



Water for life and livelihoods



Part 1: Humber river basin district River basin management plan

Updated: December 2015

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.

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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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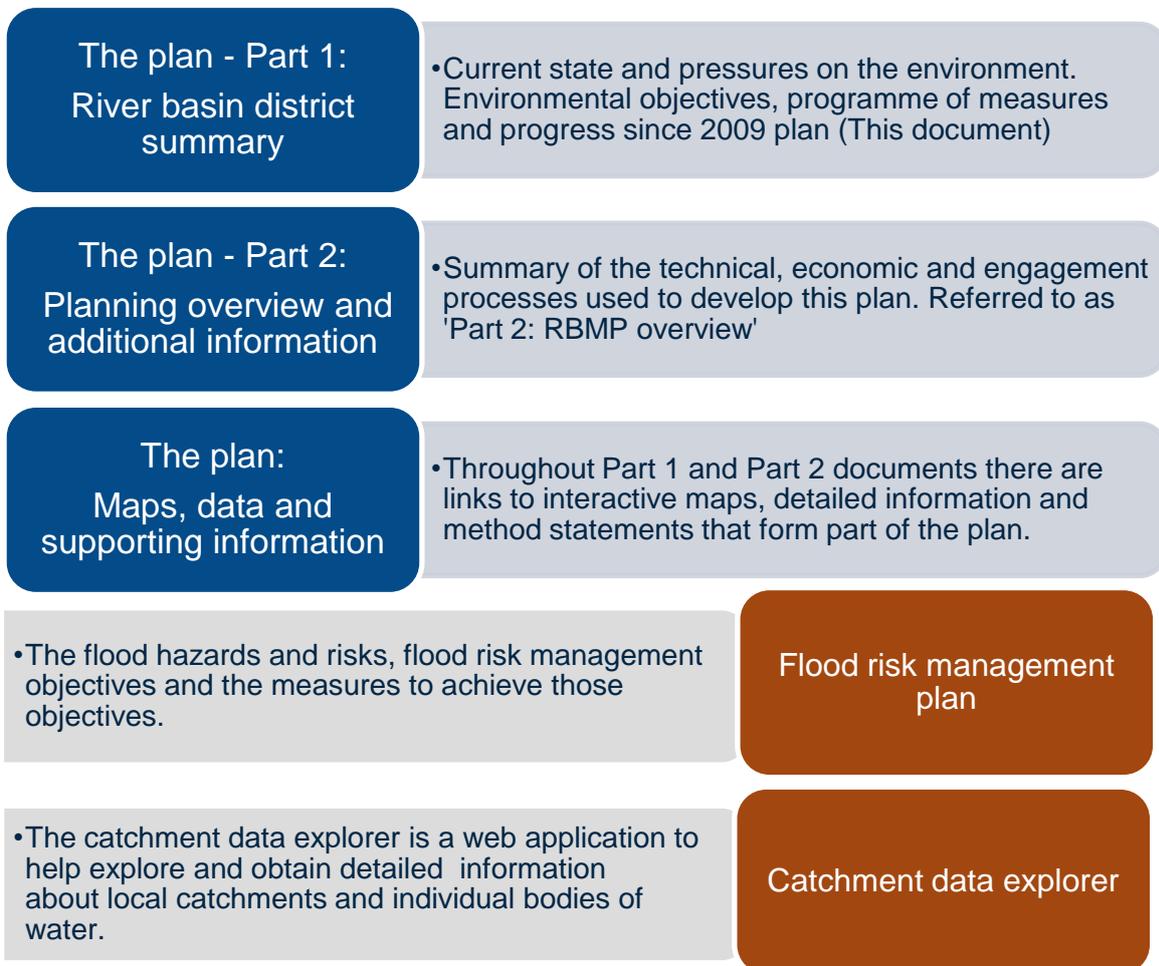
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Using the plan: accessing the most relevant information

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 through the river basin management [web pages](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).
- A guide to accessing river basin management data and supporting information is available on the river basin management [web pages](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).

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, have less impact 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. Although it is not a detailed action plan it provides a clear signal to those who use and affect water about what they can do to make sure there is enough good quality water for life and livelihoods in England.

The river basin management plan has been approved by the Secretary of State for the Environment, Food and Rural Affairs. 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. It is an update of and replaces the river basin management plan published in 2009 (referred to as the '2009 plan' in this document).

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:				
Central government departments	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 Humber river basin district

The Humber river basin district (Figure 1) covers an area of 26,100km² and extends from the West Midlands in the south, northwards to North Yorkshire and from Staffordshire in the west to part of Lincolnshire and the Humber Estuary in the east.

In total more than 10.8 million people live and work in towns and cities within the district, with the main urban centres being Birmingham, Leeds, Bradford, Sheffield, Hull and Grimsby.

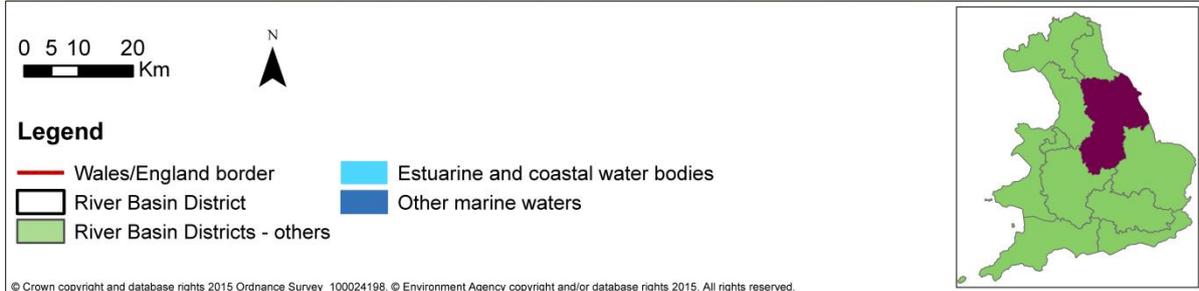
The Humber river basin district has a rich diversity of wildlife and habitats, supporting many species of global and national importance.

There are 15 management catchments that make up the river basin district, which include many interconnected rivers, lakes, groundwater and coastal waters. The catchments range from the uplands of the Peak District to fertile river valleys of the Trent to chalk aquifers of the Yorkshire and Lincolnshire Wolds and vary from rural catchments to others heavily influenced by urban and industrial land use.

The main economic sectors in the region include business services, health, wholesale and distribution. Manufacturing contributes to the economy along with some mineral abstraction, including some deep coal mines, potash mines and numerous gravel workings. Agriculture is critical for the rural economy of the district and supports natural and cultural assets that help underpin both the region's tourism and quality of life for those who live and work in the district.

