Department for Environment Food & Rural Affairs

Llywodraeth Cymru
Welsh Government

Cyfoeth Naturiol Cymru
Natural Resources Wales

Environment Agency

Water for life and livelihoods

Part 1: Severn river basin district

River basin management plan

Updated: December 2015

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Environment Agency

We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people’s lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local councils, other agencies, civil society groups and the communities we serve.

Natural Resources Wales

Our purpose is to ensure that the natural resources of Wales are sustainably maintained, used and enhanced, now and in the future.

We will work for the communities of Wales to protect people and their homes as much as possible from environmental incidents like flooding and pollution. We will provide opportunities for them to learn, use and benefit from Wales' natural resources.

We will work for Wales' economy and enable the sustainable use of natural resources to support jobs and enterprise. We will help businesses and developers to understand and consider environmental limits when they make important decisions.

We will work to maintain and improve the quality of the environment for everyone. We will work towards making the environment and natural resources more resilient to climate change and other pressures.

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Published by:
Environment Agency
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Deanery Road
Bristol
BS1 5AH
www.gov.uk/environment-agency

Further copies of this report are available on the river basin management plan web pages

(https://www.gov.uk/government/collections/river-basin-management-plans-2015).

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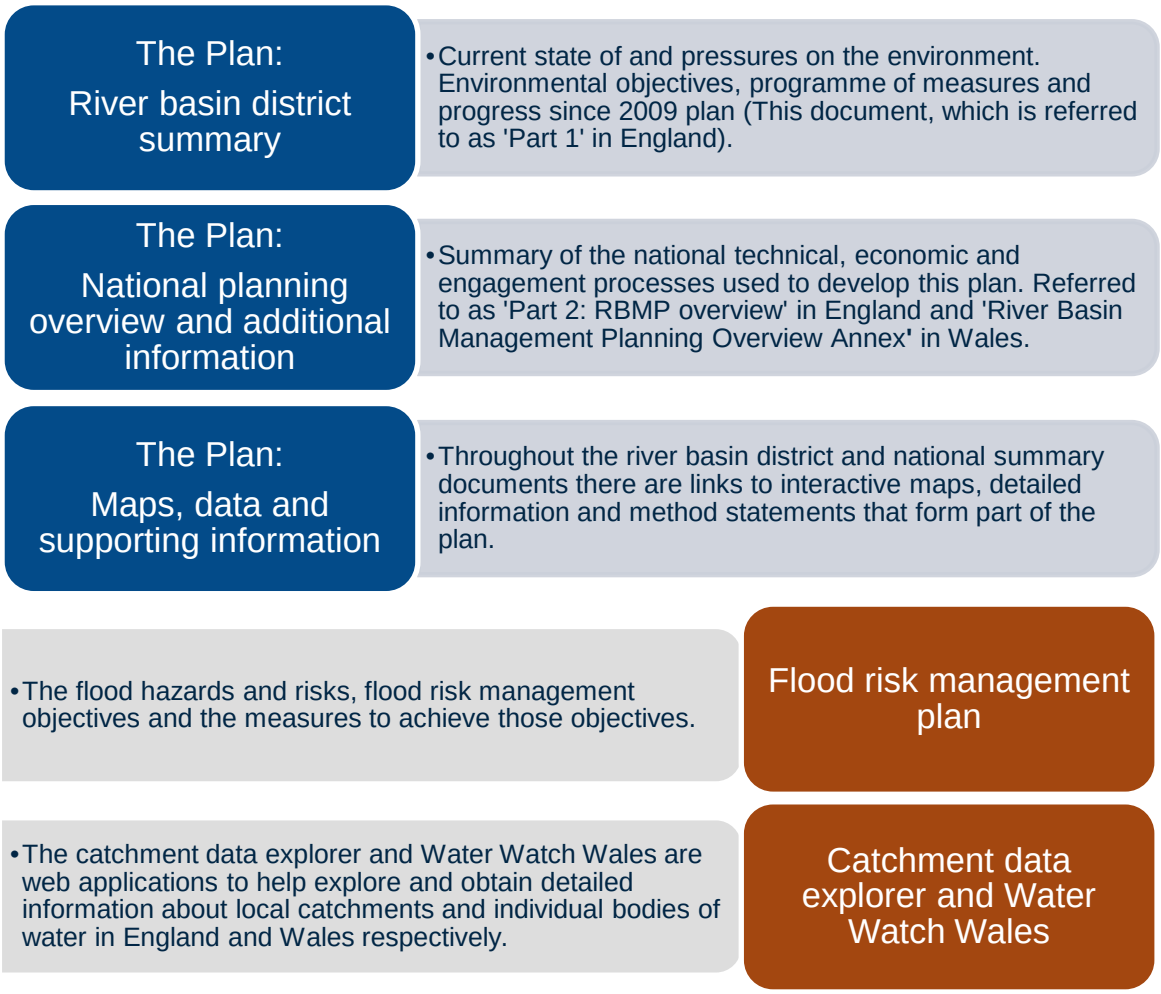
Contents

Using the plan: accessing the most relevant information

The river basin management plan consists of a number of different documents, maps and datasets, of which this is just one. Below is a summary of the statutory components of the river basin management plan (in blue) along with associated documents and data sources outside of the official plan that support the plan (in brown):



Throughout this document there are light green boxes containing links to the further information relevant to each section.

Further information

- You can access the river basin management plan and associated documents though the river basin management web pages (www.gov.uk/government/collections/river-basin-management-plans-2015).
- For further information in England a guide to accessing river basin management data and supporting information is available on the river basin management web pages (www.gov.uk/government/collections/river-basin-management-plans-2015).
- For further information in Wales, please contact please contact the Natural Resources Wales' Water Framework Directive team on: WFDWales@naturalresourceswales.gov.uk

1. Introduction

This section provides an explanation of the purpose of this plan, who it is for and how the river basin district is managed.

1.1. The purpose of a river basin management plan

Water is essential for life and livelihoods. It allows the natural environment to flourish, and businesses, agriculture and the economy to grow and prosper.

Rivers, lakes, estuaries, coastal areas, wetlands and water under the ground provide many different benefits to society; from supplying drinking water and supporting fisheries to providing an essential resource for business and agriculture, transport routes and a source of recreation that promotes wellbeing.

It is critical that this precious resource is managed properly to ensure that the needs of society, economy and wildlife can be met and maintained over the long-term.

The purpose of a river basin management plan is to provide a framework for protecting and enhancing the benefits provided by the water environment. To achieve this, and because water and land resources are closely linked, it also informs decisions on land-use planning.

This plan contains 4 sets of information that groups who manage land and water should pay particular attention to:

- **Baseline classification of water bodies** - One of the main purposes of this plan is to prevent water bodies deteriorating. The first step to preventing deterioration is to understand the baseline status for all the quality elements in each water body. Deterioration from the baseline is not permitted, except in very specific circumstances that are described in this plan. Preventing deterioration is one of the biggest challenges in managing the water environment.
- **Statutory objectives for protected areas** - This plan highlights the areas of land and bodies of water that have specific uses that need special protection. These include waters used for drinking water, bathing, commercial shellfish harvesting and those that sustain the most precious wildlife species and habitats. The plan ensures that these areas have the legally binding objectives in place that protect those uses from potentially harmful activities and new developments.
- **Statutory objectives for water bodies** - This plan sets out legally binding objectives for each quality element in every water body, including an objective for the water body as a whole. The default objective is good status. Less stringent objectives have been set in some cases where natural conditions, technical feasibility or disproportionate cost make improvement impractical. The default deadline for achieving objectives is 2021. However, extended deadlines of 2027 or beyond have been set in some cases where it would be more appropriate, impact less on existing activities or where the environment will need more time to respond to the planned measures.
- **Summary programme of measures to achieve statutory objectives** - This plan provides a framework for action and future regulation. To do this it summarises the existing mechanisms, both statutory and voluntary, that are used to manage the quality of the water environment. It also summarises the types of action and who needs to do this, to achieve the statutory objectives.

Responsibility for planning the future of the Severn river basin district is shared between the Environment Agency and Natural Resources Wales. Both organisations are committed to working together to promote the greatest benefits for the water environment. This river basin management plan is a single view of the river basin district and its future management. Where possible the same approach has been used to produce this plan. In some areas government direction or local policy has resulted in different methods to reach the same or similar outcome. Where this is the case it is clearly explained in the plan or supporting documentation.

The river basin management plan has been approved by the Secretary of State for the Environment, Food and Rural Affairs and the Welsh Minister for Natural Resources Wales. It has been prepared in line with Ministerial guidance and fulfils the requirements of the Water Framework Directive and contributes to the objectives of other EU directives. In England, it is an update of and replaces the river basin management plan published in 2009 (referred to as the '2009 plan' in this document). In Wales, it replaces the plan published in 2009, except for the economic analysis of water use (2009 Annex K) and adapting to climate change (2009 Annex H).

1.2. Who is responsible for implementing this plan

Many organisations are responsible for managing the water environment in the river basin district. These organisations are often grouped into sectors, such as water companies, agriculture and industry. Table 1 identifies these sectors and describes their role in managing the water environment.

The roles in managing the water environment are:

- **Regulator** - regulates and enforces the activities of operators
- **Operator** - undertakes activities that could potentially influence either directly or indirectly the quality of the water environment. Many of these activities are regulated
- **Influencer** - educates, influences or advises others on how to reduce their impact on the water environment
- **Undertakes projects** - undertakes environmental improvement projects (for example, habitat restoration) to reduce the damage caused by others, usually in partnership with other groups

Table 1: Main sector groups involved in river basin management

Sector	Role in managing the water environment			
	Regulator	Operator	Influencer	Undertakes projects
Agriculture and rural land management - farming, forestry and horticulture		X	X	X
Government and agencies:				
Government departments	X		X	
Natural Resources Wales	X	X	X	X
Environment Agency	X	X	X	X
Natural England	X	X	X	X
Forestry Commission		X	X	X
Marine Management Organisation	X		X	
Highways England		X	X	
Network Rail		X	X	
Industry, manufacturing and other business - including chemicals, construction, food and drink, power generation, paper, textiles and metals		X	X	
Internal drainage boards	X	X	X	X
Local government - includes local councils, national park authorities and Inshore Fisheries and Conservation Authorities	X	X	X	X
Mining and quarrying - coal mining, non coal mining and quarrying		X	X	

Sector	Role in managing the water environment			
	Regulator	Operator	Influencer	Undertakes projects
Navigation - inland waterways (Canal & River Trust), port and harbour authorities	X	X	X	X
Non-governmental organisations - user groups, catchment groups and environmental organisations (including local wildlife trusts and rivers trusts)		X	X	X
Waste treatment, transfer, storage and disposal - landfill, biowaste, waste treatment and transfer		X		
Water industry - water supply and sewage treatment activities	X	X	X	X

1.3. The Severn river basin district

The Severn river basin district (Figure 3.1), which covers over 21,000km^2 lies both in England and Wales. It extends from the Welsh uplands, through the rolling hills of the Midlands and south to the Severn Estuary.

In total over 5 million people live and work in the region and, although predominantly rural, it includes urban areas such as Bristol, Coventry, Cardiff, the South Wales Valleys and parts of the West Midlands conurbation.

The Severn river basin district has a particularly rich diversity of wildlife and habitats, supporting many species of global and national importance. For example, the Severn Estuary and its surrounding area are protected for their bird populations, habitats and migratory fish species such as Atlantic salmon, shad, lamprey and eel.

The river basin district is divided into 10 catchments, 5 of which are in England (Shropshire Middle Severn, Worcestershire Middle Severn, Warwickshire Avon, Severn Vale and Bristol Avon and North Somerset Streams), 3 sit across the border between England and Wales (Severn Uplands, Teme and Wye) and 2 are in Wales (Usk and South East Valleys). These catchments range from energetic upland streams to slower rivers in the lowlands, and include sandstone and limestone aquifers used for public water supply in the Midlands.

Around 80% of the river basin district land is used for agriculture and forestry, which shapes much of the landscape. The sector includes beef and sheep farming, large-scale dairy farms, coniferous forestry plantations and some arable and specialist horticulture. The economy of the district is supported by business, transport, health, tourism and recreation as well as manufacturing, mineral industries and the operation of commercial ports.

To support economic growth and development, significant or large scale infrastructure projects will occasionally take place within the river basin district. These projects must take account of the environmental objectives within this river basin management plan. Similarly, the potential benefits and impacts of such projects will, where relevant, be considered during future reviews and updates of the plan, including updates to the environmental objectives.

Figure 1: Map of the Severn river basin district

1.4. Significant water management issues

The significant water management issues are the main issues that limit the uses and potential benefits of managing the water environment in the river basin district in a sustainable way. They have been identified based on the results of public consultation and assessments of the pressures caused by people now, in the past, and predicted in the future.

Many of these issues arise from current activities that provide a wide range of benefits. It may therefore not be possible or desirable to fully resolve the issues.

- **Physical modifications** - affecting 27% of water bodies in this river basin district

People have made many physical changes to rivers, lakes and estuaries, for example, flood defences and weirs, and changes to the size and shape of natural river channels for land drainage and navigation. These modifications alter natural flow levels, cause excessive build up of sediment in surface water bodies and the loss of habitats and recreational uses. In many cases the uses and associated physical modifications need to be maintained. In these circumstances it may not be possible to achieve good ecological status.

- **Pollution from waste water** – affecting 29% of water bodies in this river basin district

Waste water, or sewage, can contain large amounts of nutrients (such as phosphorus and nitrates), ammonia, bacteria, harmful chemicals and other damaging substances. It can enter water bodies where sewage treatment technology to remove enough of the phosphorus and harmful chemicals doesn't exist, from leakages from privately owned septic tanks and, in wet weather, storm overflows can discharge untreated sewage having a significant impact on bathing waters. Population growth and changes in rainfall patterns are increasing the pressure on the sewer network.

- **Pollution from towns, cities and transport** - affecting 12% of water bodies in this river basin district

Rainwater draining from roofs, roads and pavements carries pollutants, including grit, bacteria, oils, metals, vehicle emissions, detergent and road salt drains to surface water, including estuaries and coastal waters. Many homes and workplaces have 'misconnected' drains, meaning that dirty water often enters surface waters and groundwater rather than foul sewer drains.

- **Changes to the natural flow and level of water** - affecting 7% of water bodies in this river basin district

Reduced flow and water levels in rivers and groundwater caused by human activity (such as abstraction) or less rainfall than usual can mean that there is not enough water for people to use and wildlife might not be able to survive. Reduced flow affects the health of fish and exaggerates the impacts of barriers such as weirs. Climate change research shows that by 2050 England and Wales can expect significant seasonal variations, with higher winter and lower summer flows, and a reduction in flow overall. In the long term, there will be less water available to abstract for drinking, industry and irrigating crops.

- **Negative effects of invasive non-native species** - affecting <1% of water bodies in this river basin district

Invasive non-native species can have significant economic impacts. The cost of controlling invasive species to make sure that flood defences and the natural environment are not compromised is rising. American signal crayfish are becoming widespread and affect animals such as fish and invertebrates. Other species such as mitten crabs destroy habitats like reed beds and can cause banks to collapse by burrowing into them. Climate change is

thought to drive certain species northwards, increasing their frequency and variety in the future and affecting the condition of water bodies.

- **Pollution from rural areas** - affecting 40% of water bodies in this river basin district

Some approaches to land management have increased the amount of soils and sediment that is being washed off the land carrying phosphorus into waters which can cause excessive algae growth called 'eutrophication'. A changing climate means that more intense rainfall is likely to occur, increasing the risk of impacts further. Nitrate from fertilisers has built up in groundwater over decades and will take a long time to reduce. Sedimentation from erosion, forestry practices, saturated and compacted fields and livestock trampling on river banks has affected river ecology by smothering fish spawning grounds. Other impacts include bacteriological contamination from animal faeces and inappropriately stored and applied livestock slurry being washed off the land, and, pesticides from farming, forestry, golf courses and parks. These contaminants pose a particular threat to bathing waters, shellfish waters and drinking water.

- **Pollution from abandoned mines** - affecting 2% of water bodies in this river basin district

Minewater is water that has naturally entered the mine workings. When the mines were operating the minewater was drained or pumped to keep it away from working areas. After mines close, mine workings flood. This results in both surface waters and groundwater being contaminated with dissolved metals such as iron, lead, copper, zinc or cadmium. In addition, impacts from the leaching of metals due to ore crushing and settlement lagoons can be a real concern because the resulting spoil heaps are often large and close to water.

Taking account of climate change

The climate is changing as a result of greenhouse gas emissions caused by human activity. Latest UK climate projections show that temperatures will continue to rise, with increased winter rainfall and more rain falling in intense storms and continuing sea level rise. The impact on river flows, water quality and ecosystems is less clear. Studies to learn more about the effects of climate change on the river basin district are underway. In the meantime, it makes sense to implement measures that are flexible or increase resilience to extreme weather events and future warming.

Risk assessments

Risk assessments are used to help identify significant water management issues by identifying where pressures could change in the future, potentially leading to a deterioration or reducing the effectiveness of measures to meet their objectives. The Environment Agency and Natural Resources Wales have reviewed and updated, where necessary, the risk assessments since the 2009 plan.

The risk assessments forecast risk up to 2027. Because of the relatively short timescale, the specific risks from climate change have been considered mainly in the faecal indicator organisms risk assessment and the abstraction-flow risk assessment.

Further information in this document

- You can find a summary of the impacts of significant water management issues by sector in section 5.

Information elsewhere in the river basin management plan

- You can find GeoPDF maps, statistics and main findings for each risk assessment in the whole of the Severn river basin district on the Environment Agency's Sharefile platform (https://ea.sharefile.com/d-s5a5e886fd664e818).
- More detail on risk assessments and links to the method statements behind them can be found in section 4.4 of Part 2:RBMP overview web pages (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en
- The Inventory of emissions, discharges and losses of priority and priority hazardous substances (https://ea.sharefile.com/d-sab675d1e4d74e5e8) provides information on priority substances in the Severn river basin district.
    - You can find more detail on how the inventory has been compiled in section 4.4 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

1.5. Working with others

River basin district liaison panel

The river basin district has a liaison panel. Members share their views as the representative of a sector that is responsible for implementing measures and carrying out projects.

The role of the liaison panel is to:

- contribute evidence to enable decision making and reporting on river basin management plans
- devise and track measures and projects as part of a programme of work to prevent deterioration and improve the environment
- work with members and their sectors to ensure a broad base for decision making and communication
- support and champion the implementation of the catchment based approach through their sectors and networks

Catchment based approach

Taking a catchment based approach helps to bridge the gap between strategic management planning at river basin district level and activity at the local water body scale. A catchment based approach aims to encourage groups to work together more effectively to deal with environmental problems locally.

Table 2 lists the catchment and partnerships groups in this river basin district. Members from some catchment partnerships also sit on the river basin district liaison panel.

Table 2: Catchment and partnership groups

Catchment	Catchment and Partnership group host
Bristol Avon & North Somerset Streams	Avon Wildlife Trust (on behalf of the Bristol Avon Catchment Group) and West of England Local Nature Partnership
Severn Uplands	Severn Rivers Trust, and Montgomeryshire Wildlife Trust
Severn Vale	Severn Rivers Trust and Gloucestershire Wildlife Trust
Shropshire Middle Severn	Severn Rivers Trust and Shropshire Wildlife Trust
South East Valleys	Natural Resources Wales
Teme	Severn Rivers Trust
Usk	Natural Resources Wales
Warwickshire Avon	Severn Rivers Trust and Warwickshire Wildlife Trust
Worcestershire Middle Severn	Severn Rivers Trust and Worcestershire Wildlife Trust
Wye	Wye and Usk Foundation and Natural Resources Wales

Catchment partnerships in England

In England, catchment partnerships are groups of organisations with an interest in improving the environment in their local area and are led by a catchment host organisation. They inform the river basin management planning process and help implement measures by:

- providing local evidence
- targeting and coordinating action
- identifying and accessing funding for improvements in the catchment
- incorporating river basin management planning into the wider environmental management of the catchment

Some of the partnerships will produce their own catchment or local plans.

The partnerships work on a wide range of issues including, but not restricted to, the water environment and river basin management. Catchment partnerships also cover coastal and marine waters. This is a Defra led initiative but the partnerships work with Natural Resources Wales across the whole of the Severn Uplands, Teme and Wye catchments. Some partnership groups are in the early stages of being set up, while others have been active for years.

The natural resources management approach in Wales

Welsh Government and Natural Resources Wales are working towards an ecosystem approach to achieve integrated natural resource management.

The ecosystem approach involves managing the different components of the environment together, including its natural systems and the benefits that people get from it. Most importantly, it emphasises that people are part of ecosystems and so should be involved in decision making. This complements the feedback from previous Water Framework Directive consultations, advocating a catchment based approach that gives a clear understanding of catchment issues and involves local communities in decision-making. There are already many good examples of partnership working and these can be built on through this river basin management plan and greater collective action.

