment that covers this action			River Basin Management Plan Measure	Social	Environment							
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Integrated Drainage Plan	N	N	Y	Develop an integrated plan (surface water / sewer / river flooding) for the Royal Portbury Dock which aims to maintain the same standard of protection into the future allowing for potential increases in rainfall intensity and tide locking	M2 - Prevention	2015 - 2021	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority
North Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		Implement monitoring on the watercourses around Weston	Y	N	N	Implement a system for monitoring recording and sharing information on flooding from other sources in Weston, and a study of the Uphill Great Rhyne and River Banewell to develop an integrated urban drainage plan	M2 - Prevention	2015 - 2021	Low	North Somerset Unitary Authority	Non statutory FRMP	North Somerset Unitary Authority

Table 13.7. Measures: Proposed. Outside of the Bristol Flood Risk Area.

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Social	Environment	Economic							
										Is there a WFD assessment that covers this action	River Basin Management Plan Measure				Prevention, protection, preparedness etc	FRMP Planning Cycles	Critical, Very High, High, Medium, Low	Action owner (bold), plan owner and support organisations	Statutory or voluntary	Action Owner	
Bath and North East Somerset Unitary Authority	N	N	Y	N	N	N	Y	Y	N	N	We are currently undertaking the preparation of the LFRMS, as a first step we will be holding an internal partnership meeting on the 13.06.2014. LFRMS is our ongoing work and we hope to complete it next year. This local Strategy is designed to help individuals, communities, businesses and the Lead Local Flood Authority understand and manage flood risk within the BANES area. Its primary focus is on local flooding from surface water, groundwater, streams and ditches (ordinary	Y	N	N	The objectives of Local Flood Risk Management Strategy (LFRMS) aim at: <ul style="list-style-type: none"> Improving our understanding of the flooding from local sources including surface water, ground water and ordinary watercourses flooding. Effectively managing the risks of flooding and managing people expectations Helping local communities , individuals and businesses to better understand and manage 	M2 – Prevention	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social							
											watercourses) but will include reference to main rivers. The lifespan of the strategy is five years.				<ul style="list-style-type: none"> Preventing an inappropriate developments that creates or increase flood risk 						
Bath and North East Somerset Unitary Authority	N	N	Y	N	N	N	N	N	N	N	We are currently undertaking the preparation of a Strategic Environmental Assessment for the BANES area in order to inform planning and development. This is at a scoping stage.	N	Y	N	To gain a better understanding of the water quality of ordinary watercourses in the BANES area. To gain a better understanding of which ordinary watercourses may be limited in their natural geomorphology (and consequent ecological status). To gain a better understanding of which ordinary watercourses may be limited in biodiversity (and consequent ecological status).	M2 - Prevention	2015 - 2021	Moderate	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bath and North East Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		We are currently undertaking the preparation of a Surface Water Management Plan for the BANES area. This is at a scoping stage.	Y	N	N	To identify those residential properties (or urban areas) at risk of flooding from surface water including land drainage and highways drainage. To identify those vulnerable communities at risk of flooding from surface water including land drainage and highways drainage. To identify those services and infrastructure at risk of flooding from surface water including land drainage and highways drainage.	M2 - Prevention	2015 - 2021	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority
Bath and North East Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		We are carrying out a detailed analysis of flooding in an area that has a long history of flooding. The analysis will enable us to devise a scheme or schemes to mitigate future flooding.	Y	N	N	To identify those residential properties in the Weston area at risk of flooding from surface water including land drainage and highways drainage. And to identify the causes and effects of surface water flooding in the area.	M2 - Prevention	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bath and North East Somerset Unitary Authority	N	N	Y	N	N	N	Y	Y	N	N		As part of the West of England Partnership (Bath and North East Somerset Council, Bristol City Council, North Somerset Council, Somerset County Council, South Gloucestershire Council), we are producing a Suds Approval Body guidance document for developers to inform them of the SAB process and the National and Local SAB standards.	Y	N	N	To ensure new developments do not increase the risk of flooding to residential properties.	M2 - Prevention	Pre 2015	Moderate	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority
Bath and North East Somerset Unitary Authority	N	N	Y	N	N	N	Y	Y	N	N		We are preparing a Bath and North East Somerset Council Suds Approval Body Supplementary Planning Document. This document will set out the required local standards that any proposed SuDS schemes should meet in order to gain Suds Approval Body approval. We would hope to have a draft of this document ready by October 2014 with a view to having a finalised Supplementary Planning Document in 2015.	Y	N	N	To ensure new developments do not increase the risk of flooding to residential properties (or infrastructure) in the BANES area.	M2 - Prevention	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bath and North East Somerset Unitary Authority	N	N	Y	N	N	N	Y	Y	N	N		We are in the process of setting up a Strategic Flood Board in order to ensure strong partnership working with relevant Flood Risk Management Authorities in the area. Community groups will also be established to highlight local issues to the Strategic Flood Board.	Y	N	N	The Strategic Flood Board will enable coordinated and strategic working between the FRAs in the BANES area and facilitate the discussion of local flooding and draining issues.	M2 - Prevention	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority
Bath and North East Somerset Unitary Authority	N	N	Y	N	N	N	Y	Y	N	N		The Flooding Incidents register is an ongoing record of property level flooding in the area. Data is recorded in a database and mapped. This data can be used to make further investigations (e.g. Section 19) or inform any flood management plans or flood mitigation schemes.	Y	N	N	To maintain a robust record of flooding incidents in the BANES area	M2 - Prevention	Pre 2015	Moderate	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority
Bath and North East Somerset Unitary Authority	Y	N	N	N	N	N	N	N	N	N		Property level flooding affected a number of industrial estate units during the Christmas period 13/14. This has prompted a EU WFD Section 19 investigation to identify the causes of flooding and the responsible RMA(s)	Y	N	Y	To identify the cause of flooding to the Broadmead Lane Industrial Estate and identify the responsible Flood Risk Authority. To identify the cause of flooding to the Broadmead Lane Industrial Estate and identify the responsible Flood Risk Authority.	M2 - Prevention	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bath and North East Somerset Unitary Authority	Y	N	N	N	N	N	Y	N	N	N		Following the flooding of the Chew Magna area in 2012. A new Property Level Protection scheme is underway in the area. This has included a review of current PLP measures and has recommended upgrading of PLP to properties. New PLP for houses is planned to be fitted in 2014.	Y	N	N	To increase the resistance and resilience of identified at-risk properties to flooding in the Chew Magna	M3 - Protection	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority
Bath and North East Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		Following the flooding of the Chew Magna area in 2012. PLP measures are being considered for properties in critical areas.	Y	N	N	To increase the resistance and resilience of identified at-risk properties to flooding in the Chew Stoke area.	M3 - Protection	2015 - 2021	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority
Bath and North East Somerset Unitary Authority	N	N	N	N	N	N	Y	N	N	N		We have a range of ongoing small scale drainage schemes to reduce flooding of highway areas and adjoining properties.	Y	N	N	On on-going process to identify, prioritise and carry out drainage works in and around highways in the BANES area, in particular where properties have been identified at risk of flooding.	M3 - Protection	Pre 2015	High	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