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 Humber 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 42% 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 38% 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 16% 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 6% 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 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 32% of water bodies in this river basin district

Some approaches to land management have increased the amount of soils and sediment that are 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 contaminations 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 4% 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 has 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 on the Environment Agency's [ShareFile Service](https://ea.sharefile.com/d-s3961180e2334409b) (<https://ea.sharefile.com/d-s3961180e2334409b>).
- 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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).
- The [Inventory of emissions, discharges and losses of priority and priority hazardous substances](https://ea.sharefile.com/d-sab675d1e4d74e5e8) (<https://ea.sharefile.com/d-sab675d1e4d74e5e8>) provides information on priority substances at the river basin district scale.
- You can find more detail on how the inventory has been compiled in section 4.4 of [Part 2: RBMP overview](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).

1.5. Working with others

River basin district liaison panel

The river basin district has 2 liaison panels, the Yorkshire Humber panel and the Trent Ancholme 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
- assist and champion the implementation of the catchment based approach

Catchment partnerships and the 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. The catchment based approach aims to encourage groups to work together more effectively to deal with environmental problems locally.

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.

Table 2 lists the partnerships in this river basin district. Some partnership groups are in the early stages of being set up, while others have been active for years. Members from some catchment partnerships also sit on the river basin district liaison panel.

Table 2: Catchments and partnership groups

Catchment	Partnership group host
<u>Aire and Calder</u>	The Aire Rivers Trust
<u>Derbyshire Derwent</u>	Derbyshire Wildlife Trust
<u>Derwent (Humber)</u>	East Yorkshire Rivers Trust
<u>Don and Rother</u>	Don Catchment Rivers Trust
<u>Dove</u>	The Trent Rivers Trust
<u>Esk and Coast</u>	Yorkshire Esk Rivers Trust
<u>Hull and East Riding</u>	Yorkshire Wildlife Trust
<u>Humber Estuary</u>	Humber Nature Partnership
<u>Idle and Torne - Idle</u>	Nottinghamshire Wildlife Trust
<u>Idle and Torne - Torne</u>	Yorkshire Wildlife Trust
<u>Louth Grimsby & Ancholme catchment - Ancholme</u>	Ancholme Valley Heritage Trust
<u>Louth Grimsby & Ancholme - North Chalk Stream (Northern Becks)</u>	Lincolnshire chalk streams project
<u>Lower Trent & Erewash</u>	Groundwork Greater Nottingham (GGN)
<u>Soar</u>	The Trent Rivers Trust
<u>Staffordshire Trent Valley</u>	Staffordshire Wildlife Trust
<u>Swale, Ure, Nidd & Upper Ouse</u>	Yorkshire Dales Rivers Trust
<u>Tame Anker and Mease</u>	Severn Trent Water
<u>Wharfe and Lower Ouse</u>	Yorkshire Dales Rivers Trust

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. 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.

Further information in this document

- You can find a map showing the location and boundaries of the 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 section 3.4 of [Part 2: RBMP overview](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).

Supporting information

- You can find more information on the liaison panel and details about membership in the [Record of consultation and engagement](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).
- You can find more information on the catchment based approach on the catchment based approach [web pages](http://www.catchmentbasedapproach.org/) (<http://www.catchmentbasedapproach.org/>)

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 and the Secretary of State for the Environment, Food and Rural Affairs 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 in England
Flooding and coastal erosion	Flood risk management plans Local Flood Risk Management Strategies Shoreline management plan	Environment Agency Lead local flood authorities Lead local flood authorities Coastal groups (risk management authority partnerships)
Climate change adaptation	UK National Climate Adaptation Strategy and Adaptation Plan	Government's Committee on Climate Change Public bodies and utility companies
Water supply	Water resources management plans Drought management plans	Water companies
Biodiversity	Biodiversity 2020: A strategy for England's wildlife and ecosystem services Natura 2000 site improvement plans	Defra Natural England
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
Marine waters	Marine Strategy Framework Directive Marine plans	Defra Marine Management Organisation

Supporting information:

- More information about the flood risk management plans can be found on the flood risk management plan [web pages \(https://www.gov.uk/government/collections/flood-risk-management-plans-frmps-2015-to-2021\)](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 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 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, 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
- the annual change 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 also plans 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 Countryside Stewardship schemes that benefit water and other sector related initiatives, for example, Campaign for the Farmed Environment
- 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 catchment partnerships. 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	457	105	282	844
Lake	11	19	104	134
Coastal	0	0	2	2
Estuarine	1	2	4	7
Groundwater	51	0	0	51
Total	520	126	392	1038

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

No. of water bodies	Ecological status or potential					Chemical status	
	Bad	Poor	Mod	Good	High	Fail	Good
987	32	136	671	148	0	32	955

Table 7: Chemical and quantitative 2015 classification for groundwaters

No. of water bodies	Quantitative status		Chemical status	
	Poor	Good	Poor	Good
51	13	38	25	26

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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).
- You can access GeoPDF maps showing the current status of water bodies on the Environment Agency's [ShareFile Service](https://ea.sharefile.com/d-s3961180e2334409b) (<https://ea.sharefile.com/d-s3961180e2334409b>).
- To obtain the 2015 classification results for each water body, download the [water body spreadsheet](https://ea.sharefile.com/d-s0faa355450243538) (<https://ea.sharefile.com/d-s0faa355450243538>).

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

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, 43% of surface waters in the 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, land drainage, and the spread of urban areas.

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

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

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	111	52	Does not apply to surface waters
Groundwater	51	16	8

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.

Table 9: Shellfish water protected areas current status and objectives

Number of shellfish waters	Objective	Number currently achieving objective	Achieving objective by 2015	Achieving objective by 2021	Achieving objective by 2027
N/A	<300 <i>E.coli</i> /100ml in the shellfish flesh and intravalvular fluid	N/A	N/A	N/A	N/A

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 10: Bathing water protected areas current status and objectives

Number of bathing waters	Objective	Number which met at least the sufficient classification in 2014*	Number expected to achieve at least sufficient in 2015	Number at risk of not achieving sufficient in 2015
23	At least sufficient classification	22	22	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 11: 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	122	1,501,399	59
High nitrate in groundwater	20	535,646	21
Eutrophication in lakes or reservoirs	3	22,107	<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 12: Urban Waste Water Treatment Directive protected areas type and extent

Reason for designation	Number of sensitive areas	Length (km) / Area (km ²) designated
Eutrophication in rivers	17	855
Eutrophication in canals	3	100
Eutrophication in lakes or reservoirs	6	4.15
Eutrophication in estuaries or coastal waters	N/A	N/A
High nitrate in surface fresh water	N/A	N/A

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. Site conservation objectives are designed to maintain or restore Natura 2000 sites to favourable conservation status. 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 favourable conservation status for the water dependent features for which the site was designated as set out in the site's conservation objectives.