Natural resource management is an important element of the Welsh Government's legislative programme and its commitment to use sustainable development as its central organising principle. The Environment (Wales) Bill together with the Wales National Marine Plan will set out a new statutory framework for the sustainable management of natural resources. The Bill will legislate for a more joined-up management process, providing a healthier, more resilient Wales, with healthy functioning ecosystems supporting economic, social, cultural and environmental benefits.

The natural resource management framework is currently being developed and is being trialled in three catchments in Wales; the Dyfi, Tawe and Rhondda. It will use a range of tools, one of which is the river basin management plan. This framework sets out all the issues and pressures on the water environment as well as the actions required to manage them at a river basin scale. It will be complemented by a catchment approach to implement actions locally.

This river basin management plan reflects the essential elements of the natural resource management framework in the following ways by:

- managing adaptively, by planning, monitoring and reviewing action
- considering the appropriate spatial scale for action
- encouraging and engaging in collaboration and co-operation
- taking account of all the relevant evidence and gathering evidence in respect of uncertainties
- taking account of the benefits and intrinsic value of natural resources and ecosystems
- taking account of the short, medium and long-term consequences of actions
- taking account of the resilience of ecosystems

Incorporating information from others in river basin management planning

Some organisations have asked for the opportunity to share their environmental data to help improve river basin management and catchment planning. For example, sharing data and information to improve local evidence on the cause of a problem, such as the reason for not achieving good status, or a new response to a problem. In England, the Environment Agency is working with the Catchment Based Approach National Support Group and others to confirm data sharing priorities. To learn more about sharing your information, contact your local catchment partnership (see further information box). In Wales, please contact the Natural Resources Wales' Water Framework Directive team.

Further information in this document

- You can find a map showing the location and boundaries of the management catchments in section 3.4.
- Contact details for the catchment partnerships as well as a summary of the measures they are carrying out can be found in section 3.4.

Information elsewhere in the river basin management plan

- You can find more information about the catchment based approach in England in section 3.4 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015)
- You can find more information on the Welsh natural resource management approach in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Supporting information

- You can find more information on the liaison panel and details about membership in the Record of consultation and engagement (www.gov.uk/government/collections/river-basin-management-plans-2015).
- You can find examples on how the Environment Agency has used information from others in the consultation response document (www.gov.uk/government/collections/river-basin-management-plans-2015).
- You can find more information on the English catchment based approach web pages (http://www.catchmentbasedapproach.org/).
- You can find more information about Wales and catchment working by contacting Natural Resources Wales' Water Framework Directive team on WFDWales@naturalresourceswales.gov.uk

1.6. Links to other major plans affecting water management

This plan provides a long-term framework for managing the issues that affect the quality of the water environment in the river basin district. However, many water management issues are so significant or complex that they demand their own more detailed plans. The public bodies that prepare these plans are bound by the Water Environment (Water Framework Directive) Regulations 2003 to have regard to the river basin management plan when exercising their functions and in the case of many of the functions exercised by the Environment Agency, Natural Resources Wales, the Secretary of State for the Environment, Food and Rural Affairs and the Welsh Minister for Natural Resources to exercise those functions so as to secure compliance with the requirements of the WFD.

Table 3 summarises the important water management issues that have their own planning processes and plans.

Table 3: Other plans affecting water management

Issue	Plans	Primary responsible bodies
Flooding and coastal erosion	Flood risk management plans	Natural Resources Wales Environment Agency Lead local flood authorities
	National flood and coastal erosion risk management strategy	Welsh Government
	National Habitat Creation Programme	Natural Resources Wales
	Catchment flood management plans	Natural Resources Wales
	Shoreline management plans	Coastal groups, (local authority led)
	Local flood risk management strategies	Lead local flood authorities
Climate change adaptation	UK National Climate Adaptation Strategy and Adaptation Plan	Government's Committee on Climate Change Public bodies and utility companies
	Climate Change Strategy for Wales (2010)	Welsh Government
Water supply	Water resources management plans	Water companies
	Drought management plans	
Water policy	Water strategy for Wales and associated action plan	Natural Resources Wales

Issue	Plans	Primary responsible bodies
Biodiversity	Biodiversity 2020: A strategy for England's wildlife and ecosystem services	Defra
	Natura 2000 improvement plans	Natural England Natural Resources Wales
	Environment strategy for Wales	Welsh Government
	Local biodiversity action Plan	Local authorities Local partnership
	Special Areas for Conservation and Special Protection Areas core management plans	Natural Resources Wales
Invasive non-native species (INNS)	The Great Britain Invasive Non-native Species strategy and implementation plan	Defra's Great Britain invasive non-native species secretariat
Estuarine waters	Marine plans	Defra Marine Management Organisation
	Welsh national marine plan	Welsh Government
	Bathing water priorities	Natural Resources Wales
Air quality	Air quality action plans	Local authorities
Forestry	Forest design plans	Natural Resources Wales
Recreation	Rights of way improvement plans	Local authority
National Parks and Areas of Outstanding Natural Beauty (AONB)	National park management plans	National Park Authority
	AONB management plans	Local authorities

Supporting information:
More information about the flood risk management plans can be found on the flood risk management plan web pages (https://www.gov.uk/government/collections/flood-risk-management-plans-frmps-2015-to-2021).

1.7. Reporting progress on this plan

A formal assessment of progress with meeting the objectives in this plan will be reported in the 2021 update to this plan. An interim report on making measures operational will be produced and reported to the European Commission in 2018.

The Environment Agency, Natural Resources Wales and other organisations have extensive monitoring programmes to assess the state of the water environment. To help monitor progress with this plan and show how the quality of the water environment is changing, the Environment Agency and Natural Resources Wales will report on a range of quality indicators. These could include:

- status or risks facing protected areas: drinking water protected areas, Natura 2000 sites, bathing waters, shellfish waters, and nutrient sensitive areas
- ecological status plus individual status of some quality elements: fish, macrophytes, invertebrates, diatoms, phosphorous, dissolved oxygen, ammonia, specific pollutants, acidity
- chemical status plus individual status of some quality elements
- changes in status of each of the individual ecological status elements

This will be used as an indicator of overall progress towards good ecological status.

As well as monitoring the state of the environment, the Environment Agency and Natural Resources Wales also plan to report on important activities that will eventually bring positive results. For example:

- numbers of fish passage improvements
- length of shoreline and river bank habitat enhancements
- area of priority habitat created or improved
- extent of new mitigation measures implemented on heavily modified and artificial water bodies

Those implementing measures should monitor and report their own progress. The following groups will be particularly important:

- catchment partnerships - progress on partnership projects, progress on securing additional funding and influencing others
- water companies - progress on implementing national environment programme schemes and other measures that relate to environmental performance agreed by the water company with their customer challenge group
- agriculture and rural land managers - progress on uptake of schemes that benefit water and other sector related initiatives, for example, Countryside Stewardship
- local authorities - opportunities taken to encourage growth by green infrastructure and habitat enhancement
- ports and navigation authorities - implementing mitigation measures
- Highways England - progress on environmental aspects of their £15 billion road investment strategy

The liaison panel, as a collective group representing the river basin district as a whole, provides an opportunity for monitoring progress against the plans, sharing best practice and helping the catchment approach. As such, positive actions taken by partners to implement this plan can be reported and collated through the panels.

2. Current state of the environment, environmental objectives and outcomes

This section describes the current state of the environment and the environmental objectives for the river basin district. It also describes the planned progress towards achieving those objectives by 2021.

2.1. Current state of the environment

The WFD indicator of the health of the water environment is whether a water body is at good status or potential. This is an assessment of a range of quality elements relating to the biology and chemical quality of surface waters and quantitative and chemical quality of groundwater. To achieve good ecological status or potential, good chemical status or good groundwater status every single element assessed must be at good status or better. If one element is below its threshold for good status, then the whole water body's status is classed as less than good.

Surface water bodies can be classed as high, good, moderate, poor or bad status. Table 4 gives a description of each of those status classes.

Table 4: Definition of status in the Water Framework Directive

Status	Definition
High	Near natural conditions. No restriction on the beneficial uses of the water body. No impacts on amenity, wildlife or fisheries.
Good	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Moderate	Moderate change from natural conditions as a result of human activity. Some restriction on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
Poor	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries.
Bad	Severe change from natural conditions as a result of human activity. Significant restriction on the beneficial uses of the water body. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

Table 5 shows the number of water bodies in the river basin district. It shows whether these are natural, artificial (such as canals and reservoirs) or have been modified ('heavily modified') for particular uses.

Table 5: Number of water bodies in the river basin district

Water body categories	Natural	Artificial	Heavily modified	Total
Rivers, canals and surface water transfers	560	47	74	681
Lake	14	7	47	68
Coastal	0	0	0	0
Estuarine	1	0	5	6
Groundwater	42	0	0	42
Total	617	54	126	797

Tables 6 and 7 summarise the current status of surface and groundwater water bodies in the river basin district.

Table 6: Ecological and chemical 2015 classification for surface waters

	Ecological status or potential					Chemical status	
No. of water bodies	Bad	Poor	Mod	Good	High	Fail	Good
755	8	134	462	151	0	35	720

For some chemical substances that bioaccumulate in the environment new standards are being introduced. These have not yet been used in England to assess good status and the original standards have been retained while further information is being obtained to increase confidence in the assessment. Natural Resources Wales has used the new standards in the classification of water bodies where data is available.

Table 7: Chemical and quantitative 2015 classification for groundwaters

	Quantitative status		Chemical status	
No. of water bodies	Poor	Good	Poor	Good
42	9	33	15	27

The 2015 water body classification is the baseline from which deterioration is not permitted unless certain and specific conditions apply.

A summary of the current state of protected areas is included in section 2.4.

Information elsewhere in the river basin management plan

- For more information on how the current status of the water environment is assessed see section 4 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).
- You can access GeoPDF maps showing the current status of water bodies in the whole of the Severn river basin district on the Environment Agency's Sharefile platform (https://ea.sharefile.com/d-s5a5e886fd664e818).
- To obtain the 2015 classification results for each water body in the Severn river basin district, download the water body spreadsheet (https://ea.sharefile.com/d-s0faa355450243538).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

2.2. Environmental objectives

The environmental objectives of the WFD are:

- to prevent deterioration of the status of surface waters and groundwater
- to achieve objectives and standards for protected areas
- to aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status
- to reverse any significant and sustained upward trends in pollutant concentrations in groundwater
- the cessation of discharges, emissions and loses of priority hazardous substances into surface waters
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants

Environmental objectives have been set for each of the protected areas and water bodies in the river basin district. They were identified through a process involving technical and economic appraisals and formal public consultation. Achieving the objectives will optimise the benefits to society from using the water environment.

The environmental objectives summarised in this section are legally binding. All public bodies must have regard to these objectives when making decisions that could affect the quality of the water environment.

In certain specific circumstances, exemptions from some of these objectives may be applied. These exemptions are considered in the process used to set these objectives.

Information elsewhere in the river basin management plan

- You can find more information on the process of setting objectives in section 5 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

2.3. Preventing deterioration

To protect the many uses and benefits the water environment provides, it is essential to prevent it deteriorating. The water industry and many of the businesses essential to the economy have invested billions of pounds in infrastructure that rely on secure supplies of clean water. Preventing deterioration also protects wildlife and people's health and wellbeing.

The requirement to prevent deterioration was taken into account when setting the water body status objectives. Each water body status objective in this plan is set no lower than the 2015 classification result for the water body. This applies to a water body's overall status and to the status of each element used in classification.

Section 3 contains a summary of the programmes of measures to protect and improve the beneficial use of the water environment in the river basin district. Without these measures, the quality of the water environment would deteriorate with associated loss of benefits. It is estimated that without these controls, 34% of surface waters in England for the Severn river basin district would deteriorate by 2027 due mainly to an increase in the unmitigated physical modification of rivers and the spread of invasive non-native species. The increase in physical modification is driven by climate change and population growth resulting in the need for increased flood protection and land drainage, the spread of urban areas and more water storage (impoundments).

An assessment of whether deterioration has occurred from the 2015 classification baseline will be carried out in 2021.

Further information in this document

- You can find an assessment of whether deterioration in water body status occurred between 2009 and 2015 in section 4.3.

Information elsewhere in the river basin management plan

- You can find information on preventing deterioration in section 3.1 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

2.4. Protected area compliance and objectives

There are many areas where the water environment is especially valued. These areas include rare wildlife habitats, bathing waters and areas where drinking water is abstracted. These areas are known as ‘protected areas’ and their uses are given particular legal protection. Protected areas are a priority for action to make sure they achieve their objectives and protect the benefits they provide.

This section presents information on the extent to which protected areas are compliant with their current standards and objectives.

Drinking water protected areas

In Wales, the objectives for drinking water protected areas are to ensure that:

- under the water treatment regime applied, the drinking water produced meets the standards of the Drinking Water Directive plus any Wales specific requirements to make sure that drinking water is safe to drink
- the necessary protection to prevent deterioration in the water quality in the protected area in order to ensure that existing purification treatment does not have to be significantly increased in future

In England, the objectives for drinking water protected areas are to ensure that:

- under the water treatment regime applied, the drinking water produced meets the standards of the Drinking Water Directive plus any UK requirements to make sure that drinking water is safe to drink
- the necessary protection to prevent deterioration in the water quality in the protected area in order to reduce the level of purification treatment required

These objectives are at risk when increasing pollution levels caused by human activity could lead to more treatment being needed in the future and where measures are needed to reduce pollution. For groundwater bodies only, not meeting these objectives may also mean the water body is classed as poor chemical status. Safeguard zones are non statutory areas identified for ‘at risk’ abstractions where land use management practices and other activities can affect the quality of the untreated water. Measures to prevent and reduce pollution are targeted within these zones.

Table 8: Drinking water protected areas current status and at risk

Water body type	Number of drinking water protected areas	Number ‘at risk’	Number at poor chemical status for drinking water protected area objectives
Surface water	78	45	Does not apply to surface waters
Groundwater	43	18	9

Economically significant species (shellfish waters)

Some areas of estuarine and coastal waters are designated as shellfish waters. Shellfish waters are areas requiring protection or improvement to support shellfish life and growth in order to contribute to the high quality of shellfish for people to eat. There are no waters designated as shellfish waters in the Severn river basin district.

Recreational waters (bathing waters)

Bathing waters are designated waters and beaches that large numbers of bathers use. The objective for bathing waters is to preserve, protect and improve the quality of the environment and to protect human health by meeting the 'sufficient' water quality standards of the Bathing Waters Directive and to take such realistic and proportionate measures considered appropriate with a view to increasing the number of bathing waters classified as 'excellent' or 'good'.

Table 9: Bathing water protected areas current status and objectives

Number of bathing waters	Objective	Number which met at least the sufficient classification in 2014*	Number we expect to achieve at least sufficient in 2015	Number at risk of not achieving sufficient in 2015
5	At least sufficient classification	5	4	1

* This is the number that would have met at least the sufficient class if the new 2015 standards had been in force

Nutrient sensitive areas (Nitrate vulnerable zones)

The objective of the Nitrates Directive is to reduce water pollution caused by nitrates from agricultural sources and to prevent further such pollution occurring. Nitrate vulnerable zones (NVZs) are designated where nitrate concentrations in water bodies are high or increasing, or water bodies are, or may become, eutrophic due to agricultural nitrate pollution. Farmers within NVZs must comply with mandatory action programme measures to reduce agricultural nitrate losses. In addition, a code of good agricultural practice has been established for voluntary implementation by all farmers.

Table 10: Nitrate vulnerable zone protected areas extent

Reason for designation	Number of NVZs	Land area(ha) covered by NVZ type	% of RBD covered by NVZ type
High nitrate in surface water	66	712,980	51%
High nitrate in groundwater	19	321,136	23%
Eutrophication in lakes or reservoirs	6	10,486	<1%
Eutrophication in estuaries or coastal waters	0	-	0%

Nutrient sensitive areas (Urban Waste Water Treatment Directive)

The objective of the Urban Waste Water Treatment Directive is to protect the environment from the adverse effects of waste water discharges. Sensitive areas are designated for water bodies affected by eutrophication or where surface water abstraction is affected by elevated nitrate concentrations. Reductions or emission standards for nutrients in sewage effluent must be met within areas sensitive to nutrient pollution.

Table 11: Urban Waste Water Treatment Directive protected areas type and extent

Reason for designation	Number of sensitive areas	Length (km)/Area (km2) designated
Eutrophication in rivers	19	701
Eutrophication in canals	2	63
Eutrophication in lakes or reservoirs	2	3.1
Eutrophication in estuaries or coastal waters	1	0
High nitrate in surface fresh water	2	30

Natura 2000 sites: Water dependent Special Areas of Conservation or Special Protection Areas

The overall objective of the Habitats Directive is to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community importance. The network of protected areas established under the Wild Birds and Habitats Directives is known as Natura 2000. Meeting site conservation objectives will ensure that the integrity of the Natura 2000 site is maintained or restored as appropriate and ensures that the site contributes to achieving the 'favourable conservation status' of its qualifying features.

The provisions of the WFD only relate to water dependent Natura 2000 sites or water dependent habitats and species on sites that combine wet and dry features. The objective is to protect and, where necessary, improve the water environment to achieve the conservation objectives for the water dependent features of the site.

Natura 2000 sites in England

Natural England advises what meeting conservation objectives means in terms of the environmental conditions (targets) and ecological requirements expected for designated habitats and species on English Natura 2000 sites. The targets set specifically to measure the condition of designated features, and the progress towards meeting the objectives, are based on UK Common Standards for Monitoring Guidance (CSMG), published by the Joint Nature Conservation Committee. Some of these monitoring attributes of Natura 2000 sites are the same or equivalent to the objectives for elements of water bodies. Natural England monitors compliance with these objectives. Where there are CSMG targets for flow and water quality elements, they have been taken into account when setting water body status objectives. Where the deadline for achieving Natura 2000 water body objectives (CSMG target) has been extended beyond 2021, the Environment Agency has agreed interim goals locally with Natural England.

Ramsar sites are wetland sites of international importance. For the purposes of river basin management planning, Ramsar sites are considered in the same way as Natura 2000 sites.

Note, that to distinguish between ecological recovery time and other factors that may require deadline extensions, in the context of WFD only, a Natura 2000 protected area is considered to be meeting its conservation objectives where all the necessary measures for water-dependent features have been completed so that only time is needed for the biological features of the site to recover.

Extended deadlines are applied to Natura 2000 sites based on expert judgement and data held in the Site Improvement Plans (SIPs). SIPs have been used to identify which sites had WFD relevant issues and remedial actions identified from 2021 onwards, and also sites where none had been identified or a pressure is not yet confirmed

Table 12 contains a summary of the current condition and objectives for Natura 2000 protected areas in England for the Severn river basin district.

Table 12: Natura 2000 water dependent protected areas current condition and objectives (In England for the Severn river basin district)

Current condition **Area of SSSI underpinning Natura 2000 sites (ha)**	
WFD - favourable	11,668
WFD - unfavourable recovering	1,125
WFD - unfavourable no change	337
WFD - unfavourable declining	208
WFD - destroyed/partially destroyed	2
Total areas	13,340

Objective	**Number of protected areas**		
	By 2015	**By 2021**	**By 2027**
All measures complete to enable conservation objectives to be achieved	6	2	4

Natura 2000 sites in Wales

In Wales, Natural Resources Wales determines what favourable condition means in terms of the environmental conditions (targets) and ecology that is expected for designated habitats and species. The targets required are based on UK Common Standards for Monitoring Guidance (CSMG), published by the Joint Nature Conservation Committee. Some of the conservation objectives for attributes of Natura 2000 sites are the same or equivalent to objectives for elements of water bodies. Natural Resources Wales monitors compliance with these objectives.

In Wales, the condition of designated habitats and species features in SAC and SPAs for the Habitats and Birds Directives are reported over 6 year cycles. This reporting approach differs between England and Wales. In England, condition is reported on a unit basis and in Wales, on a designated habitat or species feature basis. In addition there are slight differences to some of the categories used for reporting. Table 13 summarises the data for the Welsh section of the Severn river basin district based on the number of designated habitats and species features in each category. The most recent data available has been used. There are some gaps in the data due to the differences in the requirements in which the status of some designated features are reported. For example, SPA features are reported at a UK level and not at a site level. So, in Table 13 the condition of individual features are reflected as unknown. Also, the boundary of some of the SACs and SPAs cross more than one river basin district. In these cases the relevant SAC or SPA has been considered in each river basin district where the boundaries overlap.

The default objective for all N2K sites is favourable condition by 2021. An extended deadline has been applied where there is robust evidence that 2021 is not achievable. For the Severn river basin district there are two circumstances where this is the case:

- Ecological recovery time. A number of sites are still impacted by historical acid deposition. Measures to reduce emissions have been implemented and there is UK and local evidence of recovery, however, the objectives are unlikely to be achieved by 2021.
- Technically infeasible. A number of sites are impacted by the presence of invasive non-native species (INNS), for example, American signal crayfish, Himalayan balsam. In most cases it is technically infeasible to eradicate the INNS by 2021.