Action Location	Source of flood risk or coastal erosion									Contribution to WFD Outcomes	Action description	Category of objective			Describe objective	Measure	Timing	Priority	Partnership implementing measures	Statutory or voluntary measure	Responsible authority	
	Flooding from main river	Flooding from ordinary watercourses	Flooding from main river plus ordinary watercourses	Flooding from the Sea	Coastal erosion	Flooding from reservoirs	Surface water flooding	Groundwater flooding	Sewer flooding			Is there a WFD assessment that covers this action	River Basin Management Plan Measure	Social								Environment
Bath and North East Somerset Unitary Authority	N	Y	N	N	N	N	Y	N	N	N		We are working to improve our Flood Asset Register on an ongoing basis.	Y	N	N	To maintain a live register of structures and features that have a significant effect on flood risk in the area.	M2 - Prevention	Pre 2015	Moderate	Bath and North East Somerset Unitary Authority	Non statutory FRMP	Bath and North East Somerset Unitary Authority

14. Implementing the plan

This draft FRMP sets out ongoing, agreed and proposed measures to manage flood risk within the Severn River Basin District. Implementing the measures set out in the final FRMP will be through a number of established mechanisms, as set out in the National FCERM Strategy and will take place over the 2015 – 2021 planning cycle by all risk management authorities.

This will be carried out individually and in partnership where there are shared responsibilities. Proposed actions will seek approval and funding on the basis of value for money and the value of benefits in line with current government guidance.

The River Severn flood risk authorities will report on progress as these measures are implemented and completed. As measures are implemented, the next generation of measures will come forward.

The catchment based approach in England

The catchment based approach encourages local engagement and participation in decision-making. As we finalise and implement this plan we will seek to engage further with relevant catchment partnerships in order to deliver flood risk management outcomes and broader benefits. In understanding and managing flood risks locally, it is essential to consider the impacts on other parts of the catchment. Activities must seek to avoid passing risk on to others within the catchment without prior agreement. The catchment cell approach is key to managing risks at source and achieving wider benefits through more integrated water management and increasing the opportunities for developing new sources of funding as well as pooling resources and expertise. CFMPs, SMPs and now FRMPs are important in building this coordination.