Natural England determines what favourable conservation status means in terms of the environmental conditions (targets) and ecology expected for designated habitats and species. The targets required are based on UK Common Standards 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 England reports on 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.

Table 13 contains a summary of the current condition and objectives for Natura 2000 protected areas.

Table 13: Natura 2000 water dependent protected areas current condition and objectives

Current condition			
Area of SSSI underpinning Natura 2000 sites (Ha)			
WFD - favourable	18,167		
WFD - unfavourable recovering	95,637		
WFD - unfavourable no change	2,803		
WFD - unfavourable declining	524		
WFD - destroyed/partially destroyed	0		
Total areas	117,131		
Objective	Number of protected areas		
	By 2015	By 2021	By 2027
All measures complete to enable conservation objectives to be achieved	14	7	12

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 \(www.gov.uk/government/collections/river-basin-management-plans-2015\)](http://www.gov.uk/government/collections/river-basin-management-plans-2015).
- For a list of all the protected areas, associated objectives and information see the [register of protected areas \(https://ea.sharefile.com/d-s487ae61bf2a4b4fb\)](https://ea.sharefile.com/d-s487ae61bf2a4b4fb).
- You can find detailed interactive maps of the different protected areas in the river basin district showing location, current status and monitoring points on the Environment Agency's [ShareFile Service \(https://ea.sharefile.com/d-s3961180e2334409b\)](https://ea.sharefile.com/d-s3961180e2334409b).

Supporting information:

- The CSMG and interim progress goals for flow and water quality elements in Natura 2000 is available on the Environment Agency's [ShareFile Service \(https://ea.sharefile.com/d-s3961180e2334409b\)](https://ea.sharefile.com/d-s3961180e2334409b).

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).

The status part of an objective is based on a prediction of the future status that would be achieved if technically feasible measures are implemented and, when implemented, would produce more benefits than they cost. The objective also takes into account the requirement to prevent deterioration and achieving protected area objectives.

The date part of an objective is the year by which the future status is predicted to be achieved. The date is determined by considering whether the measures needed to achieve the planned status are currently affordable, and once implemented, the time taken for the ecology or the groundwater to recover.

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).

The water body objectives in this plan are:

- **'x' status by 2015:** 2015 status matches the predicted future status or potential. Here the predicted future status has already been achieved and no further improvement in status is expected. The main environmental objective is to prevent deterioration in status between 2015 and 2021.
- **'x' status by 2021:** there is confidence that as a result of the programme of measures, the water body will improve from its 2015 status or potential to achieve the predicted future status by 2021.

The 'by 2015' date has been used to clearly distinguish water bodies and elements where the reported 2015 status matches the predicted future status (and so no further improvement is expected), from water bodies and elements where an improvement from the reported 2015 status is required to achieve the predicted future status by 2021.

- **'x' status by 2027:** the deadline for achieving the status or potential has been extended to 2027. Where the time extension is due to ecological or groundwater recovery time, there is confidence that the measures needed to achieve the improvement in status are already in place or will be in place by 2021. Where the time extension is due to practical constraints delaying implementation of the measures, there is confidence the process of implementing the measures will begin before 2021. For the remaining objectives with a 2027 date, there is currently not enough confidence that the improvement in status can be achieved by an earlier date.
- **'x' status by 2040 or 'x' status by 2050 or 'x' status by 2060:** the deadlines for achieving the planned status or potential have only been extended beyond 2027 where either ecological recovery time or groundwater recovery time will delay the achieving of the planned status. In these cases there is confidence that the measures needed to achieve the improvement in status are already in place or will be in place by 2021.

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

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 987 surface water bodies in the river basin district. It shows for instance, that:

- 720 water bodies have an objective of maintaining or aiming to achieve good ecological status between 2015 and 2027
- 194 water bodies have already achieved their objective of moderate ecological status (a less stringent objective)
- 45 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	2	14	194	148	0	358	2	955	957	
By 2021	0	1	5	20	0	26	0	0	0	
By 2027	0	6	45	552	0	603	0	30	30	Extended deadline
Beyond 2027	0	0	0	0	0	0	0	0	0	
Total	2	21	244	720	0	987	2	985	987	
	Less stringent						Less stringent			

Table 15 summarises the quantitative and chemical status objectives that have been set for the 51 groundwater water bodies in the river basin district. It shows for instance, that:

- 44 water bodies have an objective of maintaining or aiming to achieve good quantitative status between 2015 and 2027 (or beyond)
- 44 water bodies have an objective of maintaining or aiming to achieve good chemical status between 2015 and 2027 (or beyond)
- 7 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	7	38	45	7	26	33	
By 2021	0	3	3	0	1	1	
By 2027	0	3	3	0	16	16	Extended deadline
Beyond 2027	0	0	0	0	1	1	
Total	7	44	51	7	44	51	
	Less stringent			Less stringent			

Although 27% of water bodies have a less stringent objective for ecological status or potential, only 6% 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 reason has been used		
		Water bodies	Natura 2000	Shellfish waters
Technically infeasible	No known technical solution is available	87	4	0
	Cause of adverse impact unknown	336	8	0
	Practical constraints of a technical nature	10	11	0
	Number of water bodies or protected areas where technically infeasible has been used	407	12	0
Disproportionately expensive	Unfavourable balance of costs and benefits	202	0	0
	Disproportionate burdens	652	6	0
	Number of water bodies or protected areas where disproportionately expensive has been used	737	6	0
Natural conditions	Ecological recovery time	52	0	0
	Groundwater status recovery time	0	0	0
	Background conditions	6	0	0
	Number of water bodies or protected areas where natural conditions has been used	56	0	0
Total number of water bodies or protected areas with an alternative objective (extended deadline and/or less stringent status objective)		847	12	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 \(www.gov.uk/government/collections/river-basin-management-plans-2015\)](http://www.gov.uk/government/collections/river-basin-management-plans-2015).
- A GeoPDF map of the types, location, boundaries, monitoring sites and current status of water bodies in the river basin district is available on the Environment Agency's [ShareFile Service \(https://ea.sharefile.com/d-s3961180e2334409b\)](https://ea.sharefile.com/d-s3961180e2334409b).
- The current status and objective for each water body is available in a spreadsheet on the Environment Agency's [ShareFile service \(https://ea.sharefile.com/d-s0faa355450243538\)](https://ea.sharefile.com/d-s0faa355450243538).