Table 13: Natura 2000 water protected areas current condition and objectives (In Wales for the Severn river basin district)

Current condition Number of Natura 2000 designated habitats and species	
Favourable: Maintained	4
Favourable: Recovered	4
Favourable: Unclassified	10
Unfavourable: Recovering	3
Unfavourable: No change	4
Unfavourable: Declining	1
Unfavourable: Unclassified	33
Destroyed: Partially	0
Destroyed: Completely	0
Not assessed	24
Total	83

Objective	Number of protected areas		
	By 2015	By 2021	By 2027
Achieve conservation objectives	4	18	3

Further information in this document

- You can find a summary of the protected area action planning process and links to action plans for each protected area in section 3.6.

Information elsewhere in the river basin management plan

- For more information on all of the protected areas see section 4.2 of the Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).
- For a list of all the protected areas, associated objectives and information in the whole of the Severn river basin district see the register of protected areas (https://ea.sharefile.com/d-s487ae61bf2a4b4fb).
- You can find detailed interactive maps of the different protected areas in the Severn river basin district showing location, current status and monitoring points on the Environment Agency's Sharefile platform (https://ea.sharefile.com/d-s5a5e886fd664e818).

Supporting information:

- The Common Standards for Monitoring Guidance and interim progress goals for flow and water quality elements in Natura 2000 is available on the Environment Agency's Sharefile Platform (https://ea.sharefile.com/d-s5a5e886fd664e818).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

2.5. Water body objectives

For surface waters, objectives are set for ecological and chemical status. For artificial or heavily modified water bodies, objectives are set for ecological potential and chemical status. For groundwater, objectives are set for quantitative and chemical status.

Water body objectives consist of 2 pieces of information: the status (for example, good) and the date by which that status is planned to be achieved (for example, by 2021).

Aiming to achieve good status or potential by 2021 is the default objective for this plan. Where certain and specific conditions apply, alternative objectives (to good status by 2021) have been set. These either involve taking an extended time period to reach the planned status (for example, good by 2027) or aiming to achieve a lower status (for example, moderate by 2015).

Where the status is less than good, this means that a less stringent objective has been set.

Explanations of the justifications for alternative objectives can be found in the River Basin Management Planning Overview Annex and Part 2: River basin management planning overview and additional information document.

The following two tables summarise the status objectives for water bodies, indicating how many of these are alternative objectives.

Table 14 summarises the ecological and chemical status objectives that have been set for the 755 surface water bodies in the river basin district. It shows for instance, that:

- 664 water bodies have an objective of maintaining or aiming to achieve good ecological status between 2015 and 2027
- 61 water bodies have already achieved their objective of moderate ecological status (a less stringent objective)
- 19 water bodies have been set an objective of reaching moderate ecological status (a less stringent objective) by 2027 (an extended deadline)

Table 14: Summary of ecological status or potential and chemical status objectives for surface water bodies (number of water bodies) including those with less stringent objectives and extended deadlines (blue shaded cells)

	Ecological status or potential						Chemical status			
	Bad	Poor	Mod	Good	High	Total	Fail	Good	Total	
By 2015	0	5	61	151	0	217	1	720	721	
By 2021	0	0	6	195	0	201	0	20	20	
By 2027	0	0	19	318	0	337	0	14	14	Extended deadline
Beyond 2027	0	0	0	0	0	0	0	0	0	
Total	0	5	86	664	0	755	1	754	755	
	Less stringent						Less stringent			

Table 15 summarises the quantitative and chemical status objectives that have been set for the 42 groundwater water bodies in the river basin district. It shows for instance, that:

- 34 water bodies have an objective of maintaining or aiming to achieve good quantitative status between 2015 and 2027 (or beyond)
- 38 water bodies have an objective of maintaining or aiming to achieve good chemical status between 2015 and 2027 (or beyond)
- 8 water bodies have already achieved their objective of poor quantitative status (a less stringent objective)

Table 15: Summary of quantitative and chemical status objectives for groundwater (number of water bodies) including those with less stringent objectives and extended deadlines (blue shaded cells)

	Quantitative status			Chemical status			
	Poor	Good	Total	Poor	Good	Total	
By 2015	8	33	41	4	27	31	
By 2021	0	1	1	0	2	2	
By 2027	0	0	0	0	6	6	Extended deadline
Beyond 2027	0	0	0	0	3	3	
Total	8	34	42	4	38	42	
	Less stringent			Less stringent			

Although 12% of water bodies have a less stringent objective for ecological status or potential, only 2% of elements have a similar objective. The difference is because the overall objective's status is determined by the lowest of the element level objectives. Therefore for many of the water bodies with a less stringent objective, most of the elements still have an element level objective of good status.

Justification for alternative objectives

Table 16 shows how many times the different reasons for justifying the setting of alternative objectives (extended deadlines and less stringent objectives) were used across all water bodies (surface water and groundwater) in this river basin district. More than one reason may have been used to justify the alternative objective for any particular water body and therefore the numbers in the table do not equal the total number of water bodies.

The table also shows the reasons extended deadlines have been set for some shellfish waters and Natura 2000 protected areas.

Table 16: Summary of the justifications for alternative objectives for water bodies, shellfish waters and Natura 2000 protected areas

Alternative objective reason	Sub-reason	Number of water bodies or protected areas where reasons have been used		
		Water bodies	Natura 2000	Shellfish waters
Technically infeasible	No known technical solution is available	7	3	0
	Cause of adverse impact unknown	101	3	0
	Practical constraints of a technical nature	8	6	0
	Number of water bodies or protected areas where technically infeasible has been used	106	7	0
Disproportionately expensive	Unfavourable balance of costs and benefits	83	0	0
	Disproportionate burdens	291	4	0
	Number of water bodies or protected areas where disproportionately expensive has been used	331	4	0
Natural conditions	Ecological recovery time	150	0	0
	Groundwater status recovery time	1	0	0
	Background conditions	24	1	0
	Number of water bodies or protected areas where natural conditions has been used	172	1	0
	Total number of water bodies or protected areas with an alternative objective (extended deadline and/or less stringent status objective)	429	4	0

Information elsewhere in the river basin management plan

- More information on alternative objectives, including explanations of the justifications for alternative objectives can be found in section 5.4 and 5.5 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).
- A GeoPDF map of the types, location, boundaries, monitoring sites and current status of water bodies in the whole of the Severn river basin district is available on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-s5a5e886fd664e818).
- The current status and objective for each water body in the Severn river basin district is available in a spreadsheet on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-s0faa355450243538).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

2.6. Reversal of trends

Actions to reverse any significant and sustained upward trends in pollutant concentrations in groundwater must be implemented as soon as a trend has been identified. It is not possible to propose an alternative that is less stringent or extend the deadline for this objective.

2.7. Progressive reduction of pollution of groundwater

Hazardous substances must be prevented from entry into groundwater and the entry into groundwater of all other pollutants must be limited to prevent pollution. Hazardous substances means substances or groups of substances that are toxic, persistent and liable to bioaccumulate, and other substances or groups of substances which give rise to an equivalent level of concern.

2.8. Environmental outcomes for 2021

To help determine the water body status objectives summarised earlier, a prediction was made about what the status of each element will be in 2021. Predicted improvements in status are based on measures where there is confidence that the:

- measures will happen by 2021
- location of the measures and the water bodies that will benefit are known
- change in element status will occur as a result of the measures

Confidence in this context means there is at least a reasonable expectation (more confident than not) that the measures will happen and the outcome will be met. Environmental processes are complex and investment plans of both public and private sectors change. Therefore some of the predicted outcomes may not be achieved. There will, however, be opportunities to implement additional measures and potentially achieve further outcomes by 2021. These opportunities are discussed in section 3.5.

The water body status objective does not always show whether an improvement in status is predicted to occur by 2021. For example, an element or water body may require an extended deadline to reach good status and so have an objective of 'good by 2027'. However, it might be predicted to improve from poor to moderate status by 2021.

To help understand the improvements predicted to occur as a result of measures in this plan, the tables 17, 18 19 and 20 summarise the current status and the predicted status in 2021 for surface water bodies (ecological and chemical status)

- groundwater (quantitative and chemical status)
- all elements for all surface water bodies in the river basin district
- selected elements that contribute to the ecological status of surface waters

Table 17: Current and predicted 2021 ecological and chemical status of surface water bodies (number of surface water bodies)

	Ecological status				Chemical status	
	Bad	Poor	Mod	Good or better	Fail	Good
Current status	8	134	462	151	35	720
Predicted 2021 status	6	89	453	207	35	720
Predicted Change	-2	-45	-9	56	0	0

Table 18: Current and predicted 2021 quantitative and chemical status of groundwater bodies (number of groundwater bodies)

	Quantitative status		Chemical status	
	Poor	Good	Poor	Good
Current status	9	33	15	27
Predicted 2021 status	8	34	13	29
Predicted Change	-1	1	-2	2

Table 19: Current and predicted 2021 status of ecological elements and chemical elements (number of elements in surface water bodies)

	Ecological status				Chemical status	
	Bad	Poor	Mod	Good or better	Fail	Good
Current status	31	315	703	4204	48	956
Predicted 2021 status	20	202	678	4349	48	956
Predicted Change	-11	-113	-25	145	0	0

The predicted status in 2021 for all of the classified elements for each water body are available in a comprehensive data set that forms part of this plan. Table 20 summarises the current and predicted 2021 status for biological elements in surface waters.

Table 20: Current and predicted 2021 status for biological elements in rivers (number of times element assessed)

		Bad	Poor	Mod	Good or better
Fish	Current status	5	61	81	179
	Predicted 2021 status	2	36	89	199
	Predicted Change	-3	-25	8	20
Invertebrates	Current status	6	21	73	434
	Predicted 2021 status	5	17	67	445
	Predicted Change	-1	-4	-6	11
Plants (macrophytes and phytobenthos)	Current status	1	66	188	152
	Predicted 2021 status	1	48	180	174
	Predicted Change	0	-18	-8	22

Further information in this document:

- Further summaries of current status, 2021 predicted outcomes and water body objectives are presented in section 5.

Information elsewhere in the river basin management plan:

- The 2021 predicted outcomes for each water body are available to download on the Environment Agency's ShareFile service: (https://ea.sharefile.com/d-s0faa355450243538).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

Additional environmental outcomes for 2021

For some measures, although there is confidence that the measure will happen by 2021, there is not enough confidence about the location or the scale of improvement to be able to predict outcomes for specific elements in specific water bodies.

These additional 2021 outcomes, which are not in the tables above, include the following:

- Improvements to protected areas such as the quality of raw water at 33 safeguard zones due to actions targeting pesticides and the water quality of a bathing water site as a result of water company improvements to waste water discharges.
- Improvements to fish habitat and better conditions for invertebrates and plants in all catchments, for example the River Frome, due to work such as installing woody debris, restoring relic river channels, creating spawning beds and preventing river access by livestock in the North Somerset Levels and Moors as a result of flood risk work.
- Reduction in phosphate and improvements to fish and eel status in more than 40 water bodies in the Wye and Severn Uplands catchments as a result of 24 projects focusing on soil management and habitat enhancement, and improvements to water company operations.
- Improvements to the ecology of at least 4 water bodies and the creation or improvement of over 80ha of wetland and 74km of river as result of flood risk management schemes.
- Reductions in metals such as cadmium, lead and zinc in one water body due to metal mine remediation near Minsterley (Shropshire).
- Reductions in sediment, nutrients, pesticides and bacterial pollution are expected across the river basin district from initiatives such as Wye Farm Regulation Trial and the Mackworth and Markeaton Brooks project. Also, where adopted, Countryside Stewardship (in England) and Glastir (in Wales) are expected to contribute.
- Improvements to the status of fish in the Wye and South East Valleys as a result of measures, for example, habitat improvements, fish passage schemes and spawning gravel cleaning that will be put in place as an alternative to salmon stocking.
- In the Wye, Usk and South East Valleys catchments improvements to habitat, morphology, water quality and a reduction in invasive species are anticipated as a result of partnership action supported by Natural Resources Wales under the Joint Working Partnership and Competitive Funding schemes.
- Following the State of Nature report a ‘Nature Fund’ was created in Wales to respond to the challenges for wildlife and habitats. Three of the 7 nature action zones eligible for the fund (Brecon Beacons, Cambrian Mountains and South Wales Valleys) fall within the Severn river basin district. With a priority being to improve river catchments, a range of improvements are expected during the life of this plan.

The environmental objectives in this plan will drive additional improvement in the water environment by 2021. Opportunities include the periodic review of water company price limits in 2019, government spending reviews, major infrastructure projects and the routine review of environmental permits.

Supporting information:

- To see a summary of the effects of this plan on the wider environment read the strategic environmental assessment (www.gov.uk/government/collections/river-basin-management-plans-2015).
- The impact assessment for the river basin management plans in England provides further information on the benefits this plan will achieve. It is available on the river basin management plan web pages (www.gov.uk/government/collections/river-basin-management-plans-2015).

3. Measures to achieve the environmental objectives

This section provides a summary of the programme of measures that are needed to manage the significant water management issues and achieve the objectives of this plan. The benefits of action and those involved are identified.

3.1. Programme of measures: background

This section provides a summary of the programmes of measures used to achieve the environmental objectives of this plan.

Table 21 provides an overview of the summary programmes of measures.

Table 21: Overview of the programme of measures

Measures to prevent deterioration		
Summary of the programmes of measures to control the significant water management issues	These ongoing measures play a significant role in preventing deterioration. They protect all the current uses of the water environment and the benefits that society gets from it. The ongoing measures represent substantial investment and all sectors with an interest in the water environment have a role to play. These measures apply across the river basin district.	Section 3.2
Measures to achieve outcomes by 2021		
Main programmes of measures for 2021 outcomes (Summary of the programmes of measures that will improve the water environment by 2021)	The main programmes have discrete funding streams to deal with particular issues. These programmes will achieve the biggest improvements in the water environment by 2021. They include the measures predicted to improve specific water bodies by 2021 and additional measures where it has not been possible to predict the geographic extent and/or size of environmental change they will result in by 2021. These measures apply in either specific locations or across the river basin district.	Section 3.3
Local measures (Summary of the local catchment measures)	Local catchment measures that will be implemented by 2021. Some of the measures are reflected in water body specific outcomes by 2021. These measures apply within specific catchments. Catchment groups also identify what more they could achieve if additional resources could be realised in future.	Section 3.4

Measures to achieve objectives to 2027 and beyond		
Summary of the programmes of measures to meet objectives for water bodies with extended deadlines	A summary of the additional measures needed to achieve objectives beyond 2021. These measures are not linked to predicted outcomes for 2021. These will be reviewed when the plans are next updated in 2021.	Section 3.5
Additional measures to achieve protected area objectives		
Summary and links to the action plans containing measures for protected areas	A summary of and links to the action plans to meet protected area objectives in specific locations.	Section 3.6

Many of these measures, for example, land-based controls on pollutants, will also lead to improvements in marine waters not covered by the WFD.

Information elsewhere in the river basin management plan

- You can find a summary of the process for identifying of measures, including how costs and benefits were assessed in section 5 of the Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).
- More information about the mechanisms used to implement measures is available on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-sabbd14301a44d5e9).
- More information on measures in Wales for the Severn River basin district can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

3.2. Measures to prevent deterioration

This section summarises the ongoing measures that help prevent deterioration and protect the many uses of the water environment and the benefits it provides. Many of these measures also help improve the quality of the water environment.

The measures are presented for each of the significant water management issues described in section 1.4.

To identify which sectors are involved in implementing the measures, the main roles in managing the water environment (identified in section 1.2) are referred to below.

Physical modifications

Physical changes such as widening, deepening and straightening rivers, estuaries and coasts help to meet the needs of society and the economy. Physical modifications allow the water environment to be used and valued for many purposes, including for navigation, flood risk management, fishing and other recreational activities that improve people's wellbeing and quality of life. These changes have helped towns and cities to develop and the economy to grow, but this can sometimes be at the expense of the water environment.

There are benefits to controlling new modifications and reducing the impacts of existing ones. While many modifications are, and will continue to be important to society, their potentially harmful impacts can be reduced and the resilience of aquatic communities improved. Taking action to address the impacts of physical modifications can have benefits for protected areas, in particular Natura 2000 sites. There is increasing evidence that in some cases, addressing the impacts of modifications (for instance by using natural water retention measures such as wetland creation and coastal realignment) could help alleviate flooding slowing flows and making more space for water.

How the issue is managed

Regulators and operators use and apply relevant legislation and policy:

- **Local government and internal drainage boards** grant land drainage consents under the Land Drainage Act 1991. **Government and agencies (Environment Agency, Natural Resources Wales)** grant flood defence consents under the Water Resources Act 1991. Subject to parliamentary approval, flood defence consents will be replaced with flood risk activity permits from April 2016. All these authorities assess applications for schemes or activities for their potential effect on local flood risk and the environment.
- **Government and agencies (Environment Agency, Natural Resources Wales)** make sure new abstraction and impoundment licences and environmental permits include protection for freshwater and migratory fish where relevant and use powers to ensure fish passes and screens are in place where appropriate.
- **Government and agencies (Marine Management Organisation, Natural Resources Wales)** use marine licensing controls under the Marine and Coastal Access Act 2009 for activities including construction, alteration or improvement works, dredging and removing substances or objects from the sea or sea bed.
- **All sectors** to consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.
- **Navigation (harbour authorities)** licence dredging and works within harbour limits.
- **Government and agencies (Environment Agency, Natural Resources Wales)** work with partners and interested groups to identify appropriate mitigation measures to achieve WFD objectives in artificial and heavily modified water bodies. Mitigation measures are practicable steps that can be taken to mitigate adverse impacts from beneficial human activities such as impoundments for water resources, or structures that provide flood defence.
- **Local government** to consider the impact on hydromorphology when preparing spatial plans and local flood risk management plans, decisions on development management, new buildings and infrastructure.

Operators and project undertakers apply the following guidance:

- **Navigation (ports and harbours), industry, manufacturing and other business, non governmental organisations and central government** use the e-learning site for flood risk management to access expert information on mitigation measures.
- **All sectors** apply relevant Environment Agency and Natural Resources Wales' WFD compliance guidance, which covers a range of activities in estuaries and coasts.
- **Industry, manufacturing and other business** use the Environment Agency's or Natural Resources Wales' 'Hydropower development: guidance for run-of-river hydropower' or the 'Hydropower Guidance Note' in Wales.
- **Navigation (ports and harbours), government and agencies (Environment Agency, Natural Resources Wales) and local government** use industry developed best practice guidance.

In England influencers and regulators to consider future management activities:

- **Local government, central government (Environment Agency)** refresh the strategic overview of sea flooding and coastal erosion to better manage environmental risk in the long term using shoreline management plans.
- **Government and agencies (Environment Agency)** to explore effectiveness of existing approach to planning guidance on development in flood plains and coastal erosion risk areas.
- **Government and agencies (Environment Agency)** to review flood defence design standards for WFD and Natura 2000 sites.
- **Government and agencies (Environment Agency)** to carry out feasibility studies and designs for flood storage areas for environmental benefits.

Further information in this document

- Section 3.3 includes further information on flood risk management investment.

Information elsewhere in the river basin management plan

- You can find more information about managing flooding and Flood Risk Management Plans in section 2 of the Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Supporting information

- More information on marine plans can be found on the gov.uk webpages (https://www.gov.uk/government/collections/marine-planning-in-england).
- Information on mitigation measures can be found on the e-learning site for flood risk management webpages (http://learning.environment-agency.gov.uk/capacitybuilding/).
- The Environment Agency's compliance guidance for activities in estuaries and coasts can be found on the gov.uk webpages (https://www.gov.uk/government/publications/complying-with-the-water-framework-directive-marine-dredging).
- The Environment Agency's guidance for hydropower development can be found on the gov.uk webpages (https://www.gov.uk/government/collections/hydropower-schemes-guidelines-and-applying-for-permission).
- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Managing pollution from waste water

Waste water, or sewage, can contain:

- nutrients such as phosphorus and nitrates
- harmful chemicals, including ammonia and metals and those used in homes and industry
- other harmful substances, including viruses and bacteria

Pollutants in waste water can affect the dissolved oxygen levels within the receiving waters and can impact on ecology. Nutrients can disturb the natural ecological balance of a water body and cause excessive growth of vegetation and algae, which may starve the water of oxygen. Other pollutants such as metals and everyday chemicals used in products around the home which are discharged in sewage may be directly toxic to plants or animals. Humans can also be affected, for example, through chemicals that accumulate in food or bacteria and viruses in waste water affecting bathing waters.

Reducing the impact of pollution from waste water will provide many benefits and help support a wide range of water uses that society values. These uses include drinking water supply, agriculture (including commercial shellfish harvesting), water sports, angling, conservation and wider benefits such as tourism and quality of life. Addressing pollution from waste water will have benefits for a large number of protected areas including bathing waters, shellfish waters, Natura 2000 sites and sensitive areas under the Urban Waste Water Treatment Directive. It also benefits marine waters under the Marine Strategy Framework Directive.