Natural Resource Management in Wales

Natural Resources Wales is developing its implementation of the ecosystem approach and Area-Based Natural Resource Management (NRM). The current area of focus is on designing and embedding the ecosystem approach. This has begun with three trial areas which will help to shape future delivery of natural resource management, including flood risk management, in Wales.

Monitoring delivery of actions

Following publication of the final FRMP in December 2015 we will monitor progress in delivering the measures set out in the FRMP. We will report progress annually to the relevant Regional Flood and Coastal Committees and review the FRMP every 6 years, as required by the Flood Risk Regulations.

15. What happens next?

The Consultation will run from 10 October 2014 – 31 January 2015. You can respond online at the GOV.UK website and your views will be considered in revising the plan.

After January 2015 we will prepare a response document which outlines the responses we received. We will publish this document in April 2015.

Consultation on the draft updates to the river basin management plans closes in April 2015 and we will also consider any feedback that is relevant to the FRMP.

The final version of the FRMP will be drafted and will be signed off by the Defra Minister in December 2015 for publication and final submission to Europe.

16. Glossary and abbreviations

AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
Catchment	The watershed of a surface water river system
CaBA	Catchment based approach: an approach to environmental planning that focuses on local engagement and partnerships
CFMP	Catchment Flood Management Plan
Coastal Groups	Voluntary coastal defence groups made up of maritime district authorities and other bodies with coastal defence responsibilities.
Cross Border Advisory Group (CBAG)	Set up under The Flood Risk (Cross Border Areas) Regulations 2012 (SI No. 1102). A statutory group made up of representatives from SEPA, Environment Agency and local authorities within the cross border areas.
Cross Border Areas	Those areas designated as 'cross border' under The Flood Risk (Cross Border Areas) Regulations 2012 (SI No. 1102).
CWS	County Wildlife Site
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
EPR	Environmental Protection Regulations
EU	European Union
FCERM	Flood and coastal erosion risk management
Floods Directive	The European Floods Directive (2007/60/EC) on the assessment and management of flood risks.
Flood Risk Area (FRA)	Areas where the risk of flooding from local flood risks is significant as designated under the Flood Risk Regulations.
FRMP	Flood Risk Management Plan – plan produced to deliver the requirements of the Regulations.
Government	The term government is used within this report to refer to Defra (the Department for Environment, Food and Rural Affairs) and Welsh Government.
Groundwater flooding	Occurs when water levels in the ground rise above the natural surface. Low-lying areas underlain by permeable strata are particularly susceptible.
Ha	Hectares
HLS	Higher Level (Environmental) Stewardship
HRA	Habitats Regulations Assessment: an assessment undertaken in relation to a site designated under the Habitats and Birds Directives
LLFA	Lead local flood authority
Local FRM Strategy	Local flood risk management strategy produced by LLFAs under the Flood and Water Management Act 2010.
Main river	A watercourse shown as such on the main river map, and for which the Environment Agency and Natural Resources Wales

	has responsibilities and powers
MSFW	Making Space for Water
National FCERM Strategy	National flood and coastal erosion risk management strategy: these are strategies prepared under the Flood and Water Management Act 2010, by the Environment Agency for England and by Welsh Government for Wales.
NNR	National Nature Reserve
NRW	Natural Resources Wales. The Natural Resources Wales took over the functions of the Environment Agency in Wales on 1st April 2013.
Ordinary watercourses (OW)	All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, Internal Drainage Boards.
PFRA	Preliminary Flood Risk Assessment – these were required to be published by December 2011 and were the first stage in delivering the Regulations.
PU	Policy Unit
Ramsar	Wetlands of international importance designated under the Ramsar Convention
Reservoir	A natural or artificial lake where water is collected and stored until needed. Reservoirs can be used for irrigation, recreation, providing water supply for municipal needs, hydroelectric power or controlling water flow.
Risk management authorities (RMAs)	Organisations that have a key role in flood and coastal erosion risk management as defined by the Act. These are the Environment Agency, Natural Resources Wales, lead local flood authorities, district councils where there is no unitary authority, internal drainage boards, water companies, and highways authorities.
RFCCs	Regional Flood and Coastal Committees
River Basin District (RBD)	These are the reporting units to the European Commission for the Water Framework Directive and the Floods Directive.
RBMP	River Basin Management Plan – plan required by the European Water Framework Directive.
River flooding	Occurs when water levels in a channel overwhelms the capacity of the channel.
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SAMP	System Asset Management Plan
SEA	Strategic environmental assessment
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
Surface water flooding	Flooding from rainwater (including snow and other precipitation) which has not entered a watercourse, drainage system or public sewer.

SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
Surface water flooding	Flooding from rainwater (including snow and other precipitation) which has not entered a watercourse, drainage system or public sewer.
SWMP	Surface Water Management Plan
WG	Welsh Government

Annex 1- Sources of objectives and measures for the draft FRMP

Eastern Valleys Catchment Flood Management Plan
Wye and Usk Catchment Flood Management Plan
Severn Tidal Tributaries Catchment Flood Management Plan
River Severn Catchment Flood Management Plan
Bristol Avon Catchment Flood Management Plan
North & Mid Somerset Catchment Flood Management Plan
Taff & Ely Catchment Flood Management Plan
Fluvial Severn Flood Risk Management Strategy
Severn Estuary Flood Risk Management Strategy
Shoreline Management Plans (2): Anchor Head to Lavernock Point
Bristol City Council Flood Risk Management Strategy
North Somerset Council Flood Risk Management Strategy
Bath and North East Somerset Flood Risk Management Strategy
South Gloucestershire Council Flood Risk Management Strategy

Annex 2 - Report of consultation and engagement (in final FRMP)

Annex 3 – CFMP and SMP policies

Catchment Flood Management Plans

The Catchment Flood Management Plans published by the Environment Agency in 2009 set out the preferred policy approach to managing flood risk from the main rivers in England and Wales through broad areas known as policy units. The policy units and associated policies within the Catchment Flood Management Plans were determined by considering the extent, nature and scale of current and future flood risk across the whole catchment in order to show the broad area where the policy decision should be applied.

The six pre-defined policies that were adopted can be described as:

- Policy 1 – No active intervention (including flood warning and maintenance). Continue to monitor and advise

- Policy 2 - Reduce existing flood risk management actions (accepting that flood risk will increase over time)
- Policy 3 - Continue with existing or alternative actions to manage flood risk at the current level
- Policy 4 - Take further action to sustain the current level of flood risk into the future (responding to the potential increases in risk from urban development, land use change and climate change)
- Policy 5 - Take further action to reduce flood risk
- Policy 6 - Take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment

It is important to note at this point that these are our current strategic policies for undertaking flood risk management work and will be adopted by this plan. Future review will be included within the overall Flood Risk Regulations cycle of delivery if necessary.

The action plans contained in the CFMPs are now largely complete. Where actions are outstanding and yet to be delivered, they have been brought forward into this FRMP. This Plan now contains all the actions applicable to main river flood risk.

Shoreline Management Plans

In addition to Catchment Flood Management Plans, Shoreline Management Plans were produced in partnership by Coastal Groups to set the strategic direction for the management of the coast for the next 100 years. Shoreline Management Plans (SMPs) are non-statutory policy documents for coastal defence management planning. They provide a large-scale assessment of the risks associated with coastal evolution and present a policy framework to address these risks to people and the developed, historic and natural environment in a sustainable manner.

The first edition SMPs were created in the late 1990s. The second edition plans (SMP2s) were produced by consultants for Coastal Groups from 2005 onwards.

SMP2s address a 100 year timeframe across 3 epochs being Epoch 1 (short-term) = years 0 to 20, Epoch 2 (medium term) = years 20 to 50 and Epoch 3 (long term) = 50 to 100 for proposed management of our coastline.

One of four policies can be applied per Epoch to each coastal management unit (i.e. defined length of coastline) and these policies are:

- No Active Intervention (NAI): where there is no planned investment in coastal defences or operations, regardless of whether or not an artificial defence has existed previously
- Hold the Line (HTL): an aspiration to build or maintain artificial defences so that the current position of the shoreline remains
- Managed Realignment (MR): by allowing the shoreline to move backwards or forwards naturally, but managing the process to direct it in certain areas
- Advance the Line (ATL): by building new defences on the seaward side of the original defences

As the SMP2s were recently completed, they will remain as plans in their own right and where applicable and appropriate, certain sea flooding actions have been brought forward into this Flood Risk Management Plan.

Annex 4 – Local Flood Risk Management Strategies

Local Flood Risk Management Strategies:

Wolverhampton City Council (In progress)

Dudley Metropolitan Borough Council (In progress)

Sandwell metropolitan Borough Council (In progress)

Bristol City Council (Public consultation in progress or complete)

North Somerset Council (Public consultation in progress or complete)

South Gloucestershire Council (In progress)

Bath and North East Somerset (In progress)

Somerset County Council (Summary of strategy published)

Northamptonshire County Council (Summary of strategy published)

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Floodline: 0345 988 1188 / 0845 988 1188 (24 hours)

Natural Resources Wales

Call us on: 0800 065 3000 (Monday - Friday, 8am - 6pm)

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