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. Some of the predicted outcomes may therefore not be achieved. However, there will 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	32	136	671	148	32	955
Predicted 2021 status	26	115	678	168	32	955
Predicted change	-6	-21	7	20	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	13	38	25	26
Predicted 2021 status	10	41	24	27
Predicted change	-3	3	-1	1

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	123	490	969	5,312	39	1,689
Predicted 2021 status	103	391	969	5,423	39	1,689
Predicted change	-20	-99	0	111	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	31	87	123	170
	Predicted 2021 status	28	79	125	179
	Predicted change	-3	-8	2	9
Invertebrates	Current status	27	55	185	481
	Predicted 2021 status	23	53	179	493
	Predicted change	-4	-2	-6	12
Plants (macrophytes and phytobenthos)	Current status	1	77	227	261
	Predicted 2021 status	1	63	219	275
	Predicted change	0	-14	-8	14

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): (<https://ea.sharefile.com/d-s0faa355450243538>).

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 included in the tables above, are:

- Improvements to the quality of raw water at 91 Safeguard Zones due to actions targeting nitrates and pesticides, for example, a partnership project in the Hull and East Riding Chalk catchment.
- Improvements in river ecology in rural and urban catchments as a result of projects and initiatives aiming to reduce diffuse inputs of sediment, nutrients and other pollutants; for example at the Sandbeck Estate (South Yorkshire), the Doe Lea project and where adopted, Countryside Stewardship.
- Ecology will improve in a number of rivers and the Humber Estuary as a result of numerous habitat restoration projects. For example, the re-meandering of Waithe Beck (Lincolnshire) and the creation or improvement of over 534ha of wetland and 42km of river as result of flood risk management schemes.
- Improvements to fish populations, including eels, due to over 20 fish passage schemes mainly in the Aire, Derwent, Don and Esk catchments.
- Restoration of peat uplands, leading to reductions in sediment and other water quality benefits.
- Improvements to the flow of rivers as a result of the Restoring Sustainable Abstraction programme.

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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (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		
<p>Summary of the programmes of measures to control the significant water management issues</p>	<p>These ongoing measures play a significant role in preventing deterioration.</p> <p>They protect all the current uses of the water environment and the benefits that society gets from it.</p> <p>The ongoing measures represent substantial investment and all sectors with an interest in the water environment have a role to play.</p> <p>These measures apply across the river basin district.</p>	<p>Section 3.2</p>
Measures to achieve outcomes by 2021		
<p>Main programmes of measures for 2021 outcomes (Summary of the programmes of measures that will improve the water environment by 2021)</p>	<p>The main programmes have discrete funding streams to deal with particular issues.</p> <p>These programmes will achieve the biggest improvements in the water environment by 2021.</p> <p>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.</p> <p>These measures apply in either specific locations or across the river basin district.</p>	<p>Section 3.3</p>
<p>Local measures (Summary of the local measures identified by catchment partnerships)</p>	<p>Each catchment partnership has identified the measures they will implement by 2021.</p> <p>Some of the measures are reflected in water body specific outcomes by 2021.</p> <p>These measures apply within specific catchments.</p> <p>Catchment partnerships also identify what more they could achieve if additional resources could be realised in future.</p>	<p>Section 3.4</p>

Forward look at measures beyond 2021		
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 will be reviewed when the plans are next updated in 2021. These measures are not linked to predicted outcomes for 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 \(www.gov.uk/government/collections/river-basin-management-plans-2015\)](http://www.gov.uk/government/collections/river-basin-management-plans-2015).
- More information about the mechanisms used to implement measures is available on the Environment Agency's [ShareFile service \(https://ea.sharefile.com/d-sabbd14301a44d5e9\)](https://ea.sharefile.com/d-sabbd14301a44d5e9).

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 by 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)** 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)** 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)** 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)** license dredging and works within harbour limits.

- **Government and agencies (Environment Agency)** 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** consider 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 the Environment Agency's WFD compliance guidance, which covers a range of activities in estuaries and coasts.
- **Industry, manufacturing and other business** use the Environment Agency's 'Hydropower development: guidance for run-of-river hydropower'.
- **Navigation (ports and harbours), government and agencies (Environment Agency) and local government** use industry developed best practice guidance.

Influencers and regulators 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 \(www.gov.uk/government/collections/river-basin-management-plans-2015\)](http://www.gov.uk/government/collections/river-basin-management-plans-2015).

Supporting information

- More information on marine plans can be found on the gov.uk [webpages \(https://www.gov.uk/government/collections/marine-planning-in-england\)](https://www.gov.uk/government/collections/marine-planning-in-england).
- The Environment Agency's compliance guidance for activities in estuaries and coasts can be found on the gov.uk [webpages \(https://www.gov.uk/government/publications/complying-with-the-water-framework-directive-marine-dredging\)](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 \(https://www.gov.uk/government/collections/hydropower-schemes-guidelines-and-applying-for-permission\)](https://www.gov.uk/government/collections/hydropower-schemes-guidelines-and-applying-for-permission).

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

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 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)** 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 council 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) 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 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.
- **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.

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. 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)** grant licences under the Water Resources Act 1991 to regulate how much water is taken from rivers, lakes estuaries and groundwater. The Environment Agency reviews the sustainability of time-limited abstraction licences as they expire and the licence holders seek replacement licences. The Environment Agency 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)** 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)** 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)** 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)** 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 takes action to curtail abstraction licences that have been identified as causing an environmental problem under the RSA programme. The Environment Agency aims to complete the programme by the end of March 2020.

Regulators and operators plan and work together:

- **Water industry** 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** produce drought plans to make sure that public water supplies are maintained while minimising the environmental impact of drought.
- **Government and agencies (Environment Agency)** 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)** 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.

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

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.

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

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.

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 and Natural England)** 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.
- **Government and agencies (Marine Management Organisation)** 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 and Natural England), 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 and Defra), 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 the addition of powers to make Species Control Agreements and Orders in the Wildlife & Countryside Act 1981 as amended by the Infrastructure Act 2015.
- **Government and agencies (Natural England)** 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 and Natural England), 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 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 \(www.gov.uk/government/collections/river-basin-management-plans-2015\)](http://www.gov.uk/government/collections/river-basin-management-plans-2015).