How the issue is managed

Regulators, operators and influencers use and apply relevant legislation and policy:

- **Government and agencies (Environment Agency, Natural Resources Wales)** grant and review environmental permits under the Environmental Permitting Regulations (England and Wales) 2010 to the **water industry, manufacturing and other business and other sectors** to protect the environment from pollutants such as chemicals, nutrients, bacteria, viruses, ammonia and organic material in discharged effluent.
- **Government and agencies (Environment Agency, Natural Resources Wales)** work with the **water industry** to develop a long-term strategy for sewerage to prevent deterioration of permitted discharges (for example, combined sewer overflows), resulting from pressures such as climate change, growth and ageing infrastructure; and to develop a long term strategy to reduce and minimise risks to the water environment from misconnected sewerage (foul sewage wrongly connected to surface water).
- **Government and agencies (Environment Agency)** grant environmental permits for small sewage discharges in designated sensitive areas. In other areas, small sewage discharges (including septic tanks) are exempt from the need for a permit if they can meet a number of criteria.
- **Government (Environment Agency)** to carry out a review of areas sensitive to eutrophication, in relation to the Urban Waste Water Treatment Directive (UWWTD) and make recommendations to **Defra**.
- **Government and agencies (Environment Agency and Health and Safety Inspectorate)** enforce restrictions and bans on the use of certain chemicals

- **Local government** considers the impact on water quality in their preparation of spatial plans, decisions on spatial planning, development management, new buildings and infrastructure.
- **All sectors** to consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.

Further information in this document

- You can find more information on water company investment in section 3.3.

Information elsewhere in the river basin management plan

- You can find more information on the National Environment Programme in Section 2 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Supporting information

- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Managing pollution from towns, cities and transport

Rainwater draining from roads and pavements carries many pollutants. These include metals, vehicle emissions, silt, grit, bacteria from animal faeces and oil. Other issues arise from pollution from households and business, for example, misuse of the drainage network. Pollution can enter surface water sewers that discharge to rivers, estuaries and coastal waters, causing harm to animals and plants.

Dealing with pollution from towns, cities and transport is a complex task. Costs for the measures tend to be higher and ownership of the problem is less clear. Existing legal powers are designed to address specific sources of pollution rather than small-scale or cumulative impacts from many different sources. However, there are some ways in which the challenge can be addressed. Benefits from action include improved flood resilience, climate change adaptation, increased biodiversity and social cohesion. In addition, protected areas, particularly certain bathing waters and shellfish waters, can be improved when enough resources are targeted at a specific issue.

How the issue is managed

Regulators and operators use and apply relevant legislation and policy:

- **Local government** uses planning conditions, legal agreements and enforcement powers under the Town and Country Planning Act 1990 and the Planning (Wales) Bill to prevent or stop pollution from developments, roads and other infrastructure.
- **Local government** makes sure that new developments address potential pollution problems by using sustainable drainage systems to manage surface water.
- **Local government** uses powers under the Building Act 1984 to rectify misconnected waste water pipe work, and statutory nuisance powers under the Environmental Protection Act 1990 to stop water pollution from unauthorised operations such as transient car wash operations.
- **Government and agencies (Environment Agency, Natural Resources Wales)** use anti-pollution works powers (including service of notices) under the Water Resources Act 1991 to prevent or clean up small scale pollution, for example, ensuring storage tanks are bunded or repairing misconnections.
- **Industry, manufacturing and other business** comply with existing regulations (for example, the Environmental Permitting (England and Wales) Regulations 2010) to make sure that chemicals are properly managed and surface water drainage is appropriately used and maintained.

Operators take action, where appropriate:

- **Industry, manufacturing and other business (construction industry)** use sustainable drainage systems to remove silt and minimise other chemicals to prevent polluting run-off.
- **Local government** considers urban diffuse pollution pressures when developing spatial plans, determining planning applications and designing and constructing local authority owned buildings, infrastructure and grounds. These should incorporate sustainable drainage schemes and water efficiency measures where practical and affordable.
- **Local government** incorporates green and blue infrastructure into regeneration schemes where possible.

- **Local government and industry, manufacturing and other business** reduce the impact of pesticides by using Amenity Assured registered weed control contractors under the Voluntary Initiative.

Regulators and operators plan and work together:

- **Government and agencies (Environment Agency) and Highways England** apply the memorandum of understanding agreement covering the strategic road network and remediation of high risk outfalls.
- **Government and agencies (Environment Agency, Natural Resources Wales) and urban and transport (Network Rail)** operate under the terms of a memorandum of understanding covering contaminated land, water discharge and use of pesticides.
- **Government and agencies (Environment Agency, Natural Resources Wales and water industry)** investigate and deal with misconnections, for example, through the National Misconnections Strategy group and in accordance with Defra's diffuse urban action plan and Natural Resources Wales' Diffuse Pollution Plan**.**
- **All sectors** to consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.
- **Industry manufacturing and other business, local government, navigation and general public** follow codes of conduct and non-statutory estuary and coastal management plans to protect and improve the water environment in specific locations.
- **Local government** works with **industry, manufacturing and other business (Local Enterprise Partnerships), and non governmental organisations** (catchment partnerships and Local Nature Partnerships) to develop joint improvement programmes.
- **Industry, manufacturing and other business (Local Enterprise Partnerships)** work in partnership with **all sectors** to help identify where money from the European Growth Programme is invested to develop local economies and enhance the environment.

Further information in this document

- You can find more information on Highways England's environment fund in section 3.3.

Supporting information

- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Changes to natural flow and levels of water

Taking too much water from freshwater or tidal rivers, canals, lakes and groundwater damages the environment. Changes in the natural flow and level of water could affect some Natura 2000 sites; particularly water dependent Special Areas of Conservation and Special Protection Areas. Improving the way water resources are managed will make sure that there is enough good quality water for a healthier water environment and secure supplies of water for people, businesses and agriculture. It will also provide more leisure opportunities and increase the amenity value of natural environments, leading to health benefits for people.

How the issue is managed

Regulators and operators use and apply relevant legislation and policy:

- **Government and agencies (Environment Agency, Natural Resources Wales)** grant licences under the Water Resources Act 1991 to regulate how much water is taken from rivers, lakes estuaries and groundwater. The Environment Agency and Natural Resources Wales reviews the sustainability of time-limited abstraction licences as they expire and the licence holders seek replacement licences. The Environment Agency and Natural Resources Wales will take action to curtail time-limited licences that are not sustainable. Replacement licences are granted on a sustainable basis in line with water body objectives.
- **Government and agencies (Environment Agency, Natural Resources Wales)** change or revoke permanent licences to protect the environment from actual or potential damage, including serious damage under the Water Resources Act 1991.
- **Government and agencies (Environment Agency, Natural Resources Wales)** work to bring a number of currently exempt abstraction activities into regulation following public consultation and formulation of government policy and legislation. This includes dewatering, transfers for inland navigation and previously exempt irrigation activities**.** Some reductions in currently exempt abstractions that are causing serious damage to the environment may be necessary. This may result in an improvement in groundwater and flow in affected water bodies**.**
- **All sectors** consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.

Regulators and operators take action:

- **Government and agencies (Environment Agency, Natural Resources Wales)** identify water resource pressures due to abstraction and restore sustainable flows and groundwater levels through changes to abstraction licences and physical changes to river channels to improve flows. New licences must be sustainable and prevent future impacts.
- **Government and agencies (Environment Agency, Natural Resources Wales)** implement the Restoring Sustainable Abstraction (RSA) programme. This programme identified, investigated and is solving environmental risks or problems caused by unsustainable licensed water abstraction. The Environment Agency and Natural Resources Wales take action to curtail abstraction licences that have been identified as causing an environmental problem under the RSA programme. The Environment Agency and Natural Resource Wales aim to complete the programme by the end of March 2020.

Regulators and operators plan and work together:

- **Water industry** to complete statutory water resource management plans, setting out how supplies and demand for water will be managed over a 25 year period, and takes action to restore sustainable groundwater and flows where impacts due to abstraction have been confirmed.
- **Water industry** to produce drought plans to make sure that public water supplies are maintained while minimising the environmental impact of drought.
- **Government and agencies (Environment Agency, Natural Resources Wales)** produce abstraction licensing strategies to help ensure a consistent approach to managing water resources and balancing the needs of water users and the environment.
- **Government and agencies (Environment Agency, Natural Resources Wales)** revoke unused licences where the licence holder does not have a reasonable need for the water.
- **Water industry** carries out adaptive management trials to determine the best measures for improving heavily modified water bodies used for water supply.
- **Government and agencies (Natural Resources Wales)** produce drought plans that set out the agencies actions to plan for, and manage droughts.

Regulators, operators, influencers and project undertakers make sure water is used efficiently:

- **All sectors** take up or encourage water efficiency measures, including water industry work on metering, leakage, audits, providing water efficient products, promoting water efficiency and education.
- **Local government** sets out local plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of Schedule 1 to the Building Regulations 2010.
- **Industry manufacturing and other business** implement tighter levels of water efficiency, as proposed by changes to the Building Regulations.
- **Agriculture and rural land management** manage demand for water and use water more efficiently to have a sustainable water supply for the future.
- **Local government** commissions water cycle studies to inform spatial planning decisions around local water resources.

Further information in this document

- You can find more information on water resources sustainability measures and water company investment in section 3.3.

Information elsewhere in the river basin management plan

- You can find more information about the management of abstraction and flow in Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Supporting information

- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Managing invasive non-native species

Some non-native animals and plants are invasive and can have significant social, economic and environmental impacts. Where they lead to greater erosion some plants, such as Himalayan balsam, can increase flood risk. Others like American signal crayfish can decrease river bank stability and most have negative impacts on ecology and leisure activities such as angling and water sports. There are also significant costs in controlling and safely disposing of invasive species such as Japanese knotweed on development sites and managing species such as zebra mussels, which can block pipes, intakes and other structures.

The approach to dealing with invasive non native species is set out in the GB Invasive Non-native Species Strategy. The strategy aims to minimise the risk posed by, and reduce the negative impacts of invasive non-native species. It adopts a hierarchical approach stressing prevention, followed by early detection and rapid response and finally long-term management and control.

Many invasive non-native species spread rapidly and once they are established control is often prohibitively expensive or technically infeasible and ultimately unsuccessful.

The most effective and least expensive measure is to reduce the number of new species introduced and slow the spread of those that are already present by applying good biosecurity (measures which reduce the risk of spreading diseases and invasive non-native plants and animals) and promoting the 'Check, Clean Dry' and ‘Be Plantwise’ campaigns.

Natura 2000 protected areas can be vulnerable to certain invasive non-native species. Intensive and often expensive control measures may be required to actively manage or eradicate them in specific circumstances. For example, at sites designated for their wetland habitat interest, Himalayan balsam can dominate and reduce the habitat space available for native plant species. Controlling the Himalayan balsam by targeted and intensive hand pulling or cutting over a number of years can reduce the pressure from this species and prevent further deterioration of the habitat.

How the issue is managed

Regulators and operators use and apply relevant legislation and policy:

- **Government and agencies (Environment Agency, Natural England and Natural Resources Wales)** use the Keeping and Introduction of Fish Regulations 2015 and Wildlife and Countryside Act 1981 to control movements of invasive non-native species. A change in legislation, implemented in April 2014, introduced a ban on selling 5 high-risk plant species including water primrose and floating pennywort.
- **Agriculture and rural land management** is aware of the Wildlife and Countryside Act 1981 and does not allow certain species to escape into the wild. In Wales, the list of animals and plants considered under schedule 9 is being reviewed and may change when it is incorporated into the planned Environment (Wales) Bill.
- **Government and agencies (Marine Management Organisation, Welsh Government and Natural Resources Wales)** use policies within emerging marine plans and marine policy statements to support controlling and mitigation against invasive non-native species.
- **Government and agencies** implement EU Regulation 1143/2014 on Invasive Alien Species. Implementation of the regulation is gradual and will take place throughout the period of this plan.

Regulators, operators, influencers and project undertakers plan and work together:

- **Government and agencies (includes Environment Agency, Natural England and Natural Resources Wales), non governmental organisations (including angling, conservation and recreation)** implement the updated Great Britain strategy on invasive species, which includes species impact risk assessments, action plans and rapid response.
- **All sectors** work together to develop and implement codes of practice to reduce the spread of invasive non-native species.

Regulators, operators, influencers and project undertakers take action:

- **Government and agencies (includes Environment Agency, Defra, Welsh Government and Natural Resources Wales), non governmental organisations (angling, conservation and recreation) and navigation** implement rapid responses to contain and eradicate new invasions where practicable. This measure is aided by Species Control Agreements and Orders in the Wildlife & Countryside Act 1981 as amended by the Infrastructure Act 2015.
- **Government and agencies (Natural England and Natural Resources Wales)** manage invasive non native species at selected protected sites as appropriate.
- **All sectors** can form Local Action Groups to deal with invasive non-native species and raise awareness.

Regulators, operators, influencers and project undertakers build awareness and understanding:

- **Government and agencies (includes Environment Agency, Natural England and Natural Resources Wales), non-governmental organisations (including angling, conservation and recreation), local government and navigation** work in partnership to influence recreational users to slow the spread of invasive non native species by promoting 'Check, Clean, Dry' actions.
- **Government and agencies (Defra and Welsh Government) and all sectors** raise public awareness of the risk of transferring non-native species accidentally and of preventative approaches.
- **Central government** helps the non-native species secretariat co-ordinate alert systems, species records and a central repository for information, including public online and smart phone submission of species records.

Information elsewhere in the river basin management plan

- You can find more information about the management of invasive non-native species in section 2 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Supporting information

- The GB Invasive Non-native Species Strategy can be found on the GB non-native species secretariat webpages (www.nonnativespecies.org/index.cfm?sectionid=55).
- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Manage pollution from rural areas

Pollution from rural areas comes from the combined effects of numerous sources, including agriculture, roads, recreational land use such as golf courses and forestry activities. It is mainly caused by nutrients, contaminants, chemicals such as pesticides and sediment entering water bodies as a result of land management activities.

Dealing with pollution from rural areas will help society reap the benefits of a healthy water environment. Farmers will benefit from making sure soil and nutrients are retained on the land rather than losing them, through run-off, to water. Controlling this run-off will help reduce localised flooding, reduce the sedimentation of lakes and harbours, improve fisheries and reduce the amount of harmful chemicals entering water bodies. Water companies will spend less money treating water for colour, pesticides and nitrate contamination. A reduction in nutrients will also benefit water quality and habitat in estuaries and coastal waters.

A wide range of protected areas will see benefits, including bathing water, shellfish waters, drinking water protected areas, Natura 2000 sites and nutrient sensitive areas designated as nitrate vulnerable zones.

How the issue is managed

Regulators and operators use and apply relevant legislation and policy:

- **Government and agencies (Environment Agency, Natural Resources Wales)** check and ensure compliance against environmental permits under the Environmental Permitting (England and Wales) Regulations 2010 and against requirements of a wide range of environmental legislation.
- **Agricultural and rural land management (farm businesses)** comply with permits granted under the Environmental Permitting (England and Wales) Regulations 2010. Permitted activities include some discharges to groundwater, spreading of waste to land for agricultural benefit, pig and poultry units over a certain size and safe recovery of agricultural waste.
- **Agricultural and rural land management (farm businesses)** comply with the action programme measures within the Nitrate Pollution Prevention Regulations 2015 in all nitrate vulnerable zones.
- **Agricultural and rural land management (farm businesses)** comply with the requirements of the Control of Pollution (Silage Slurry and Agricultural Fuel Oil) Regulations 2010 (SSAFO).
- **Agricultural and rural land management (farm businesses)** ensure that polluting matter is not present at a place where it has or is likely to enter controlled waters to avoid enforcement action under Water Resources Act 1991.
- **Government and agencies (Farming Advice Service)** advise farmers on general requirements of cross compliance and regulations required under the WFD.
- **Government and agencies (Environment Agency, Natural England and Natural Resources Wales)** provide site-level advice on the specific requirements of regulations.
- **Government and agencies (Natural England, Natural Resources Wales)** provide advice on the specific requirements of regulation that relate to designated sites, and can prevent or stop potentially damaging activities.

- **Government and agencies (Environment Agency, Natural England and Natural Resources Wales)** deliver advice and training to farmers in some priority catchments through an approach such as Catchment Sensitive Farming and Glastir.
- **Government and agencies (Environment Agency, Natural Resources Wales)** review the effectiveness of measures within catchments, and where there is sufficient need, consider whether further action should be proposed.
- **Government and agencies (Forestry Commission, Natural Resources Wales)** comply with the UK Forestry Standard, the government's approach to sustainable forestry.
- **Local government** uses planning conditions, legal agreements and enforcement powers under the Town and Country Planning Act 1990 to prevent or stop pollution from rural developments, roads and other rural infrastructure.
- **Local government** considers the impact of pollution when preparing spatial plans, minerals and waste plans and making decisions on development management, new rural buildings and rural infrastructure.

Operators, influencers and project undertakers take action:

- **Agricultural and rural land management (farm businesses)** meet cross compliance requirements of the Basic Payment scheme funded by the Common Agricultural Policy.
- **Agricultural and rural land management (farm businesses)** voluntarily participate in Countryside Stewardship and Countryside Productivity schemes to prevent deterioration, improve water quality and reduce flood risk.
- **Agricultural industry manufacturing and other business** participate in sector led approaches including farm assurance and the Campaign for the Farmed Environment schemes.
- **Water industry and rural land management** work together in drinking water safeguard zones to reduce the need for water treatment as a result of nutrients or pesticides to meet drinking water standards.
- **Government and agencies (Forestry Commission, Environment Agency and Natural Resources Wales)** use opportunity mapping to identify and promote locations where woodland creation can achieve multiple benefits for the environment**.**

Further information in this document

- You can find more information on Countryside Stewardship in section 3.3.

Information elsewhere in the river basin management plan

- You can find more information about the management of pollution from rural areas in section 2 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and in the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).

Supporting information

- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Managing pollution from minewaters

Mining has taken place across England and Wales for hundreds of years and has left a legacy of pollution from abandoned waste and minewater drainage tunnels. Pollutants in minewater draining from abandoned coal and metal mines and leached from mining wastes cause water pollution and harm aquatic life, including fish and insects.

Although pollution from minewaters is not a significant water management issue across the River Severn basin district as a whole, in places it is an important local issue. An example is the South East Valleys catchment.

The Coal Authority currently operates 70 treatment schemes at abandoned coal mines using funding from the Department of Energy and Climate Change across England, Wales and Scotland, including 3 in the Severn river basin district. These schemes must continue to operate to prevent deterioration in rivers and groundwater. Since 1994, the Coal Authority has cleaned up and protected over 240km of rivers, protected drinking water supply groundwater, and each year stops over 3,000 tonnes of iron and other contaminants causing pollution.

Supporting information

- National measures in Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

3.3. Main programmes of measures for 2021 outcomes

This section provides a summary of the main programmes of measures, grouped by funding sources, which will improve the water environment by 2021. The outcomes of these measures fall into 2 categories:

- measures which the predicted improvements in the status of water bodies by 2021 are based upon
- measures which will happen by 2021 and achieve environmental outcomes, but there is not enough confidence (in location or scale of improvement) to predict specific outcomes

The main programmes are:

- water company investment programme
- rural investment
- Highways England's environment fund
- flood risk management investment programme
- catchment level government funded improvements in England
- catchment level, funded improvements in Wales
- water resources sustainability measures

Supporting information

- You can find a list of the measures used to predict improvements in status by 2021 for specific elements in specific water bodies, and a summary of the measures expected to result in additional environmental outcomes for 2021 on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-sabbd14301a44d5e9
- National and local measures for Wales can be found on Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/)

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

Water company investment programme

Ofwat, the economic regulator of the water companies reviews water industry investment plans every 5 years. As part of this process, known as the price review, the Environment Agency and Natural Resources Wales works with water companies, Ofwat and others to make sure that investment protects the water environment, increases resilience and secures long-term benefits for society and the economy. The Environment Agency and Natural Resources Wales set out the environmental obligations, including work required to prevent deterioration and achieve protected area and water body status objectives.

Across England and Wales, water companies will be investing £3.5 billion in environmental improvements between 2015 and 2020.

Significant investment will go into addressing point source impacts from sewage treatment works and discharges from the sewer network. This will reduce pollutants such as ammonia and nutrients that disturb the natural ecological balance of water bodies and cause excessive growth of vegetation and algae.

Further investment will deal with abstraction and flow pressures. This includes reducing the amount of water that can be taken or measures to enhance habitats to compensate for damage caused by abstraction.

Habitat improvement schemes are planned to reduce the impact of physical modifications caused by water company operations and action is planned to deal with invasive non-native species on water company land. Further measures will ensure compliance with the Eels Regulations, which require water intakes to be screened to prevent eels and other fish from being drawn out of the river into drinking water treatment works.