Supporting information

- The GB Invasive Non-native Species Strategy can be found on the GB non-native species secretariat [webpages \(http://www.nonnativespecies.org/index.cfm?sectionid=55\)](http://www.nonnativespecies.org/index.cfm?sectionid=55)

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)** 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 the 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 and Natural England)** provide site-level advice on the specific requirements of regulations.
- **Government and agencies (Natural England)** 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 and Natural England)** provide advice and training to farmers in some priority catchments through an approach such as Catchment Sensitive Farming.

- **Government and agencies (Environment Agency)** reviews the effectiveness of measures within catchments, and where there is sufficient need, considers whether further action should be proposed.
- **Government and agencies (Forestry Commission)** 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 and Environment Agency)** 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 \(www.gov.uk/government/collections/river-basin-management-plans-2015\)](http://www.gov.uk/government/collections/river-basin-management-plans-2015).

Managing pollution from minewaters

Mining has taken place across the country 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. It affects over 1,700 km of rivers in England and stops some rivers from achieving good status and groundwater bodies, the source of some minewater, from achieving good chemical status.

There are usually many sources of metal pollution in a catchment including point sources such as minewater drainage tunnels and diffuse sources such as waste heaps and groundwater inputs. Almost all mines closed before 2000 and so no one can be held liable for water pollution.

Dealing with pollution from minewaters will substantially improve water quality and help wildlife, including fish, insects and other aquatic life. It will also protect valuable drinking water supplies. Cleaning up pollution from minewater has other benefits, for example, treatment using wetland reed beds significantly enhances biodiversity and provides a rich habitat for birds.

How the issue is managed

Regulators use and apply relevant legislation and policy:

- **Government and agencies (Environment Agency)** grant and review permits under the Environmental Permitting (England and Wales) Regulations 2010 to control the quality and quantity of treated minewater that is returned to the environment.
- **Government and agencies (Environment Agency)** grant licences under the Water Resources Act 1991 to regulate how much water is taken from groundwater as a result of minewater treatment schemes.

Regulators and project undertakers take action:

- **Government and agencies (Environment Agency)** carry out focussed monitoring to identify the main sources of metals in catchments affected by abandoned metal mines, subject to funding.
- **Government and agencies (Environment Agency and Coal Authority)** work with **non governmental organisations (universities, National Trust, Rivers Trusts and others)** to research and provide low cost effective treatment schemes for metal minewaters.
- **Government and agencies (Coal Authority)** develop and build minewater treatment schemes at abandoned metal mines where there are technically feasible and cost beneficial solutions and funding is available.
- **Government and agencies (Coal Authority)** operates 42 treatment schemes at abandoned coal mines with funding from the Department of Energy and Climate Change (DECC) to clean up over 240km of rivers and protect drinking water supplies from groundwater. In 2015 to 2016, DECC has allocated £15 million to develop and build new schemes where there are technically feasible and cost beneficial solutions, and operate existing coal minewater treatment schemes.
- **Government and agencies (Environment Agency)** monitor pollution from abandoned deep coal mines and have prioritised existing discharges requiring treatment.

- **Government and agencies (Environment Agency and Coal Authority)** work together to review impacts from existing discharges from coal mines and identify where measures are needed to prevent new pollution of rivers and groundwater.

Section 3.3 describes the programme of measures that will reduce the pressure from this significant water management issue and secure improvements for the water environment by 2021.

Further information in this document

- You can find more information on the abandoned metal mines programme in section 3.3.

Information elsewhere in the river basin management plan

- You can find more information about the management of pollution from minewaters in Section 2 of [Part 2: RBMP overview](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).

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
- Countryside Stewardship
- Highways England's environment fund
- flood risk management investment programme
- catchment level government funded improvements
- abandoned metal mines programme
- 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) (<https://ea.sharefile.com/d-sabbd14301a44d5e9>).

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 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 sets 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. This equates to, when forecast over a 37-year period, a total of approximately £520 million being invested in this river basin district.

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.

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.

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.

Examples of these measures in the Humber river basin district

Water resources

Following investigations in previous years, Yorkshire Water has agreed to over £17 million of investment to benefit fisheries, water environments and biodiversity as well as a large investment to improve water quality. This investment will see a number of reservoirs investigated to improve compensation flows or improve the management of sediment to sustain river morphology. The company will be working with partners at particular sites to achieve the best outcome, for example, with canoeists in the Washburn Valley.

The company will also remove barriers to migration upstream of reservoirs and plan to remove some main river weirs to support greater movement of fish in certain catchments.

As part of the contribution to other WFD outcomes, the company plans to adopt an approach to manage invasive species on its own sites and continue with work to improve ancient woodlands and designated sites.

Water quality

The River Dearne drains a largely industrial area of south Yorkshire centred around Barnsley. Plans for Yorkshire Water investment by March 2020 include improving treatment at Clayton West, West Bretton and Lundwood (Barnsley) wastewater treatment works. This investment will reduce levels of ammonia, which is toxic to fisheries and invertebrates, in these discharges.

The investment at Clayton West and West Bretton will improve ammonia status from moderate to good in 7.1km of river from Bentley Brook to Cawthorne Dyke in the upper reaches of the catchment. The investment at Lundwood will improve ammonia status from moderate to good in 8.5km of the River Dearne from Barnsley to the River Dove at Darfield in the lower part of the catchment.

Yorkshire Water will also be investigating whether its storm overflows in these areas are impacting on the river as a fishery. These investigations will involve extensive monitoring and modelling studies.

Countryside Stewardship

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 to 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 river basin district.

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 river basin district by 2021.

Flood risk management investment

The Environment Agency's Flood and Coastal Erosion Risk Management capital investment programme aims 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.

Based on the first year of investment, a number of improvements to the environment resulting from the flood risk management investment programme are linked to predicted improvements in status by 2021 for specific elements in specific water bodies. These actions will contribute to the achievement of good ecological potential.

Examples of these measures in the Humber river basin district

Skipton flood alleviation scheme

Skipton flood alleviation scheme is expected to provide approximately 2ha of Biodiversity Action Plan habitat as part of the overall scheme. The Environment Agency is working with the Yorkshire Wildlife Trust and other partners to identify suitable locations along the River Aire to introduce a combination of wet and deciduous woodland and hedgerow planting.

Leicester flood risk management strategy

The Leicester flood risk management strategy is looking at improving the movement of flood flows through the River Soar corridor. This work involves enhancing and improving the river channel and removing silt that has accumulated in structures in the flood plain over the years to improve the movement of out of bank flows. It is expected that approximately 1 hectare of priority habitat in the form of a wetland will be created as part of the overall scheme.

Catchment level government funded improvements

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 measures. 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, management of 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. This includes habitat creation and channel improvements. Other 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.