Climate change adaptation and mitigation is an integral part of water company planning and is an essential part of assessing scheme options. This is particularly important for water resources planning, where water companies must plan up to 25 years in advance to make sure that there is enough water to meet future demands.

Most of the measures are well-established engineering solutions that are proven to be effective. Changes are secured through amendments to environmental permits.

There are some catchment and habitat improvement schemes that are less well established, including measures to reduce pesticide pollution. Some of these schemes rely on voluntary behavioural change affecting agricultural practice. These can be less effective when compared to engineering solutions.

In England, a 'fair share approach' is applied to the selection of measures, which assumes there is a proportional reduction in polluting load from each of the contributing sectors. For example, when identifying measures for phosphorus in a catchment, the amount coming from sewage treatment works and the amount from other sources, such as rural diffuse pollution was calculated. If the sewage works was responsible for 70% of the phosphorus load, then the measure identified is to achieve 70% of the required phosphorus reduction. In this situation achieving an improvement in status is reliant on other sectors putting additional measures in place.

In Wales, National Resources Wales will include measures where there is a proven link shown by data (and supported by modelling), between a water company's activity and a failure to meet required standards. This will include installing phosphate-stripping equipment at sewage treatment works. Measures are also being carried out to ensure that the receiving environment does not deteriorate due to development resulting in increased discharges from wastewater treatment works.

Water company investment will directly contribute to predicted improvements in status by 2021 for specific elements in specific water bodies. A large proportion of this will be achieved by installing phosphate-stripping equipment at sewage treatment works. In addition,

measures to reduce the amount of water taken out of the environment for public water supply will make sure that there is enough water left in rivers and lakes to support good ecological status. This will be achieved through changes to water company abstraction licences.

A wide range of measures will secure additional outcomes for the environment, but are not linked to specific improvements in element status by 2021 because there is insufficient confidence about the scale of improvement. This includes measures for eel passage, measures to protect drinking waters and improve bathing waters and measures to improve river habitat and flow regime where it is affected by impoundment for public water supply.

Water companies are also investing in the Chemicals Investigation Programme, a multi-million study to better understand the impacts of chemicals in treated sewage and to trial new treatment technologies and catchment measures to reduce these impacts. The results from the Chemicals Investigation Programme will be used to implement measures to reduce the impacts of chemicals discharged in sewage in the future.

An example of these measures in the Severn river basin district

Water quality

The River Leadon catchment, located in Herefordshire and Gloucestershire, is a part of the wider Severn Vale management catchment. The River Leadon joins the River Severn at Over, near Gloucester. One of the contributing elements to not achieving good status is elevated levels of phosphorus. Although a predominantly rural catchment, the reason for the elevated levels has been found to be a combination of rural diffuse pollution and point source pollution.

For point source pollution, Severn Trent Water is planning to reduce nutrient levels in the discharges from 5 sewage works within the catchment. Together these schemes will remove most of the entire water company fair share of phosphorus load. Severn Trent Water has taken a catchment approach, to optimise the environmental improvements needed at the headwater and downstream throughout the catchment. This ‘headwater to estuary’ approach also ensures that improvements in the upper reaches of catchment feed down into the lower reaches, maximising the environmental benefit and reducing the extent of future improvement programmes.

Water resources

In Shropshire, Worcestershire and Gloucestershire Severn Trent Water and the Environment Agency have investigated whether public water supply abstraction is contributing to water bodies not achieving good status. The outcome of these investigations has resulted in solutions being identified to improve 5 water bodies and 1 SSSI where abstraction has been shown to be having an impact. This work includes a combination of measures such as habitat improvement work, flow augmentation and movement of existing groundwater abstraction in the upper reaches to more sustainable locations.

Rural Investment

Countryside Stewardship in England

In England, Countryside Stewardship is a new scheme that is open to all eligible farmers, woodland owners, foresters and other land managers through a competitive application process. It is entirely voluntary and is part of a wider investment of £3.5 billion in England under the Common Agricultural Policy for 2016 to 2020. It will contribute £900 million of new funds to enhance the natural environment, particularly the diversity of wildlife and water quality. Of this funding, about £400 million will be invested over a 5-year period to improve water quality and increase resilience against flooding.

By 2020, it is expected that 30% to 40% of rural England could be part of a Countryside Stewardship agreement. Countryside Stewardship supports the implementation of measures over and above legal requirements and good practice. It will address soil management and reduce the effect of nutrients, sediment and faecal contamination. This will reduce the impact of eutrophication and benefit bathing waters, shellfish waters and drinking water. This is achieved through measures categorised by the following groups:

- enhanced field management, including seasonal livestock exclusion, winter cover crops, buffer and riparian management strips next to watercourses and reduced nutrient applications from fertilisers
- land use change, including woodland and wetland creation or converting arable land to grassland which requires less fertiliser
- water and woodland capital grants, including sediment traps, fencing of watercourses and tree planting
- re-naturalising rivers and coast defences, including making space for water and coastal realignment

Countryside Stewardship will support climate change resilience, for example, by planting trees next to rivers and streams, which can reduce river temperature and the risk to salmonid fisheries. It will also reduce sedimentation of rivers, making rivers better able to store more flood water.

Individually these measures can be effective at a field scale but a number of land managers need to take up measures across the whole catchment for the measures to be really effective. As a result, improvements to the environment from Countryside Stewardship are not linked to specific improvements in water body element status by 2021. The uptake of measures is voluntary, with the first agreements commencing in January 2016.

The individual nature of catchments including soils, topography and rainfall make it difficult to quantify the benefits of these measures.

Countryside Stewardship is expected to achieve additional environmental outcomes for 2021. Preliminary research suggests that for nutrients and sediment it may provide elemental improvements of approximately 2% - 10% from the current position where supported with advice. In some discreet locations an improvement of up to 18% may be achieved, but the precise locations will depend on the level of uptake of measures by farmers and the supporting advice provided. Further research is planned that will help to evaluate the likely benefits of Countryside Stewardship for water.

It is not yet possible to describe the detail of schemes or exact location of investment, however improvements are anticipated within the English part of the Severn river basin district.

Glastir in Wales

Glastir is the Welsh Government's sustainable land management scheme comprising the basic-level Entry, the higher-level Advanced, Commons and Organic. It also includes the restoration, creation and management of woodlands. They are entirely voluntary schemes and form a large part of a wider investment in Wales under the Welsh Government's Rural Communities – Rural Development Plan 2014 to 2020. The objectives of Glastir are to bring about beneficial environmental outcomes by:

- managing soils to help conserve carbon stocks and reduce soil erosion
- improving water quality and reducing surface run-off
- managing water to help reduce flood risks
- conserving and enhancing wildlife and biodiversity
- managing and protecting landscapes and the historic environment
- creating new opportunities to improve access and understanding of the countryside

Glastir supports the implementation of measures over and above legal requirements, cross compliance and usual farming practice.

Glastir Advanced supports environmental work targeted at specific locations that are best placed to meet the aims of the scheme. Expressions of interest for a Glastir Advanced contract, submitted by applicants, are scored on the ability of that particular holding to meet the objectives the Welsh Government is seeking to address. This is identified by measuring the intersection of the area of land included in the expression of interest with a series of geographical information system (GIS) layers, wherever they occur throughout Wales. These GIS layers inform where specific objectives of Glastir can best be met. The specific objectives are prioritised within each GIS layer, but the relative importance of each layer can be adjusted, by using weighting factors, to ensure the greatest priorities are addressed first.

For water quality, the relevant GIS layer identifies those areas where Natural Resources Wales was confident in its evidence that land management practices are contributing factors to failing water quality standards defined under the Water Framework Directive.
Within these priority areas, Glastir Advanced is used to address soil management and ways to reduce the effect of nutrient, sediment and faecal bacteria pollution through the provision of water management plans for each holding. The plans are also used to help provide the most appropriate management options and capital works to gain the best outcome for water quality priorities through Glastir.

To date, Glastir Advanced has 11,000ha of targeted management to provide beneficial outcomes for water quality objectives across the whole of Wales.

Glastir Woodlands is underpinned by a management plan, drawn up in line with the UK Forestry Standard, which is the reference standard for sustainable forest management in the UK. The sustainable management and restoration of forested and wooded land, along with the creation of well-designed new woodlands and forests, is essential to ensure the supply of good-quality fresh water, provide protection from natural hazards such as flooding or soil erosion, and to protect the needs of aquatic species.

Highways England’s environment fund

Highways England is the government company that manages motorways and major A roads. It manages around 6,500 miles of trunk roads that accommodate 33% of all road travel and 50% of lorry travel. Over the next 5 years, Highways England’s environment fund will invest £300 million in the existing strategic road network for environmental improvements. A proportion of this will address pollution from highway run-off.

Highway run-off is waste that collects on roads made up of silt and grits mixed with contaminants, including metals from brake pads and oil from engines and vehicle emissions. During storms this is washed off the road and can reach rivers, lakes or groundwater without being treated. The metals, nutrients and sediments can harm the ecology of the water environment. This is made worse by the effects of physical modifications required by the road network, such as bridges and culverts.

Highways England takes a risk-based approach to decide how and where to invest, using modelling that looks at factors including road length drained and climatic conditions. The actual impact of a measure on the receiving water body can’t be entirely predicted, although the standard techniques are relatively reliable and well understood.

Outfalls will generally be treated with sustainable drainage systems (SuDS), which is a broad term of measures from those that can trap pollutants at the side of the carriageway through a swale (shallow grassy ditch) to large balancing ponds that regulate flow quantity as well as allowing pollutants to settle out. To address physical modification pressures, techniques such as fish and eel passes are installed to allow fish migration.

SuDS are moderately resilient to climate change as they use natural processes and cope well with fluctuations, although prolonged drought may restrict their effectiveness. They can achieve a range of benefits, when used on the strategic road network these include water quality improvements, flood risk reduction and water availability.

Improvements to the environment from Highway England’s investment programme are not linked to specific improvements in water body element status by 2021. Highways England has not yet announced the location of investment so improvements in specific locations cannot be predicted. Further detail is expected during 2016.

Implementing the programme will result in additional environmental outcomes for 2021. The pressure from sediment and chemical loadings will be reduced by an order of magnitude and there will be reductions in metals and nutrients alongside improvements in dissolved oxygen levels. Eel passes on culverts will allow upstream migration resulting in more sustainable eel populations.

It is not yet possible to describe the detail of schemes or exact location of investment, however improvements are anticipated within the English part of the Severn river basin district by 2021.

Flood risk management investment

The Environment Agency's and Natural Resources Wales' Flood and Coastal Erosion Risk Management capital investment programmes aim to reduce the risks of flooding and erosion to people's homes and the economy over the next 6 years to 2021. Projects will focus on protecting people and avoiding other economic damage (including farming business). Some may also contribute towards improving the status of water bodies, protecting valuable wildlife sites and creating new habitats.

Flood and coastal erosion risk management is a legitimate use of many water bodies but has in some cases resulted in significant modification and alterations in hydromorphology. Activities to improve water body conveyance and reduce flood risk, such as construction and reinforcement of banks, channel re-sectioning and vegetation management often have a negative impact on the condition of water bodies.

The capital investment programme aims to reduce the impact of these activities by, where possible, working with natural processes. This includes using natural flood management measures to slow, store and filter floodwater. This will achieve more sustainable flood risk management schemes, often with significant additional environmental and social benefits. This approach is used together with traditionally constructed hard defences to increase the resilience of communities to extreme events, both floods and drought.

In identifying and designing schemes the impacts of climate change, such as more winter rainfall, more intense rainstorms and sea level rise are taken into account.

Meeting statutory obligations, improving the natural environment and mitigating climate change will be achieved through 'win-wins' at the same time as reducing flood and coastal erosion risk (for example, through natural flood management). Achieving environmental outcomes is integral to flood and coastal risk management, for example, where possible when improving defences opportunities to reduce any barriers to eel passage will also be sought.

Improvements to the environment arising from the capital investment programme are not linked to predicted improvements in status by 2021 for specific elements in specific water bodies due to insufficient confidence about the scale of improvement or exact location of investment.

An example of these measures in the Severn river basin district

Slow the Flow – Shropshire rivers

The rivers of Shropshire have dramatically changed in character over the years through the influence of land management changes in the uplands and lower valleys. This has resulted in faster response rates to rain events, high flow velocities and increased flood risk to rural communities; reduced groundwater storage leading to lower summer flows; extensive loss of riparian habitat and natural gravel beds essential to many important species.

Using the principles of woodlands for water and rural sustainable drainage systems the aim is to work with lead partners, local communities and landowners to identify opportunities to implement small scale land management projects, including woodland planting, that demonstrate the benefits of working with natural processes to restore sustainable river environments. The projects will contribute to reducing flood risk, improving water quality, reducing erosion/silt and enhancing riparian habitats, and increasing groundwater storage to improve summer low flows.

Catchment level government funded improvements in England

As part of the commitment to the catchment based approach, Defra has made £10.1 million available during 2015 to 2016 for voluntary action to improve the water environment through the Catchment Partnership Action Fund (CPAF) and the Environment Agency's Environment Programme. The Environment Agency will invest £4.64 million through its Environment Programme, with more than 50% of this being specifically for partner-led projects.

CPAF will invest £5.1 million in 2015 to 2016. £1.3 million of this supports the role of catchment hosts, with the remainder going to projects carried out by voluntary groups. Of the CPAF and Environment Programme funding, at least £2 million will be used for dealing with urban pollution issues.

A wide variety of measures are funded at a catchment level. This includes advisory and action based schemes to reduce the impact of pollution from rural and urban areas along with habitat improvement measures to increase biodiversity.

Natural England will continue to invest in protected areas. This will focus on safeguarding and, where necessary, improving the condition of Natura 2000 sites using measures such as river restoration, lake restoration, diffuse pollution, freshwater invasive species and habitat restoration on wetland sites.

The effectiveness of measures within this programme is variable. Measures such as removing barriers to fish migration are well established engineering solutions and are effective. However, there are some catchment and habitat improvement schemes that are less well established, including measures to reduce pesticide pollution or undertake wider river habitat enhancements. Some measures rely on behavioural change in agricultural practice, so may be less effective compared to engineering solutions.

Projects need to be resilient to a changing climate, performing under a variety of conditions and supporting the long-term health of the catchment. When developing its investment programme, the Environment Agency considers the contribution each action will make to reduce climate change risks and works with partners to manage these risks and help catchments adapt.

The outcomes of a number of projects will directly contribute to predicted improvements in status by 2021 for specific elements in specific water bodies.

Catchment level government funded improvements address a range of pressures and will secure a variety of improvements to the environment, but are not linked to outcomes for 2021 because of insufficient confidence about the scale of improvement.

Example of these measures in the Severn river basin district

Gloucester Magnificent Severn project

The River Swilgate has been classified as being of poor ecological status. It is currently failing to achieve the target of good ecological status due to significant physical and hydromorphological modifications as well as diffuse pollution. The Environment Agency, Tewkesbury Borough Council and Natural England have collaborated to support Tewkesbury Nature Reserve Limited.

The project involves river restoration in and near a developing community nature reserve within 40ha of natural flood plain in Tewkesbury. The first phase of capital works in the reserve has started with the excavation of 8 wetland borrow pits, 2 reed beds, 1 backwater pond, 4 re-profiled meanders and 1 new meander. The extensions to an existing surface water treatment reedbed will help clean and attenuate flows into the River Swilgate. The targeted bank re-profiling, new meander, in-channel diversification, new spawning gravels

and woody features will also be of value to fish, including the Biodiversity Action Plan species eel and brown trout.

The greater diversity of habitat in the restored stretches of river and flood plain will be enjoyed by people and wildlife. Managed access to these features will provide an opportunity for the public to experience and appreciate nature on their doorstep.

Catchment level, funded improvements in Wales

In Wales, Natural Resources Wales has made available £4.2 million for 2015-2018 to fund projects that benefit the wildlife, people and economy of Wales. The Competitive Fund is based around the aim of Natural Resource Management, namely, to sustainably manage our natural resources in a way and at a rate that can maintain and enhance the resilience of our ecosystems whilst meeting the needs of present generations without compromising the ability of future generations to meet their needs. There will be a focus on the Natura 2000 network of designated sites in Wales (Special Areas of Conservation and Special Protection Areas). This is to help achieve Wales' legal obligations under the European Birds Directive and Habitats Directive. At the same time, it seeks to integrate this conservation work with other social and economic benefits highlighted as important in Natural Resources Wales's Corporate Plan.

This has provided funding to partners across Wales. In the Severn river basin district this includes work to restore rivers, improve in-river and riparian habitat, tackle invasive non-native species and provide education and community engagement.

Natural Resources Wales also manages projects partially funded by others, including the European Union and Big Lottery Fund (BIG). For example, the LIFE Natura 2000 Programme for Wales is a project to develop prioritised improvement plans (PIPs) which set out prioritised, costed actions for every Natura 2000 site in Wales with the aim of restoring these prime wildlife sites and safeguarding them for the future.

The Welsh Government's Nature fund of £5 million is supporting 20 projects that, through collaborative action, tackle declining biodiversity and deliver benefits to communities across Wales.The focus of investment is on delivering 5 key priorities in 7 Nature Action Zones. The 5 key activities are:

- action to improve river catchments
- action to improve marine ecosystems
- action to enhance local environment
- action to realise the potential in our upland areas
- action to stimulate innovation

For the Severn river basin district the relevant Nature Action Zones are the Brecon Beacons, Cambrian Mountains and South Wales Valleys. Projects range from work to improve the farmed landscape in river catchments to peatland restoration and a community project managing woodland.

Other partners such as the Wales Biodiversity Partnership (WBP) bring together key players from the public, private and voluntary sectors to promote and monitor biodiversity and ecosystem action in Wales. The work of WBP is implemented through the wider partnership and the support team.

Water resources sustainability measures

Abstraction and other changes to river flows and groundwater levels are putting pressure on the water environment, and, in some cases, are causing environmental damage. Dealing with abstraction and flow pressures now will address damage that is already occurring and also help support sustainable supplies of water for the future.

Measures grouped within this programme are based on applying existing provision under the Water Resources Act 1991. Current tools will be fully used to achieve environmental objectives ahead of abstraction reform which will create a system that has built in long-term flexibility to help deal with future challenges of changing climate, population and economic growth whilst protecting the environment and trying to ensure water is used efficiently.

Most measures will be applied through the current abstraction licensing system and involve the following types of action:

- constraint or refusal of applications to renew time limited licences
- changes to or revocation of abstraction licences necessary to protect the environment from serious damage
- working with licence holders to voluntarily apply to change licences to make them sustainable
- bringing previously exempt abstractions under regulation (new authorisations)
- implementing the Restoring Sustainable Abstraction (RSA) programme
- revoking unused licences

The existing abstraction licence charge scheme funds these measures. (Note water company actions are included in the section titled 'Water company investment programme').

Licence change measures are well established and proven to result in environmental benefits once the change becomes effective, and will achieve environmental outcomes. Some water bodies will respond quickly to changes in timing and volume of water abstracted. Surface water bodies suffering from serious damage will see flows increased, and the damage being caused will be stopped. However, for licence changes made to groundwater abstractions, benefits may take longer to take effect, and can be over many years. This is particularly true when considering groundwater recovery times within some major aquifers.

Climate change will affect the future demand for water as well as its availability and quality. Rivers and groundwater water bodies are already under pressure. Demand for water is increasing due to population growth, urban development and land-use change. Climate change is expected to alter the frequency and distribution of rainfall, increasing temperatures and increasing the frequency and severity of extreme weather events. Dealing with unsustainable abstraction and implementing water efficiency measures is essential to prepare and be able to adapt to climate change and increased water demand in future.

Not all of the measures can be linked to outcomes in specific water bodies by 2021 because there is insufficient confidence in the exact scale and timing of improvement. However, classification change may be seen in some, as yet unspecified, water bodies. All the measures will bring about additional environmental outcomes, these are described below:

- Through the RSA programme, the Environment Agency and Natural Resources Wales will take action to change or revoke abstraction licences that have already been identified as causing an environmental problem.
- The Environment Agency and Natural Resource Wales are using government guidance and evidence to take a prioritised approach to assessing whether licence changes are needed to protect the environment from serious damage to the environment. All abstractors should anticipate changes to their abstraction licences in water bodies affected suffering from serious damage.
- Following public consultation and formulation of government policy, a number of currently exempt abstraction activities are expected to come under regulation. This will give greater ability to control the environment and prevent damage.

RSA is a programme of work that identifies, investigates and solves environmental risks or problems caused by unsustainable licensed water abstraction throughout England and Wales. RSA work is undertaken by the Environment Agency, Natural Resources Wales, water companies, local authorities, conservation bodies and site owners.

The Environment Agency and Natural Resource Wales work with abstractors to find solutions that will increase water levels in certain rivers, streams, lakes and other natural wetland habitats. It is an umbrella programme of work required under the European Habitats and Wild Birds Directive (HD), designated Sites of Special Scientific Interest (SSSI), Biodiversity Action Plans (BAP) and designated sites of local importance. It focuses on sites where plants and animals are dependent on good levels of water.

For all river basin districts there are 81 non-water company licences in the RSA programmes.

There are currently no non-water company RSA schemes in Severn river basin district.

3.4. Local measures

Catchment based approach

Taking a catchment based approach helps to bridge the gap between strategic management planning at river basin district level and activity at the local water body scale. A catchment based approach aims to encourage groups to work together more effectively to deal with environmental problems locally. Most catchment groups operate at the water 'management' catchment scale. Figure 2 shows the management catchments in the river basin district.

Figure 2: Management catchments within the Severn river basin district

Catchment partnerships in the Severn river basin district are a major initiative to encourage local action to protect and enhance the water environment. The partnerships consist of a wide range of groups with an interest in the water environment. This includes, but is not limited to, local government, angling interests, wildlife organisations, water companies, land managers, business representatives and government agencies.

Each catchment partnership is committed to working collaboratively to share evidence, develop common priorities and carry out work on the ground. Many partnerships are producing catchment plans that will detail local actions related to the measures in this plan.

The catchment based approach is a Defra led initiative but the partnerships work with Natural Resources Wales across the whole of the Severn Uplands, Teme and Wye catchments. Catchment initiatives in the South East Valleys and Usk catchments are led by Natural Resources Wales.

Partnerships are at different levels of maturity, so while some may have a detailed plan for measures in their catchment, others may be newly formed and may not have such a detailed view at this stage.

The following section has been developed by Natural Resources Wales and the catchment partnerships (plus other interested groups) and reflects their views on current priorities and future ideas. It includes a summary of the main measures that partnerships are contributing to.

These ideas for local measures have been suggested by catchment partnerships and reflect local priorities which can often be around achieving 'multiple benefits' for shared outcomes through collaborative working. Such multiple benefits include improved water quality, habitat and biodiversity as well as contributing to some flood and climate resilience.

The catchment partnerships seek funding for these local measures from a range of sources including government, other national and international providers such as the Big Lottery or EU LIFE as well as local partners and stakeholders who have an interest. Normally, to secure funding, projects would need to be fully developed with all the necessary permissions secured in advance.

Each catchment summary page sets out measures that are linked to water body outcomes for 2021 and also measures which will improve the environment, but cannot be linked to water body outcomes for 2021 (for example, because the exact outcome or location is not confirmed). These measures are mainly funded through local funding streams and where this is not the case it is explained within the text.

This is followed by a description of some of the additional measures the partnerships would like to pursue if they were able to secure additional funding. They have presented their initial ideas of what they would do with £100,000 per year and with £1,000,000 per year to help to show local ambition in the short and longer term.

Supporting information

- More information on the location of water bodies and catchments, along with associated data, can be found on the Catchment data explorer (http://environment.data.gov.uk/catchment-planning/) and Water Watch Wales (http://waterwatchwales.naturalresourceswales.gov.uk/en/).

Measures in the Bristol Avon and North Somerset catchment

Catchment partnership: The Bristol Avon Catchment Partnership is supported by the Environment Agency, Natural England, Forestry Commission, Wessex Water, Bristol Water, Bristol City Council, Bath and North East Somerset Council, Wiltshire Council, Bristol Avon Rivers Trust (BART), Farming and Wildlife Advisory Group South West (FWAG SW), Avon Frome Partnership, Avon Wildlife Trust, Wiltshire Wildlife Trust and the Woodland Trust.

The partnership works closely with Local Nature and Enterprise Partnerships to strategically enable delivery on the ground. The priority river basin management issues to tackle in this catchment are:

- excessive nutrient pollution and sediment leaching
- degraded ecological habitats
- flooding and flow issues

Contribution to environmental outcomes for 2021

The Bristol Frome Diffuse Pollution Project will address agricultural pollution on the Ladden and Bradley Brooks. The Defra funded project began in June 2015. BART and FWAG SW will work with landowners to improve farm practices/infrastructure in high risk areas.

The Mendip Lakes Partnership was established by Bristol Water in 2015 to work with key landowners and partners to improve water quality across the Chew Valley and Blagdon Reservoir catchments. Avon Wildlife Trust will support this through the Chew Valley Diffuse Pollution Project.

The North Somerset Levels and Moors Catchment Project funded by Wessex Water will carry out an integrated restoration project. Avon Wildlife Trust is working with partners and landowners to improve wetland systems, improve biodiversity and address water quality/quantity issues.

Future aims

Ideas for additional measures with £100,000 per year:

- Bristol Avon Nutrient Reduction Project – Reduce nutrient pollution from high risk water bodies within the catchment, working with key landowners and stakeholders to tackle diffuse/point source pollution and also address pollution incidents along highways and urban areas.
- Healthy Headwaters – Habitat enhancements, including backwater creation and tree works to the headwaters of the Bristol Avon catchment. This will resolve ecological failures and improve amenity/recreational value and enable local parishes to improve local scale water management issues.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- River Avon for all – This overarching project would include multi-beneficial landscape scale projects to help improve water quality, alleviate flood risk, resolve failures in fish and invertebrates, and increase recreational opportunities. Sustainable urban drainage systems projects will also be incorporated, including woodland creation projects, to align work with planners, developers and local authorities.

For more information contact: www.bristolavoncatchment.co.uk or mailto:info@bristolavoncatchment.co.uk Severn Uplands catchment

Measures in the Severn Uplands catchment

Catchment partnership(s): The Severn Uplands partnership is co-hosted by the Severn Rivers Trust and Montgomeryshire Wildlife Trust and is made up of the Environment Agency, Natural Resources Wales (NRW), the Canal & River Trust, Powys Council, Shropshire Council, Shropshire Wildlife Trust, Severn Trent Water, United Utilities, local internal drainage boards, Coed Cymru and the Woodland Trust.

The priority river basin management issues to tackle in this catchment are agricultural and rural land management, point source pollution and physical modification of water courses.

Contribution to environmental outcomes for 2021

Between 2012 and 2015, 19 projects focusing on fish migration, rural diffuse pollution and flooding have seen more than £900,000 invested in the catchment. The projects have seen improvements in water quality and fish populations. At least 4 more projects are confirmed. These are the Camlad and Rea Brook in England funded by the Catchment Partnership Action Fund (£46,000) and the Welsh Camlad and Severn Uplands Partnership under the Joint Working Partnership fund from NRW (£401,000). The Tanat and Llifior Brook projects are funded through the Competitive Fund from NRW (£80,000 and £63,000). These projects include action to reduce the impact of invasive non-native species, improving access to good habitat for fish by removing barriers to migration, and improvements to water quality leaving farm yards. The extent of elemental improvement is currently being reviewed. These projects will also have a strong community approach to connect people to their rivers.

Ideas for additional measures with £100,000 per year:

- Continuation of the Monty Rivers project to work with communities, volunteers and education organisations throughout the Welsh part of the catchment to remove invasive species, clear litter, undertake surveys and act as protectors of the river.
- Restore fish access throughout the Llifior Brook to reach good ecological status throughout the entire water body.
- Love Your River Shrewsbury project working with the community, local authority and water company to reduce the effects of urban pollution from sources such as misconnections and industrial area run-off. This will resolve failures in fish, invertebrate and macrophyte populations and improve amenity and recreational value.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Removal of all barriers to fish migration throughout the catchment to ensure good ecological status and healthy fish populations.
- Development of a landscape scale project in the Hafren Forest to involve local communities, heritage, biodiversity, access and tourism. This will improve water quality, fish and invertebrate populations, access to wildlife and the source of the Severn, leisure activities and education, and give wider benefits to the local population.
- Severn Uplands Invasive Species Project to remove non-native plant species from the source of the Severn down. This long-term sustainable goal can be tackled with systematic and logical actions.

Further information on the partnership is available at: http://barcmp.webnode.com/.

Measures in the Severn Vale catchment

Catchment partnership(s): The Severn Vale partnership is hosted by Gloucestershire Wildlife Trust and Severn Rivers Trust. The steering group comprises the hosts, the Environment Agency, Natural England, Gloucestershire County Council, Stroud District Council and the National Farmers' Union (NFU).

The priority river basin management issues to tackle in this catchment are: reduce rural diffuse pollution, reduce urban diffuse pollution, and physical modification (morphology and barriers to migration)

Priority areas identified through the partnership and workshops include the Leadon catchment, the Frome and Cam catchment.

Contribution to environmental outcomes for 2021

- On the River Leadon a project is occurring in 2015/16 to reduce rural diffuse pollution in partnership with local landowners. It will include riparian fencing and livestock watering solutions to reduce cattle entry to the river. Installation of large woody debris and deflectors to add diversity to the watercourse and create a range of habitats for spawning fish, invertebrates and aquatic plants. Tree work to reduce over shading.
- On the River Frome a number of projects are taking place in 2015/16. In partnership with Stroud District Council, building on the installation of 50 structures in 2014/15, a project to install woody debris to create habitat and attenuate flood waters is in place. This has support and interest from a wide range of stakeholders including local flood groups, national leads from government agencies as well as councillors and MPs.
- External funding has been secured for the paleo channel restoration on the River Frome (north channel) at Bonds Mill, Stonehouse. The project aims to restore 1.2km of relic river channel and riparian habitat; provide a multi-species fish pass at Bond’s Mill weir and quality habitat for eels, invertebrates, aquatic wildflowers, and UK and local Biodiversity Action Plan species such as water voles. It will also provide some flood risk benefits as a natural flood management measure.

Future aims

The wider partnership numbering more than 70 organisations has a list of potential projects that the catchment partnership is now working into bids for completion between 2016 and 2021. These projects focus on a range of subjects and areas including:

- Facilitation funding for the River Leadon, working with landowners to meet river basin management and Biodiversity 2020 targets
- Additional natural flood risk management works on the River Frome
- Wetland and riparian habitat creation along the River Severn to increase flood storage, improve flood resilience and enhance populations of key species, for example European eel and lapwing etc
- Catchment Scale Invasive Species Project to remove non-native plant species from the Severn Vale
- The partnership has identified 14 major unfunded projects within the catchment, and will explore funding opportunities for these going forwards. Further projects are to be developed on a catchment wide scale via the partnership engaging with all interested parties, established groups and land managers focusing on river basin management priorities, land use change, sustainable urban drainage systems, community engagement, biodiversity, soil loss, water quality, nutrient management and barriers to migration
- The partnership will provide a link and advice to the Severn River Basin Liaison Panel on the next cycle of river basin district management plans

Further information is available at: http://catchmentbasedapproach.org/severn

Measures in the Shropshire Middle Severn catchment

Catchment partnership(s): The Shropshire Middle Severn partnership is hosted by Shropshire Wildlife Trust and Severn Rivers Trust. The partnership operates through 2 catchment based approach (CaBA) groups facilitated by Shropshire Wildlife Trust.

Telford CaBA Group comprising the Environment Agency, Severn Rivers Trust, Severn Trent Water (STW), Telford and Wrekin Council, the National Farmers' Union (NFU), Strine Internal Drainage Board, University of Wolverhampton, Telford Green Spaces, Partnership Business Environmental Support Scheme for Telford, Natural England (NE), Canal & River Trust.

Meres CaBA Group (North Shropshire) comprising the Environment Agency, Severn Rivers Trust, Severn Trent Water (STW), Shropshire Council, NFU, Campaign for the Farmed Environment (CFE), Catchment Sensitive Farming (NE), Meres and Mosses RSPB, Canal & River Trust.

The priority river basin management issues to tackle in this catchment are urban diffuse pollution, rural diffuse pollution, and working with natural processes to mitigate flood impact.

Contribution to environmental outcomes for 2021

- The partnership was created in 2013 and development stages have focused on identifying issues, stakeholders and landowners to work with and develop projects through a project register. The register is steering partnership effort in regard to collaborative working.
- Love Your River Telford. A water quality project with a strong emphasis on sustainable drainage, rain gardens and De-pave type community initiatives. A River Rangers school programme is now in its third year and will be delivered in rural schools in 2015/16.
- Shropshire Natural Flood Management Project. This is part of a larger project in Shropshire working with landowners in 7 pilot catchment areas to develop natural solutions to reduce the impacts of flooding on food production, communities and livelihoods. Two of the pilots are within Shropshire Middle Severn, Gobowen and Battlefield Brook, Shrewsbury.

Future aims

Ideas for additional measures with £100,000 per year:

- Reduce rural diffuse pollution. This will be developed alongside STW's catchment officers in relation to their innovatory activity - STEPS programme and the 'Farmers as producers of clean water' scheme.
- Improve cohesion between CSF, STW, NFU, CFE and others in their support for enhanced water management within the farming sector.
- Build river restoration programmes for the Roden and Tern catchments under the Magnificent Severn [Shropshire] delivery mechanism.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Landscape scale watercourse and water quality programme in Perry, Tern and Roden – 3 million people drink water from Shropshire – Safeguard Zones are extensive – aim to reduce rural diffuse pollution, sustain food production and conveyance.
- Develop a range of projects in Telford to reduce impacts of surface water flow in terms of quantity and quality. Design and deliver programmes on urban watercourses that deliver enhanced resilience, restore ecological function and enhanced public amenity.
- Develop a catchment wide approach to flood alleviation and silt run-off through natural processes, including a woodlands for water programme.

Further information on the partnership is available at:
http://catchmentbasedapproach.org/severn.

Measures in the South East Valleys catchment

Catchment partnership(s): There are numerous parties in the catchment working to improve the water environment. These include Blaenau Gwent Council, Caerphilly Council, Cardiff Council, Cardiff Harbour Authority, Coal Authority, Coed Cymru, Confor, Dŵr Cymru Welsh Water, Flylife, Glamorgan Rivers Trust, Groundwork Wales, Merthyr Tydfil Angling Association, Merthyr Tydfil Council, Miller Argent, the National Farmers' Union Cymru, the National Grid, Natural Resources Wales, Rhondda Cynon Taff Council, South East Wales Rivers Trust (SEWRT), Vale of Glamorgan Council, Welsh Government, Wildlife Trust of South & West Wales, Wildlife Trusts Wales.

The priority issues are physical modifications (that is, barriers to fish migration from weirs and impoundments, urban modifications and land drainage on the Wentlooge levels adjacent to the Severn estuary); urban diffuse pollution (particularly sewage and misconnections); and pressure from minewaters.

Contribution to environmental outcomes for 2021

- Healthy rivers – Groundwork Caerphilly, in river and riparian improvements.
- Invasive non-native species programmes – Caerphilly & Newport CBC.
- Gwyl Taff – South East Wales Rivers Trust, education and community engagement around the recovery of the River Taff.

Future aims

Ideas for additional measures with £100,000 per year:

- Build a formal partnership that is able to develop and implement projects.
- Build on previous work in additional water bodies to provide easements to barriers, restore river habitats and reduce urban diffuse pollution.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Removal of all barriers to fish migration throughout the catchment to ensure good ecological status and healthy fish populations.
- Develop and implement multi-beneficial landscape scale projects to help reduce diffuse pollution, improve water quality and mitigate the impacts of physical modifications while benefitting the local economy, communities and people, by taking an integrated natural resource management approach.

Further information is available at:

https://naturalresources.wales/water/quality/?lang=en

Measures in the Teme catchment

Catchment partnership: The Teme catchment partnership, hosted by the Severn Rivers Trust is made up of the Environment Agency, Natural Resources Wales, the Forestry Commission, Natural England, Shropshire Hills Area of Outstanding Natural Beauty (AONB), Malvern Hills AONB, Catchment Sensitive Farming, Shropshire Council, Worcestershire Council, Worcestershire Wildlife Trust, Herefordshire Nature Trust, Shropshire Wildlife Trust, Severn Trent Water, ADAS, Woodland Trust and local representatives from farming and community wildlife groups.

The priority river basin management issues to tackle in this catchment are diffuse pollution from agricultural and rural land management, point source pollution and physical modification of water courses.

Contribution to environmental outcomes for 2021

Between 2012 and 2015, 16 projects focusing on fish migration, rural diffuse pollution and flooding have seen more than £2 million invested in the catchment. The projects have seen improvements in water quality and fish populations. At least 4 more projects are confirmed, including a 5 year Heritage Lottery Funding 'Springs of Rivers' project led by the Severn Rivers Trust, funding over £4 million to action the impact of invasive non-native species, improve fish migration by removing barriers and improvements to riparian habitats. The extent of elemental improvements is currently being reviewed. These projects will also have a strong community approach to connect people to their rivers.

Future aims

Ideas for additional measures with £100,000 per year:

- Action on the Upper Teme on identified holdings to reduce diffuse pollution, restore riparian habitats and reduce sediment and siltation.
- Restore fish access and riparian habitat throughout the Clun Catchment for the River Clun Recovery Project, assisting the recovery of the fresh water pearl mussel.
- Reduce rural diffuse pollution from livestock across multiple landowners on failing water bodies in the Lower Teme with fencing, coppicing, in-channel habitat enhancements and wetland creation.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Removal of all barriers to fish migration throughout the catchment to ensure good ecological status and healthy fish populations.
- Action on the River Corve, a landscape scale project to improve failing water bodies. Baseline surveys completed by partnership, mapped invasive species, fish barriers, diffuse pollution and poor riparian habitats. Mitigation measures on identified holdings and land would improve habitats, reduce sediment loading and open up fish passage, in turn improving water quality, fish and invertebrate populations and giving wider benefits to the local population.
- Catchment Scale Invasive Species Project to remove non-native invasive plant species from the source of the Teme down. This long-term sustainable goal can be tackled with systematic and logical actions aided by the Shropshire Hills AONB 'Strategy of Control of Himalayan balsam'.

Further information on the partnership is available at: http://barcmp.webnode.com/.

Measures in the Usk catchment

Catchment partnership(s): There are numerous parties in the catchment working to improve the water environment. These include Brecknock Wildlife Trust, Brecon Beacons National Park, Canoe Wales, Cardiff University, Coed Cadw, Woodland Trust, Coleg Gwent, Dwr Cymru Welsh Water, Fishery Owners, Forum for the Future, Gwent Wildlife Trust, Keep Wales Tidy, Monmouth Environmental Partnership, Monmouthshire Council, the National Farmers' Union Cymru, the National Trust, Natural Resources Wales, Newport Council, Torfaen Council, Wye & Usk Foundation.

The priority issues are physical modifications (that is, barriers to fish migration and impoundments), diffuse pollution from both rural and urban areas, and pressure from abstraction.

Contribution to environmental outcomes for 2021

- River Restoration and Fisheries Development – Wye and Usk foundation working with Natural Resources Wales and the farming community to address diffuse pollution and changes in hydrology.

Future aims

Ideas for additional measures with £100,000 per year:

- Build a formal partnership that is able to develop and implement projects.
- Build on previous work with landowners in additional water bodies to reduce rural diffuse pollution, restore river habitats and manage invasive species.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Removal of all barriers to fish migration throughout the catchment to ensure good ecological status and healthy fish populations.
- Develop and implement multi-beneficial landscape scale projects to help reduce diffuse pollution, improve water quality and mitigate the impacts of physical modifications while benefitting the local economy, communities and people, by taking an integrated natural resource management approach.

Further information is available at:

https://naturalresources.wales/water/quality/?lang=en

Measures in the Warwickshire Avon catchment

Catchment partnership: The Warwickshire Avon partnership is made up of the following partners: Severn Rivers Trust, Warwickshire Wildlife Trust, the Environment Agency, Worcestershire Wildlife Trust, Natural England, Severn Trent Water, the National Farmers' Union, Amenity Forum, independent farmers, Campaign for the Farmed Environment, the Country Land and Business Association, the Woodland Trust, the Forestry Commission, Warwickshire Rural Hub and Warwickshire County Council.

The priority river basin management issues in the catchment are identifying and reducing urban and rural pollution, engaging communities to help them to connect with their local water environment, and returning water corridors to a near natural state.

The partnership is focused on 3 priority areas; the Leam catchment, Coventry and Badsey Brook and its tributaries.

Contribution to environmental outcomes for 2021

- Two funded projects in 2015-16 focusing on Brookstray in Coventry and Blacksoils Brook near Redditch will reduce the impact of man-made structures and diffuse pollution inputs by reinstating a relic channel; de-silting a pond to provide fish refuge; re-meandering straightened channels and involving the community in invertebrate monitoring. The measures will require approximately £40,000 capital costs and £17,000 operation costs, with 60% of the total funding coming from government grant in aid.
- Vale of Evesham Partnership Project - the partnership will contribute to this project, proposed by Worcestershire Local Nature Partnership, to deliver a variety of environmental objectives, for example reduced sedimentation of water bodies and flood risk.