Examples of these measures in the Humber river basin district

Salmon to south Yorkshire project

The Environment Agency is working with the Don Catchment Rivers Trust to address fish passage on the River Don. The project is the culmination of years of investment in water quality and improved environmental regulation. The conditions are now good for the return of migratory salmon to the River Don. Previous investment by the Environment Agency in fish passes at Crimpsall Sluice and Sprotbrough, down and upstream of Doncaster, means that salmon will soon be able to reach the outskirts of Rotherham. A combined hydropower and fish pass scheme is being built on Thrybergh Weir which will enable this.

In 2015 Ward End Weir was removed. Furthermore, there are partners' proposals to install hydropower and fish pass schemes on other weirs on the river. These combined efforts leave only 5 weirs preventing the re-establishment of a viable and sustainable salmon population in the River Don for the first time in over 150 years. The Don Catchment Rivers

Trust is leading on the Living Heritage of the River Don project to install 2 technical fish passes and 3 easements on these outstanding weirs. In addition to reconnecting the river ecologically, the project will engage the local community with the river, thereby improving stewardship.

Clough woodlands project

Through the Environment Agencies continuing partnership with the Peak District National Park Authority (Moors for the Future Partnership), the Forestry Commission, National Trust and the Woodland Trust, new areas of clough woodland have been created on the steep valley sides of several of the tributaries of the Upper Derbyshire Derwent catchment in the Peak District, including the Rivers Ashop, Noe, Westend and the Derwent.

These woodlands will help address failing elements hydrology, pH, copper and zinc and, as the woodland establishes, they have the potential to reduce rapid run-off during heavy rainfall. Over 57ha of upland oak woodland habitat have been created in 2014/15 and will continue to be planted in 2015/16.

Abandoned metal mines programme

In England, abandoned metal mines pollute up to 1,700km of rivers with cadmium, lead, zinc, copper and iron. Defra set up the “Water and Abandoned Metal Mines Programme” in partnership with the Environment Agency and the Coal Authority to begin to address this pollution.

In 2015 to 2016, nationally Defra has allocated £4.5 million to deal with water pollution from abandoned metal mines including operation of existing schemes. The programme is carried out through a partnership. The Environment Agency is funded to carry out focused monitoring to identify the main sources of metal pollution in impacted river catchments. Where studies highlight a significant impact, identifiable sources and where treatment appears likely to clean up the pollution, the Coal Authority leads the development of measures. Subject to funding and outcomes of prioritisation, the Coal Authority will provide feasible remedial measures. This will begin to clean up polluted rivers, and stop groundwater discharges causing pollution.

Climate change is expected to lead to more frequent intensive rainfall and increased river flows. This is likely to increase the significance of diffuse sources of metals. In identifying treatment options, climate change mitigation is considered.

Treatment technologies for point sources at abandoned metal mines range from proven active chemical treatments to less well proven innovative passive systems that do not require ongoing supply of chemicals or energy. Measures to deal with diffuse inputs include civil engineering options such as capping or removing metal rich material, as well as green engineering techniques that rely on plants and small-scale riverbank restoration to limit the entry of metal rich soils to rivers. The programme includes investigation and testing of new treatment technologies to develop new, low-cost but effective measures. Outcomes are secured through voluntary action by government subject to availability of funds, with treatment schemes being regulated through abstraction licences and environmental permits.

Environmental improvements from the Water and Abandoned Metal Mines Programme are linked to predicted improvements in status for 2021 for iron, zinc and invertebrates in specific water bodies.

An example of these measures in the Humber river basin district

Abandoned metal mines pollute up to 500km of rivers in the Humber river basin district. Investigations are underway or planned for most of the rivers affected by metal mines. The feasibility of building measures that provide environmental and economic benefits will be investigated during the second cycle, particularly in the Swale and Nidd catchments.

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 provisions 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 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 Abstractions (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.

Some of the outcomes from water resources sustainability measures are linked to predicted improvements in status by 2021. They will improve the hydrological regime element of classification, supporting good status in some surface water bodies and good quantitative status in some groundwater.

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 will take action to change or revoke abstraction licences that have already been identified as causing an environmental problem.
- The Environment Agency is using government guidance and evidence to take a prioritised approach to assessing whether licence changes are needed to protect the environment from serious damage. All abstractors should anticipate changes to their licences in water bodies 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, water companies, local authorities, conservation bodies and site owners.

The Environment Agency works 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 programme.

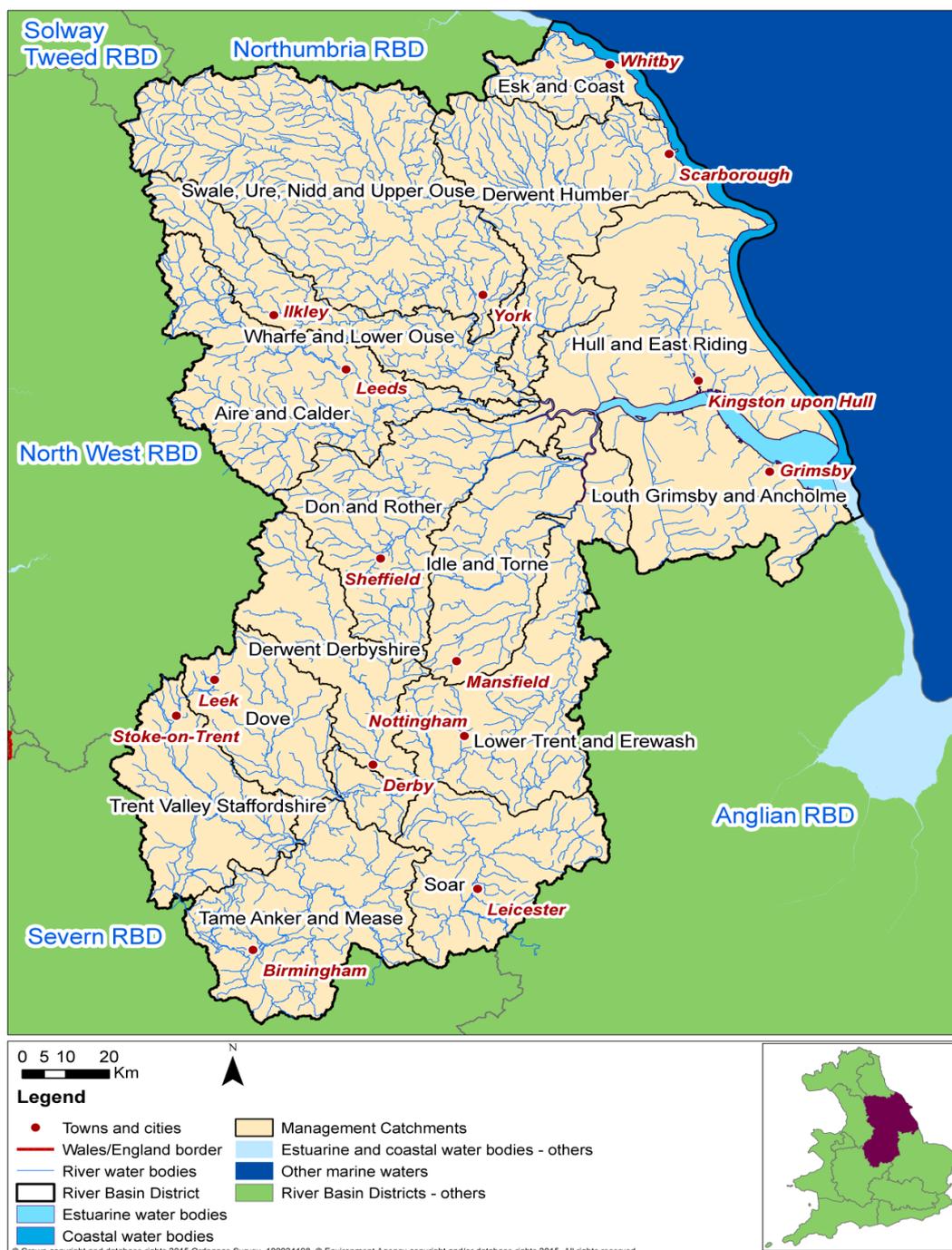
Examples of these measures in the Humber river basin district

Under the RSA programme for Humber RBD there is one non-water company licence. This licence is in the agricultural sector and is being changed to help protect a SSSI. It has a planned delivery date of March 2016.

3.4. Local measures

Catchment partnerships are a major initiative to encourage local action to protect and enhance the water environment. The catchment based approach allows flexibility in the geographic scale at which catchment partnerships operate. Most catchment partnerships operate at the water ‘management’ catchment scale. Some operate at a smaller catchment scale. The partnerships consist of a wide range of stakeholders 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. Figure 2 shows the management catchments in the river basin district.

Figure 2: Management catchments within the Humber river basin district



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. 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 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 \(http://environment.data.gov.uk/catchment-planning/\)](http://environment.data.gov.uk/catchment-planning/).

Measures in the Aire and Calder catchment

Catchment partnership: The Aire and Calder catchment partnership is hosted by the Aire Rivers Trust. Members include Bradford/Calderdale/Leeds/Wakefield/Kirklees/Craven councils, Calder and Colne Rivers Trust, Canal and Rivers Trust, the Environment Agency, Groundwork Leeds, South Pennines and Yorkshire West Local Nature Partnerships and the Yorkshire Wildlife Trust, the RSPB, Trust for Conservation Volunteers, Yorkshire Water, Natural England.

The partnership is still at a relatively early stage, although it includes some well-established organisations with a history of working together. It is in the process of reviewing governance and membership. The partnership operates as a forum for dialogue, co-ordination, information sharing and facilitation of collaborations. It envisages that project delivery will be through partnership members rather than the partnership itself.

The partnership's vision is for 'a healthy and wildlife-rich water environment that is valued and enjoyed, bringing social and economic benefits to all.'

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

- mitigation of the effects of heavily modified water bodies
- point source pollution, primarily from water company assets
- diffuse pollution, both urban and rural

Other issues for the partnership include litter and invasive species.

Contribution to environmental outcomes for 2021

- Work on 9 substantial weirs on the Aire should be complete by 2021, with non-governmental funding of approximately £4.3 million.
- In 2015-16 work will be done by Friends of Bradford Beck to identify sources of urban diffuse pollution on Bradford Beck and other nearby water bodies. This is a partnership project with Bradford Environmental Action Trust, Bradford Council, the Environment Agency, the University of Sheffield and Yorkshire Water. The work is supported by the Catchment Partnership Action Fund and partnership funding, £13,000 capital cost and £58,000 operational costs.

Future aims

- Ideas for additional measures with more partnership funding include: Restoration of viable salmonid populations. Finalise an 'estuary to source' route for fish passage by enabling fish passage at 3 further weirs on each of the Aire and the Calder, at a total cost of approximately £3.5 million.
- Build on previous work with landowners to reduce rural diffuse pollution. Continue this successful approach in additional water bodies in order to reduce sediment production and restore riverside habitats and manage invasive species.
- Develop and support a stewardship approach to improve the water environment, engage the community and enhance amenity.
- Build on the outcomes of the Bradford Beck project, develop a systematic and effective approach to identification and remediation of sources of urban diffuse pollution.

Further information on the partnership is available at: <http://aireandcalderpartnership.org/>

Measures in the Derwent Derbyshire catchment

Catchment partnership(s): The Derbyshire Derwent catchment partnership is hosted by the Derbyshire Wildlife Trust.

The priority river basin management issues to be tackled in the catchment are:

- diffuse rural pollution
- diffuse and point source urban pollution
- impoverished biodiversity within the catchment and barriers to fish movement

Contribution to environmental outcomes for 2021

The partnership is still in the formation and development stages, but a steering group has been set up, which is focusing on identifying stakeholders and landowners. The group is looking at the evidence and opportunity mapping. Sub groups have been established to look at specific issues and these groups are developing project ideas.

Future aims

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

- identify and reduce pollution in 4 key water bodies in the catchment
- work with farmers on ways to manage diffuse agricultural pollution
- demonstrate and promote the benefits of collaborative working
- support community action and educational initiatives to improve the water environment and, where appropriate, support increased access on new and existing public footpaths and public open space
- improve biodiversity within the catchment by invasive species management, habitat management and improvement such as establishing new wetlands
- provide multiple benefits by tree planting, in-river woody debris and invasive species management
- consider the impact of climate change on the environment and ways to manage and mitigate this, particularly in the World Heritage Site
- influence and support sustainable development in urban areas to deliver multiple benefits, including climate change adaptation and mitigation

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

- identifying and reducing pollution on 10 water bodies in the catchment
- further development and widespread implementation of biodiversity projects

Further information on the partnership is available on the catchment based approach [website](#):

<http://www.catchmentbasedapproach.org/humber>

Measures in the Derwent Humber catchment

Catchment partnership(s): A formal Yorkshire Derwent Partnership is in the process of formation as of May 2015 and workshops have helped to identify the priorities for the catchment. Current partners in the interim steering group comprise the Environment Agency, Natural England, Forestry Commission, Yorkshire Wildlife Trust, East Yorkshire Rivers Trust and North Yorkshire County Council. Much of the catchment has a high conservation status, but not all of this is in favourable condition. A major issue in the catchment is, therefore, to maintain and restore the areas designated for conservation.