Future aims

Ideas for additional measures with £100,000 per year:

- Completion of Blacksoils Brook reinstatement - reducing peak flows and erosion on the canalised River Arrow and increase riparian habitat.
- Restoration of the River Sherbourne; a heavily modified, urban river.
- Fence 5 metre buffer strip along sections of the River Sherbourne and restore banks to facilitate water vole re-colonisation and increase fish refuge areas.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Restoration of the straightened Canley Brook, Coventry.
- Enhance riverine features of the Smite Brook to reduce nitrification to Coombe pool.
- Enable fish passage on the weir at Stoneythorpe, Southam.
- Living Landscapes project on other tributaries of the River Avon - including farmer events, rural sustainable drainage schemes, woody debris installation and the creation of fish refuges.
- Reprofiling of river banks on the River Arrow near Alcester.
- Proposal of a fish pass on the weir on the River Alne near Alcester.
- Creation of 6 to 8 fish passes on the River Avon to reduce barriers to fish movements.
- Riverfly monitoring across various rivers within the Warwickshire Avon.

For current information on the Warwickshire Avon catchment partnership, see the catchment based approach website: http://www.catchmentbasedapproach.org/severn

Measures in the Worcestershire Middle Severn catchment

Catchment partnership(s): The Worcestershire Middle Severn partnership is hosted by Worcestershire Wildlife Trust and Severn Rivers Trust. The steering group comprises the hosts, the Environment Agency, Natural England, Shropshire Wildlife Trust, Worcestershire County Council, Canal & Rivers Trust, Severn Trent Water and South Staffs Water.

The priority river basin management issues to tackle in this catchment are:

- reduce rural diffuse pollution
- reduce urban diffuse pollution
- look for opportunities for natural solutions such as woodlands for water

Priority areas identified through the partnership and workshops include Bromsgrove Brooks, Stour catchment and Dowles Brook (Wyre Forest).

Contribution to environmental outcomes for 2021

- The partnership was newly created and initially focused on identifying issues, stakeholders and landowners to work with and developing projects.
- In 2015/16 the ‘Love Your River Bromsgrove’ project is occurring. Its focus is on identifying and reducing sources of urban and rural diffuse pollution. It will strive to reduce the impacts of man-made structures within the catchment. In addition, community engagement, monitoring and projects will be carried out.
- Shropshire Natural Flood Management Project. This is part of a larger project in Shropshire working with landowners in the Much Wenlock area to develop natural solutions to reduce the impacts of flooding.

Future aims

Ideas for additional measures with £100,000 per year:

- Expand the scope of the 'Love Your River Bromsgrove' project to include increased rural diffuse pollution work. This will involve Severn Trent Water’s catchment officers.
- Engage additional communities to take ownership of their local water environment and provide access to the water environment through the Love Your Rivers template. Communities within Worcester and Stour catchment will be the next to be engaged.
- Identifying pollution sources in the Dowles catchment (Wyre Forest) and looking to demonstrate natural solutions to provide multiple benefits (flood alleviation, habitat improvement, erosion control) and compliment the management of the National Nature Reserve.
- Assist previous and ongoing Catchment Restoration Fund (CRF) works within the River Worfe catchment.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Returning the Battlefield Brook within Sanders Park, Bromsgrove to a natural channel. This would involve feasibility studies and then removing its concrete lining.
- Returning water corridors in the Dowles catchment to a near natural state through reducing siltation from field run-off.
- Develop a programme of improvement works for the River Stour, identifying and reducing pollution complemented by community engagement work.
- Develop a catchment wide approach to flood alleviation and silt run-off through natural processes including a ‘Woodlands for water’ programme.

For more information, go to: http://catchmentbasedapproach.org/severn

Measures in the Wye catchment

Catchment partnership(s): The Wye catchment partnership operates within England and Wales and is jointly hosted by the Wye and Usk Foundation and Natural Resources Wales (NRW). The partnership is currently made up of 129 organisations and stakeholders covering the sectors of agriculture, forestry, tourism, recreation, mining, business, water companies, statutory bodies and both local and national government. It acts as a portal for numerous other groups and works with the Local Nature Partnerships.

The partnership demonstrates what can be achieved by thinking for the long term, taking an integrated approach (considering economic, social, environmental and cultural outcomes), collaborating and involving others in finding sustainable solutions.

The priority river basin management issues to tackle in this catchment are phosphate, poor soil management (leading to excessive overland flow/sediment loss to water) and loss of biodiversity.

Contribution to environmental outcomes for 2021

- The organisations within the partnership have a proven record of delivering river basin management improvements, for example the LIFE + ISAC project changed fish element status in the 9 assessed water bodies in that catchment from 5 good, 1 moderate, 3 poor in 2009 to 4 high and 5 good in 2014. The Wye catchment partnership encompasses all those who are working to improve the water environment, co-ordinating efforts between statutory bodies, local government and non-governmental organisations (NGOs). The NGOs in the partnership expect to raise more than £1,000,000 a year to spend on river basin management across the 16 projects already in progress or about to start. A further 12 projects are being undertaken by statutory bodies, water companies and local business, and these represent an investment of more than £5,000,000 a year. 24 of these projects are focusing on the top 3 issues, 4 are also dealing with acid waters, public water abstraction, community education and engagement.
- The partnership expects to bring 40 of the 75 water bodies currently limited by diffuse source phosphate or fish elements into good status by 2021. This will reflect previous work due to ecological lag time.

Future aims

Ideas for additional measures with £100,000 per year:

- Increased co-ordination between Natural England, NGOs, the Environment Agency, NRW and water companies to maximise the use of existing funds. Resolution of phosphate issues in the Ithon sub-catchment, which is currently causing failure of water bodies.

Ideas for additional measures with £1,000,000 per year (as above plus the following):

- Matched funding for LIFE+ bid, which will deliver favourable condition status for the Welsh Wye Special Area of Conservation.
- Deliver Wye nutrient management plan objectives.
- Work on a one to one basis with all farmers in the catchment to resolve soil structure issues and degraded riparian habitat. It will ensure Glastir and Countryside Stewardship is used effectively for river basin management where this is currently restricted, helping to normalise flows, increase biodiversity and resolve diffuse water pollution issues.
- Introduce gravel to the lower Elan, bringing it into good ecological potential.

Further information on the partnership is available at: www.wyecatchment.org

3.5. Forward look at measures beyond 2021

This section provides a summary of the measures which are envisaged as necessary for protected areas and water bodies to achieve their objectives for 2027 and beyond. It also describes opportunities which could enable additional measures to be implemented by 2021.

Measures to 2027

Table 22 contains a summary of the types of measures which are envisaged to be necessary to address each significant water management issue up to 2027. This is not exhaustive and will inevitably change. Change can occur for a variety of reasons including, new evidence, changes in water body status, funding availability, government policy changes, development impacts and climate change.

The measures in table 22 are required in addition to the measures to address the significant water management issues described in section 3.2.

The summary programmes of measures and environmental objectives in this plan will be reviewed and updated in 2021. The WFD does not generally allow the timescale for the achievement of environmental objectives to be extended beyond 2027. Therefore as part of the plan update in 2021, choices will have to be made about the appropriate use of less stringent objectives.

Table 22: Summary of types of measures envisaged as necessary to achieve objectives for each significant water management issue

Types of measures envisaged in the river basin district	Main sectors involved in implementing the measures
Measures to address physical modification	
• Improvement to condition of channel/bed and/or banks/shoreline • Removal or easement of barriers to fish migration • Removal or modification of engineering structure • Improvement to condition of riparian zone and/or wetland habitats • Vegetation management • Change to operations and maintenance	• Government (central and local government) • Industry, services and infrastructure (non governmental organisations, internal drainage boards, navigation, industry, manufacturing and other business) • Rural land management • Water industry

Types of measures envisaged in the river basin district	Main sectors involved in implementing the measures
Measures to address pollution from waste water	
• Mitigate/Remediate point source impacts on receptor • Reduce diffuse pollution at source • Reduce point source pathways (i.e. control entry to water environment)	• Industry services and infrastructure (industry, manufacturing and other business, urban and transport, waste treatment, transfer, storage and disposal, mining and quarrying) • Water industry
Measures to manage pollution from towns, cities and transport	
• Reduce diffuse pollution pathways (i.e. control entry to water environment) • Mitigate/Remediate diffuse pollution impacts on receptor	• Industry services and infrastructure (non governmental organisations, urban and transport, industry manufacturing and other business, navigation)
Measures to address changes to natural flow and level of water	
• Improvement to condition of channel/bed and/or banks/shoreline	• Government (local government)
Measures to address pollution from rural areas	
• Reduce diffuse pollution at source	• Rural land management
Measures to manage invasive non-native species	
• Mitigation, control and eradication (to reduce extent) • Early detection, monitoring and rapid response (to reduce the risk of establishment)	• Government Industry services and infrastructure (non governmental organisations)

Section 3.6 contains further information on measures to achieve protected area objectives, including those with extended deadlines.

The cost of programmes of measures provides a good indication of the scale and phasing of action. Table 23 shows the current assessment of the potential costs of measures to achieve the water body and protected area objectives for England in this plan. The costs of measures are broadly allocated to the sectors whose activities cause the problem in line with the 'polluter pays principle'. Beyond the known funding to 2021, no decision has been made on where the costs will fall. In some cases, the sectors may not pay their own costs. Note figures are rounded to the nearest £10 million.

Table 23 Summary of estimated costs and phasing of action in England

Sectors	Total cost of measures over 37 years (undiscounted) to achieve objectives (£m)	Phasing to 2021 (% of total cost envisaged to 2021)	Phasing post 2021 (% of total cost envisaged after 2021)
Government	100	<10%	>90%
Rural land management*	1040	<10%	>90%
Industry, services and infrastructure	60	<10%	>90%
Water industry	560	30-40%	60-70%

***The rural land management costs are based on a range due to different scenarios of cost allocation. The midpoint is presented here to be consistent with other costs.

Opportunities for additional measures

There will be greater certainty on the measures that will be required between 2021 and 2027 when this plan is updated in 2021. Before then, a number of strategic reviews and funding streams could enable additional measures to be confirmed and/or implemented before 2021. Some of these opportunities in England and Wales are described below.

External funding sources

The following funding sources could be used to implement measures.

- The LIFE Regulation, which was published on 20 December 2013, sets a budget for 2014 to 2020 of €3.4 billion for projects to invest in the environment and climate change. Calls for applications are annual, for priorities including nature, biodiversity, water, floods and drought.
- The Heritage Lottery Fund invests £375 million each year, a portion of this being available to environmental improvement projects through the 'Parks for People' (£100,000 to £5 million), Heritage Grants (over £100,000) and 'Landscape Partnerships' (£100,000 to £3 million) programmes. Calls for applications can be once or twice a year and are often a 2 stage process.
- In England, the government has asked Local Enterprise Partnerships to prepare economic strategies to inform the allocation of domestic and European 'growth funds', for example, the Single Local Growth Fund and the European Structural and Investment Funds. The criteria for allocation of these funds include environmental protection and sustainable development, providing an opportunity for water infrastructure that supports efficient and sustainable use of water.

Review of Urban Waste Water Treatment Directive designations

The Urban Waste Treatment Directive aims to protect the water environment from the adverse effects of discharges of urban waste water and certain industrial discharges by specifying minimum treatment requirements as well more stringent tertiary treatment when needed to protect designated sensitive receiving waters.

Sensitive area designations are currently reviewed every 4 years, in England, the latest review was completed in December 2015. The Environment Agency would like to see a move towards 6 yearly cycles to align with WFD, but this would require changes to legislation.

EU Priority Substances Directive

The 2013 revisions to the Priority Substances Directive have been transposed into domestic legislation. To comply with the new requirements, by 22 December 2018, the Environment Agency will submit a supplementary monitoring programme and a preliminary programme of measures to the European Commission, with the aim of achieving good chemical status by 2027. In England, the required measures will need to be considered in water company investment plans, as part of the 2019 Price Review and will be finalised in the 2021 update of the river basin management plans. All of the required measures will be made operational by 2024.

In England, preliminary investigations of chemicals with new European standards indicate that they could have a significant impact on good status in future. Sewage may be a significant source of some of these chemicals. Whilst sewage treatment is generally effective at reducing inputs this may not always be sufficient. Some substances have restrictions or bans on usage but these may take many years to result in lower environmental concentrations.

Review of water company price limits

Ofwat is expected to review the prices that water companies can charge their customers in 2019. As part of this process, water companies will need to update their business plans to include (among other things) additional environmental improvements agreed with their customers and the Environment Agency.

Water strategy for Wales

This strategy sets out the direction for water policy in Wales over the next 20 years in the context of the Environment (Wales) Bill and Well-being of Future Generations (Wales) Act 2015. The strategy is accompanied by an action plan with milestones up to 2025 (and beyond).

The priorities for 2015-18 will include a more focused approach to sewerage and drainage management and development and implementation of legislation to support sustainable drainage solutions, reform of the abstraction licence system in Wales to ensure the sustainable management of water resources now and in the future, and a review and, where appropriate, change to current practices and regulatory approaches to deal with diffuse pollution.

Common Agricultural Policy

The current agreement for funding from the Common Agricultural Policy, including the basic payment scheme and rural development programme that encompasses Countryside Stewardship, ends in December 2020. Negotiations for continued funding for the period 2021 to 2027 have not yet begun.

Water resources management plans

Water companies will publish new plans in 2019. These plans set out how they will balance supply and demand for water over a 25 year period. The new plans will enable them to take account of expected changes in demand for water and in their available supply as a result of climate change and population growth as well as any new measures needed to deliver environmental objectives.

Review of nitrate vulnerable zones designations and action plans

Every 4 years, the UK is required to review the evidence in relation to the extent of nitrate vulnerable zones (NVZ) and the effectiveness of the action programme introduced by the Regulations and to implement changes where required. NVZs are a means of reducing or preventing water pollution caused by nitrates from agricultural sources. The next review is underway and any changes are expected to be implemented in January 2017.

Further information in this document

- You can find more information on the ongoing measures to prevent deterioration for each significant water management issue in section 3.2.

Information elsewhere in the river basin management plan

- You can find more information about the catchment economic appraisal in section 5.5 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015).

Supporting information

- You can find a list of the measures needed to achieve water body objectives for 2027 and beyond on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-sabbd14301a44d5e9).
- You can find the impact assessment on the river basin management plan web pages (www.gov.uk/government/collections/river-basin-management-plans-2015).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

3.6. Additional measures to achieve protected area objectives

Measures have been developed for protected areas that are at risk of or do not currently meet their objectives. Table 24 summarises the action planning process.

Table 24: Summary of measures for protected areas

Protected Area	Programme
Drinking water protected areas - surface water and groundwater	Safeguard zones have been established for water sources in drinking water protected areas where extra treatment is likely to be required in the future. Safeguard zone action plans have been developed including measures needed to manage activities that may threaten raw water quality for surface waters and ground waters.
Recreational waters (bathing waters)	Bathing water profiles have been produced for all designated sites. They include details of the measures needed to achieve compliance with the revised standards that came into force in 2015. Further information is available on the measures for those bathing waters at risk of not achieving sufficient in 2015 in the bathing water action plans (continuing at risk).
Nutrient sensitive areas (Urban Waste Water Treatment Directive)	Measures have been identified to make sure that all relevant discharges from waste water treatment plants within the sensitive area have appropriate phosphorus or nitrogen emission standards.
Nutrient sensitive areas (nitrate vulnerable zones)	The objective of the Nitrates Directive is to reduce water pollution caused by nitrates from agricultural sources and to prevent further such pollution occurring. Nitrate Vulnerable Zones (NVZs) are designated where nitrate concentrations in surface and/or groundwaters are high or increasing, or where waters are, or may become eutrophic, due to agricultural nitrate pollution. Farmers within NVZs must comply with mandatory action programme measures to reduce agricultural nitrate losses. In addition a code of good agricultural practice has been established, for voluntary implementation by all farmers.
Natura 2000: Water dependent Special Areas of Conservation (SACs) and Special Protection Areas for Wild Birds (SPAs)	In England, Natural England has developed site improvement plans (SIPs) for water dependent sites. SIPs provide an overview of issues affecting the site condition; identify priority actions, timescales for implementation and potential funding sources. Natural England monitors, reviews and updates SIPs where appropriate. In Wales, Natural Resource Wales are developing prioritised improvement plans (PIPs) for all Natura 2000 sites that are not currently in favourable status. These PIPs, together with thematic plans, will address key strategic issues, contributing to achieving objectives under the Water Framework Directive. On cross border sites a single plan will be produced. Natural Resources Wales is currently reviewing its Core Management Plans for Natura 2000 sites to ensure that the targets reflect the latest knowledge.

Supporting information:

- You can find more information on the measures in England for protected areas at the following locations:
    - For drinking water protected areas for surface water (https://ea.sharefile.com/d-scac3ff7da4a424eb) and for groundwater (https://ea.sharefile.com/d-sa22fd79de304532a)
    - You can access more information on recreational waters on the Bathing Water Explorer (http://environment.data.gov.uk/bwq/profiles/) and in the bathing water action plans (continuing at risk) on the Environment Agency's ShareFile service https://ea.sharefile.com/d-s2c9919e38f04798b
    - For Nitrate vulnerable zones visit the NVZ web pages (https://www.gov.uk/nitrate-vulnerable-zones)
    - The Natura 2000 site improvement plans are available on Natural England's website (http://publications.naturalengland.org.uk/category/4878851540779008)
- You can find more information on the measures in Wales for protected areas at the following locations:
    - You can access more information on bathing water action plans at (https://naturalresources.wales/water/quality/bathing-water-quality/?lang=en)
    - For Nitrate vulnerable zones visit the NVZ web pages (https://naturalresources.wales/water/quality/nitrate-vulnerable-zones/?lang=en)
    - The Natura 2000 improvement plans are available via a licence agreement by Natural Resources Wales. Please contact the Natural Resources Wales' Water Framework Directive team on: WFDWales@naturalresourceswales.gov.uk.

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

4. Changes from 2009 to 2015

This section contains an assessment of what has been achieved and what has happened since the first river basin management plan was published in 2009.

It includes a summary of the improvements made to the evidence used in river basin management planning, a report on the implementation of measures, and a summary of progress towards achieving the environmental objectives in the 2009 plan and where progress has not been made.

For Wales further details for this section could be found in the separate River Basin Planning Progress Report for Wales 2009-2015

4.1. Improvements in evidence

Over the last 6 years the Environment Agency and Natural Resources Wales has done much to improve the understanding of the water environment. The quantity and quality of the evidence available has grown because of significant investment.

- In England, an additional £4.7 million has been invested in a new ecological monitoring programme for rivers and an additional £1.5 million invested in chemical monitoring technology. This means that the number of classification results in the river basin district has increased from 7,352 in 2009 to 7,486 in 2015.
- In the river basin district, more than 1,600 investigations have been carried out to identify the reasons (pressures, and the sources of the pressures) why good status and protected area objectives have not been achieved.
- The actions that would be needed to achieve good status and protected area objectives have been identified.
- Through detailed economic appraisal, there is an improved understanding of the benefits the water environment can provide and the cost of the measures needed to realise the benefits.
- The latest generation of environmental assessment criteria has been introduced in collaboration with a range of partners and leading scientists. These improvements to methods mean that the classification results are now a better interpretation of the general health of the water environment. These changes include:
    - new standards for additional chemical substances
    - updated standards for existing physico-chemical elements
    - new and improved biological assessment tools and new intercalibrated biological classification boundary values.
- Improvements have been made in mapping of the water body network.
- Improved risk assessments have been introduced to help target future monitoring programmes, and predict and help prevent potential deterioration in the water environment.

This new evidence was used in the review and update of the environmental objectives in the 2009 plan.

Further information in this document

- You can find summaries of the latest water body classification results and the reasons for not achieving good status in section 5.
- You can find more information on risk assessments in section 1.4.

Information elsewhere in the river basin management plan

- You can find more information in Part 2: RBMP overview available on the river basin management plan web pages (www.gov.uk/government/collections/river-basin-management-plans-2015) for:
    - the process used to review and update the environmental objectives in the 2009 plan, in section 5.2
    - measures identification in section 5.2
    - economic appraisals in section 5.3
    - review of the water body network in section 4.1
    - review and update of heavily modified water body designations in section 4.1
    - revised risk assessments in section 4.4
- GeoPDF maps showing the latest classification results for the whole of the Severn river basin district can be found on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-s5a5e886fd664e818)
- You can find a spreadsheet containing the reasons for not achieving good status for the Severn river basin district on the Environment Agency's ShareFile service (https://ea.sharefile.com/d-s0faa355450243538)

Supporting information

- You can find the full description of changes to environmental standards on the UKTAG website (http://www.wfduk.org/).
- The full description of changes to biological methods can be found on the UKTAG website (http://www.wfduk.org/).
- You can find more detailed information on progress in Wales on the implementation of the 2009 Plans in River Basin Planning Progress Report for Wales 2009-2015 (https://naturalresources.wales/water/quality/?lang=en).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

4.2. Measures implemented

Planned measures implemented since 2009

Most of the measures (over 95%) summarised in the 2009 plans have been completed.

A few measures have not been completed in the river basin district for the following reasons:

- 18 measures have been reassessed and are no longer needed or considered effective
- 2 were not funded (funding withdrawn)
- there was no mechanism to implement 5 of the measures

Additional measures implemented since 2009

As well as the measures in the 2009 plans, a significant number of other measures have been implemented. For instance in England, the government provided £90 million between 2010 and 2015 for additional measures to improve the physical water environment, reduce pollution, and reduce the impact of invasive non-native species.

It is estimated that the additional measures in the river basin district represent a further investment of at least £11.5 million. Table 25 gives a summary of the issues addressed by additional measures in England in the Severn river basin district and an indication of the scale of additional measures.

Further information of additional measures in Wales in the Severn river basin district are contained in the separate River Basin Planning Progress Report for Wales 2009-2015.

Table 25 – Summary of additional measures in England in the Severn river basin district

Significant water management issue	Number of measures	Cost (£Million)	Number of water bodies benefiting
Physical modifications	75	5.8	141
Pollution from rural areas	20	4.0	94
Pollution from town, cities and transport	9	0.84	36
Pollution from abandoned mines	0	0.0	0
Invasive non-native invasive species	2	0.1	10
Other	3	0.69	7
Total	**109**	**11.5**	**288**

Supporting information

- You can download a spreadsheet of the additional local measures implemented from 2009 from the Environment Agency's ShareFile service (https://ea.sharefile.com/d-s13e5e39caef432d9).
- You can find more detailed information on additional measures in Wales in River Basin Planning Progress Report for Wales 2009-2015 (https://naturalresources.wales/water/quality/?lang=en).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

Effectiveness of measures implemented since 2009

Most of the measures implemented between 2009 and 2015 have resulted in improvements to the quality of the water environment, providing significant additional benefits. However, the scale of the improvements has not always been enough to fully secure compliance with WFD environmental objectives (protected area and water body status objectives) set in the 2009 plan. Section 4.3 identifies some of the reasons for this.

For Wales detailed information on the current state of the water environment including information on the effectiveness of measures implemented is contained in a separate River Basin Planning Progress Report for Wales 2009-2015.

For England Table 26 contains a summary of how effective the measures implemented since 2009 were at achieving WFD environmental objectives. Measures are grouped by each significant water management issue. The assessment is based on the measures implemented across England as a whole, not just in the English part of the Severn river basin district.

Table 26: Summary assessment of the effectiveness of measures for each significant water management issue (Whole of England level assessment)

Physical modifications
Obstructions Removing or lowering weirs and building fish passes has generally been effective. In some cases, it has not been possible to fully remove the pressure because of the obstruction's historic value or the need to prevent erosion or mobilisation of contaminated sediments. In some cases full compliance with WFD environmental objectives has not yet been achieved because other barriers elsewhere in the catchment are still present.
Habitat improvement Habitat improvements, from large-scale river restoration to relatively minor schemes on small watercourses, have generally been effective. They have led to improvements in fish populations and other wildlife. The effectiveness of these schemes at achieving compliance with WFD environmental objectives will only become apparent once the new habitat and associated wildlife has matured. In some cases, it is expected that additional restoration elsewhere in the catchment will be required to support a fully functioning ecosystem.
Pollution from waste water
There were over 300 improvement schemes implemented at sewage treatment works since 2009. These have been effective at helping to achieve compliance with WFD environmental objectives.
Pollution from rural areas
Government advice Catchment Sensitive Farming was effective at encouraging farmers to adopt measures to help achieve WFD environmental objectives (mainly for protected areas). In areas where Catchment Sensitive Farming was targeted, between 2006 and 2013, the estimated quantity of pollutant (including phosphorus, nitrate, sediment and faecal indicator organisms) released from agricultural sources reduced by between 4% and 12% (on average).

Regulation

Regulation has reduced the impact of pollution incidents and helped to prevent deterioration. There is some evidence that action plans for nitrate vulnerable zones helped to reduce pollution from nutrients. The overall effectiveness can only be assessed over a longer period.

Industry initiatives

A number of schemes have promoted voluntary action including, advice and grants through local catchment groups, advice through the Campaign for the Farmed Environment, and work lead by water companies to improve the quality of water they abstract for public water supply. Advice is effective at promoting the adoption of good farming practice. Measures that go beyond good practice greatly increase where grants have been provided. Many of these schemes resulted in improvements to the local water environment.

Environmental stewardship (2006 to 2014)

There was good uptake of measures to protect the water environment. Measures were not always placed where most benefit could be gained or the uptake sufficiently concentrated within a catchment to reduce pressures enough to achieve compliance with WFD environmental objectives.

Cross compliance

Compliance with environmental conditions attached to the Single Farm Payment was high. The environmental conditions were strengthened in 2010 and 2015. The associated measures had a small impact on the quality of the water environment

Changes to the natural flow and level of water

Changes in abstraction licences

The national Restoring Sustainable Abstraction programme has been effective at improving habitat for fish and other wildlife. Voluntary and compulsory action has resulted in changes to over 200 abstraction licences (by the Environment Agency and government. As a result of this, 27 billion litres of water has been returned to the environment.

Nationally this programme has been effective at helping to achieve compliance with WFD environmental objectives, in particular those for Natura 2000 protected areas

Demand management

Demand management and water efficiency techniques have been implemented by many sectors including government, water industry, independent bodies and trade associations.

Local Development Plans/Frameworks have been introduced which set out local plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of Schedule 1 to the Building Regulations 2010.

Water companies have reduced leakage from their supply networks and increased the number of homes with meters across water stressed areas.

Most of these have been effective at a local scale.

Pollution from towns, cities and transport

A variety of measures have been implemented to reduce pollution from urban areas. These include contaminated land restoration; installation of sustainable drainage systems for new and existing developments; treatments to remediate road run-off; regulatory action following pollution incidents; initiatives to resolve misconnected foul drainage systems; and pollution prevention advice to occupiers of industrial estates.

Most of these measures have been effective at the local scale. However, in some cases the effectiveness is low, as there needs to be more measures within an area if improvements are to be sustained over the long term. Given the scale, cost and complexity of this issue, the measures have not been effective at reducing the pressure enough to achieve compliance with WFD environmental objectives.

Invasive non-native species

A variety of measures have been implemented to prevent the introduction and spread of invasive non-native species. These have been moderately effective and have slowed the deterioration in the biodiversity of affected waters and the spread to unaffected waters. Measures to remove invasive non-native species from affected waters are only effective for a minority of species where a rapid response to their presence is possible. Evidence gathered in cycle 1 has confirmed that it is technically infeasible to remove most species once they are established. At locations such as Natura 2000 sites, intensive (and ongoing) action can mitigate the pressure, but not remove it.

4.3. Progress towards achieving the environmental objectives in the 2009 plan

Preventing deterioration

To assess compliance with the WFD objective of preventing deterioration, 2015 classifications results (based on data up to the end of 2014) using the standards and classification tools used in 2009, were compared with the 2009 classification baseline. The assessment considered whether the water body had deteriorated from one status class in 2009 to a lower one in 2015. This was applied to a water body's overall status and to the status of each element used in classification.

The results of this assessment for water bodies in the river basin district are summarised in Table 27. Table 34 in section 5 provides a breakdown by elements.

Table 27: Water bodies that have deteriorated (at >75% confidence)

Water bodies	Number	Percentage
Surface water ecological status	16	2%
Surface water chemical status	0	0%
Groundwater quantitative status	0	0%
Groundwater chemical status	0	0%

Where deterioration of status has occurred, the cause needs to be identified and measures to restore the water body to its previous status put in place as soon as possible.

In some cases, reported deterioration may be a result of changes to monitoring programmes or be an artefact of monitoring and assessment processes (sampling error). Distinguishing these changes from real deterioration in the quality of the environment that has been caused by a new activity or a change in an existing pressure in a catchment can be difficult.

Table 34 in section 5 contains a summary of the causes of deterioration that have already been identified. This summary is for each element by pressure and sector. You can also download a spreadsheet containing the water body elements that have deteriorated in status since 2009 (see further information box at the end of this section).

In certain and specific circumstances deterioration of status is permitted. These circumstances are described in Article 4.6 (temporary deterioration) and Article 4.7 (new modifications) of the WFD. No cases that meet these requirements have been identified in this river basin district.

Protected area objectives

Drinking water protected areas

The Drinking Water Inspectorate is the competent authority for the drinking water directive. They publish an annual report detailing compliance with the directive's water quality requirements.

The Environment Agency has established safeguard zones and produced associated action plans for all relevant drinking water protected areas to manage the risk of water quality deteriorating.

Following improvements in the knowledge of the pressures in catchments, improved monitoring programmes for chemicals and new abstractions which have come about, the number of drinking water protected areas classified as at risk of water quality deterioration or at poor chemical status (for groundwater only) has increased. Measures such as providing advice and guidance to stakeholders, capital grants for infrastructure improvements (for example biobeds) and payment for ecosystem services have been used to protect water quality in drinking water protected areas.

Economically significant species (freshwater fish)

The freshwater fish directive was repealed in December 2013. Environmental objectives for freshwater fish protected areas ceased to have effect from that date. An equivalent level of protection is provided by the water body objectives in this plan.

Recreational waters (bathing waters)

A revised bathing water directive introduced new water quality objectives for bathing water protected areas from 2015. Projected classification of bathing waters against the new standards is summarised in section 2.4. Compliance with the water quality standards of the old bathing water directive was assessed for the final time in 2014. These results are summarised in Table 28. This shows an increase in compliance since 2009.

Table 28: Bathing water compliance with old (1976) Bathing Water Directive objectives:

Year	Number of bathing waters	% compliant with mandatory standards	% compliant with guideline standards
2009	4	100	50
2014	5	100	40

Natura 2000 sites: Water dependent Special Areas of Conservation or Special Protection Areas

In 2009 11 Natura 2000 protected areas in England in the Severn river basin district had an objective of maintaining or achieving their water dependent conservation objectives by 2015 (assessed on basis of measures being underway/complete, known pressures, anticipated measures and likely improvements in condition). Of these, 6 had all measures completed (i.e. no further intervention is required) to enable their water dependent objectives to be achieved by 2015, based on knowledge of current pressures on the sites.

Details of progress for Natura 2000 protected areas in Wales in the Severn river basin district are contained in the separate River Basin Planning Progress Report for Wales 2009-2015.

Water body status objectives

As a result of the improvements in monitoring, standards and classification tools described in section 4.1, it is not possible to identify environmental change by simply comparing the 2009 and 2015 classification baselines. Instead, a set of 2015 classifications results (based on data up to the end of 2014) has been produced using the standards and classification tools used in 2009. This helps identify where they may have been an actual environmental change since 2009.

Table 29 shows the percentage of water bodies at good status for the:

- 2009 baseline
- predicted outcomes in 2015 envisaged in the 2009 plans
- 2015 classification results produced using the 2009 methods

Table 29: Comparison of 2009 baseline with 2015 predicted and actual results (using the water body network, standards and classification tools used in 2009)

Percentage of water bodies at good or better status	2009	2015 predicted	2015 actual
Surface water ecological status	29	34	27
Surface water chemical status	8	8	14
Groundwater quantitative status	74	74	74
Groundwater chemical status	77	77	67
Overall status	30	35	28

Although many of the measures completed over the last 6 years are providing benefits for the local environment, the comparison shows a reduction in the number of water bodies at good status. After 2009 additional biological monitoring was put in place and the design of the monitoring network was improved. The new monitoring has revealed more symptoms of environmental issues. The change between 2009 and 2015 reported in the table above does not necessarily constitute a real environmental deterioration. Over this period, 584 individual water body elements improved by one or more class.

The reasons why the predicted improvement in status has not yet been seen include:

- the measures have not been as effective at reducing pressures at the water body scale as expected
- the environmental standards which the measures were designed to achieve were not tight enough to fully protect the biological elements
- there are pressures acting on the water bodies that were not known in 2009
- improvements in the monitoring network identifying that pressures are having more impact than previously detected the pressure has been reduced but the biology has yet to fully improve
- some classification elements have improved in status, but no improvement in the status of the water body has been reported due to the use of the ‘one out all out’ classification rule

Further information in this document

- You can find a summary of the causes of deterioration that have already been identified in section 5.

Information elsewhere in the river basin management plan

- A more detailed explanation of the approach to preventing deterioration can be found in section 2.2 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en).
- You can find detail on the circumstances in which deterioration may be permitted (temporary deterioration and new modifications) in section 3.1.4 of Part 2: RBMP overview (www.gov.uk/government/collections/river-basin-management-plans-2015) and the River Basin Management Planning Overview Annex (https://naturalresources.wales/water/quality/?lang=en)..
- You can download spreadsheets for the Severn river basin district containing:
    - a spreadsheet containing the 2009 classification baseline, predicted and actual results for 2015 using the standards and classification tools used in 2009
    - a map of the 2015 classification results using the standards and classification tools used in 2009
    - a spreadsheet containing the water body elements that have deteriorated in status since 2009

  from the Environment Agency's ShareFile service (https://ea.sharefile.com/d-s13e5e39caef432d9).

Sharefile links have been updated – please use the guide to accessing data and information to access files https://www.gov.uk/government/publications/river-basin-management-plans-accessing-data-and-information-guide

5. Summary statistics

This section provides a summary of the key statistics for the river basin district at water body and quality element level.

Summary statistics tables

The tables in this section provide a summary of the plan data for the river basin district and can be used for quick reference. To understand the purpose of the data and how it has been generated see the relevant sections earlier in this document. The detailed data behind the summaries can also be accessed by following the links in the relevant sections.

The following descriptions explain the content of the tables and the further information box shows where more information can be accessed.

- **Table 30: Summary statistics for the Severn river basin district: Water bodies:** shows the status, by percentage, of the different types of water bodies in the river basin district. It also shows the long term objective and for water bodies in England, the predicted outcome by 2021 and for water bodies in Wales, the objective by 2021.

- **Table 31: Summary statistics for the Severn river basin district: Elements:** shows the status, by percentage, of the water body elements in the river basin district. It also shows the predicted outcome by 2021 and the objective. It also shows the long term objective and for water bodies in England, the predicted outcome by 2021 and for water bodies in Wales, the objective by 2021.

- **Table 32: Pressures preventing waters reaching good status and the sectors identified as contributing to the impact (reasons for not achieving good status):** shows the number of reasons for water bodies not achieving good status for each pressure and which sector is contributing to this. The table shows individual counts and there may be more than one reason in a single water body.

- **Table 33: Significant water management issues (SWMIs) preventing waters reaching good status and the sectors identified as contributing to the impact (reasons for not achieving good status):** shows the number of reasons for water bodies not achieving good status because of each significant water management issue and which sector is contributing to this. The table shows individual counts and there may be more than one reason in a single water body.

- **Table 34: Reasons for deterioration by one or more status class between 2009 and 2015 and the sectors identified as contributing to the impact:** shows the number of reasons for water body elements deteriorating by one of more status class, with 75% confidence, for that pressure and which sector is contributing to the deterioration. The table shows individual counts, if there is more than one element deteriorating in a water body, then there will be more than one reason assigned.

Further information in this document:

- You can access the detail behind Table 30 and Table 31 on the current status, predicted outcomes and objectives for water bodies and elements in section 2.
- The detail behind Table 33 on the significant water management issues can be found in section 1.4.
- You can find more information on Table 34 and the reasons for deterioration in section 4.3.

Table 30: Summary statistics for the Severn river basin district: water bodies

	Rivers, Canals and SWTs*	Lakes	Estuaries	Coastal	Surface Waters Combined	Ground water	All Water Categories
% of water bodies at good or better ecological status/potential now	21%	13%	0%		20%		
% of water bodies predicted to be at good ecological status/potential or better by 2021	29%	13%	17%		27%		
% of water bodies with an objective of good ecological status/potential or better	88%	85%	100%		88%		
% of water bodies at good chemical status now	95%	100%	83%		95%		
% of water bodies predicted to be at good chemical status by 2021	95%	100%	83%		95%		
% of water bodies with an objective of good chemical status	>99%	100%	100%		>99%		
% of water bodies at good chemical (groundwater) status now						64%	
% of water bodies predicted to be at good chemical (groundwater) status by 2021						69%	
% of water bodies with an objective of good chemical (groundwater) status						90%	
% of water bodies at good quantitative status now						79%	
% of water bodies predicted to be at good quantitative status by 2021						81%	
% of water bodies with an objective of good quantitative status						81%	
% of water bodies at good or better overall status now	21%	13%	0%		20%	55%	22%
% of water bodies predicted to be at good or better overall status by 2021	29%	13%	17%		27%	60%	29%
% of water bodies with an objective of good or better overall status	88%	85%	100%		88%	71%	87%

*SWTs are surface water transfers

Table 31: Summary statistics for the Severn river basin district: elements

	Rivers, canals and SWTs*	Lakes	Estuaries	Coastal	Surface waters combined	Ground-water	All water categories
% of ecological elements at good or better status now (biological, physico-chemical and specific pollutants)	81%	65%	84%		80%		
% of ecological elements predicted to be at good status or better by 2021 (biological, physico-chemical and specific pollutants)	84%	65%	84%		83%		
% of ecological elements with an objective of good status or better (biological, physico-chemical and specific pollutants)	98%	94%	100%		98%		
% of chemical elements at good status now	95%	100%	93%		95%		
% of chemical elements predicted to be at good status by 2021	95%	100%	93%		95%		
% of chemical elements with an objective of good status	>99%	100%	100%		>99%		
% of chemical (groundwater) elements at good status now						91%	
% of chemical (groundwater) elements predicted to be at good status by 2021						92%	
% of chemical (groundwater) elements with an objective of good status						98%	
% of quantitative elements at good status now						90%	
% of quantitative elements predicted to be at good status by 2021						92%	
% of quantitative elements with an objective of good status						95%	
% of elements at good or better status now	83%	73%	88%		82%	91%	83%
% of elements predicted to be at good or better status by 2021	85%	73%	88%		85%	92%	85%
% of elements with an objective of good or better status	98%	96%	100%		98%	97%	98%

*Surface water transfers

Table 32: Pressures preventing waters reaching good status and the sectors identified as contributing to the impact (reasons for not achieving good status) in the Severn river basin district

Pressure	Agriculture and rural land management	Industry	Mining and quarrying	Navigation	Urban and transport	Water Industry	Local & central government	Domestic general public	Recreation	Waste treatment and disposal	Other	No sector responsible	Sector under investigation	Total
Abstraction and flow	10	5	0	4	0	44	0	0	0	0	6	3	15	**87**
Chemicals	14	5	66	0	1	2	0	0	0	0	7	0	80	**175**
Biochemical oxygen demand	1	1	0	0	2	5	0	0	0	0	0	0	1	**10**
Dissolved oxygen	21	2	0	0	4	5	0	0	0	0	4	6	9	**51**
Ammonia	9	2	0	0	5	18	0	2	0	1	0	0	6	**43**
Fine sediment	67	0	0	0	6	1	0	0	0	0	1	1	1	**77**
Invasive non native species	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**
Nitrate	4	0	0	0	1	0	0	0	0	0	0	0	1	**2**
Phosphate	637	17	0	0	103	301	0	28	0	0	3	18	40	**1147**
Physical modification	45	13	0	9	58	12	45	0	6	0	19	87	52	**346**

Table 33: Significant water management issues preventing waters reaching good status and the sectors identified as contributing to the impact (reasons for not achieving good status) in the Severn river basin district

Significant water management issue	Agriculture and rural land management	Industry	Mining and quarrying	Navigation	Urban and transport	Water Industry	Local & central government	Domestic general public	Recreation	Waste treatment and disposal	Other	No sector responsible	Sector under investigation	Total
Physical modifications	53	10	0	11	58	10	45	0	6	0	23	85	53	**354**
Pollution from waste water	3	20	0	0	14	345	0	30	0	0	2	2	5	**421**
Pollution from towns, cities and transport	0	7	0	0	143	6	0	0	0	0	2	0	2	**160**
Changes to the natural flow and level of water	16	9	0	3	0	45	0	0	0	0	7	0	5	**85**
Invasive non-native species	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**
Pollution from rural areas	742	0	0	0	0	0	0	0	0	0	0	0	0	**742**
Pollution from abandoned mines	0	0	71	0	0	0	0	0	0	0	6	0	0	**77**

Table 34: Reasons for deterioration from one or more status class between 2009 and 2015 and the sectors identified as contributing to the impact in the Severn river basin district

Pressure causing deterioration	Agriculture and rural land management	Industry	Mining and quarrying	Navigation	Urban and transport	Water Industry	Local & central government	Domestic general public	Recreation	Waste treatment and disposal	Other	No sector responsible	Sector under investigation	Total
Abstraction & Flow	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	21	21
Biochemical oxygen demand	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Oxygen	1	0	0	0	0	0	0	0	0	0	0	0	2	3
Ammonia	0	0	0	0	0	4	0	0	0	0	0	0	2	6
Fine sediment	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Invasive non native species	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrate	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosphate	8	0	0	0	0	4	0	0	0	0	0	0	6	18
Physical Modification	1	1	0	0	0	0	0	0	0	0	0	0	3	5

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