The priority river basin management issues in the catchment to tackle include:

- reducing diffuse water pollution from agriculture
- removing barriers to fish migration and improving in-channel habitat
- restoring the River Derwent Site of Special Scientific Interest (SSSI) to favourable condition

Contribution to environmental outcomes for 2021

- the partnership will assist the Environment Agency with the 'Doing More for the Derwent Project' to improve fish passage on the Lower and Middle Derwent (£895,000)
- Continuation of the Derwent Restoration Project (alongside the above) to restore the Lower Derwent SSSI. Work will improve habitats and address agricultural diffuse pollution.
- a Catchment Partnership Action Fund Project for the River Seph to reduce sediment and improve fish habitat (£31,000)
- project work on Thornton Beck to reduce sediment, slow the flow and prevent deterioration of the watercourse
- habitat restoration work on Pickering Beck to address silt pathways and improve habitat for fish and the Duke of Burgundy butterfly (£13,000)
- bathing water investigations in Scarborough (£2,000)

Future aims

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

- straightened Derwent project to exemplify benefits of re-naturalising the Upper Derwent (£50,000)
- extend the principles of the Slowing the Flow Project across the Upper Derwent and Rye operational catchments to reduce flood risk, address sediment issues and create wet woodland (£100,000)
- production of farm plans across the North York Moors National Park to address diffuse pollution
- citizen science projects and a table top catchment model and riverfly monitoring (£40,000)

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

- address barriers to fish migration at Nunnington Mill (£350,000)
- remove large and small barriers to fish migration on the Derwent (£5 million)
- restore large sections of the Derwent to improve water quality, habitat, biodiversity and flood resilience' (£4 million)
- Coastal pollution, fisheries and invertebrate monitoring along with marine litter and education campaign (£70,000)

Further information on the partnership is available at: <http://www.catchmentbasedapproach.org>

Measures in the Don and Rother catchment

Catchment partnership(s): The Don Network is an alliance of existing delivery groups hosted by the Don Catchment Rivers Trust and the Environment Agency. The Network includes the Wildlife Trusts, National Trust, Rivers Trust, Sheffield River Stewardship Company, internal drainage boards, local authorities and local community groups.

The priority river basin management issues in the catchment are heavily modified habitat, point source pollution and diffuse pollution.

Contribution to environmental outcomes for 2021

- The Living Heritage of the River Don project is focusing on fish passage solutions that will improve the status for fish and will help to reconnect 23km of river. The cost of these measures will be £1,414,000 over 3 years, with 84% of funding coming from the Heritage Lottery Fund.
- At least 5 more weirs will be addressed by the Canal & River Trust, Sheffield City Council and Yorkshire Water that will all contribute to the aim of restoring salmon to south Yorkshire by creating a fish highway along the Don to spawning grounds above Sheffield.
- The Rotherham Rivers Project phase 1 is restoring and creating 94 hectares of habitat at 12 sites along the river corridors of the Don and Rother as part of the wider Living Don programme. The costs over 3 years of £300,000 have primarily been funded by the WREN Biodiversity Action Fund awarded to the Sheffield and Rotherham Wildlife Trust, plus funding from Natural England and Rotherham Metropolitan Borough Council.
- The Dearne Valley Green Heart Partnership's Nature Improvement Area has completed the phase 1 actions, which included the creation of a new washland nature reserve by the RSPB at Houghton with associated downstream flood alleviation benefits. The phase 2 actions include further connectivity work at Houghton Washland and the Wombwell Ings extension project.

Future aims

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

- deliver habitat improvements along the river corridors of the Don, the Rother and their tributaries as identified in the relevant Living Don Partnerships action plans
- urban river restoration such as Blackburn Brook in Sheffield and Bentley Mill Stream in Doncaster
- protect and improve high quality habitat in the headwaters and potential spawning grounds

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

- day-lighting, de-culverting, restoration and access to urban rivers that promote a sense of place and develop green corridors through cities, for example River Sheaf and River Porter in Sheffield, Sough Dyke and Measbrough Dyke in Barnsley
- develop the River Rother and River Dearne washlands to reconnect flood plains where appropriate, to improve water quality, habitat, biodiversity and flood resilience
- Ea Beck and Doe Lea landscape scale restorations to improve water quality, habitat, biodiversity and flood resilience

For current information on the partnership see <http://www.dcr.org.uk/the-don-network>.

Measures in the Dove catchment

Catchment partnership(s): The Dove catchment partnership is hosted by Trent Rivers Trust and has some 30 active members from the public, private and voluntary sectors.

Priority issues for the partnership are:

- diffuse rural pollution by phosphates, pesticides and sediment
- the negative impacts of man-made modifications such as weirs, and the benefits of bank reinforcements and large woody material on river function and habitat
- balancing high visitor numbers and recreational use with wildlife protection

Contribution to environmental outcomes for 2021

- The partnership is looking to develop projects to achieve actions in priority water bodies across the catchment. The 'Letting the Dove Flow' project aims to restore the Dovedale and Wolfscote Dale Sites of Special Scientific Interest (SSSI). In association with Loughborough University, the partnership is developing an assessment and monitoring tool for the removal of weirs and the use of large woody material to improve river ecosystems.
- The partnership will be working on Foston Brook to reduce rural diffuse pollution and also help reduce flooding in Scropton Village through a series of catchment investigations, a programme of targeted farm advice and guidance.

Future aims

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

- further work on Foston Brook, which needs to be sustained for at least 3 years to deliver multiple benefits and monitor outcomes
- begin to deliver the Dovedale and Wolfscote Dale Restoration Plan
- Work to find opportunities to manage sediment problems affecting flooding and abstraction and improve habitat on the Lower Dove
- add small-scale habitat improvement works to support the ongoing project that is looking to reduce diffuse pollution in the Tittesworth Reservoir catchment

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

- deliver similar projects to Foston Brook in the Bentley Brook, River Tean and upper Dove catchments to reduce diffuse pollution
- deliver a significant element of the Dovedale and Wolfscote Dale Restoration Plan
- carry out capital works to deliver opportunities identified on the Lower Dove
- build on the work of the Churnet Valley Living Landscape Partnership

Further information on the partnership is available at: <http://www.trentriverstrust.org/site/River-Dove>

Measures in the Esk and Coast catchment

Catchment partnership: The Yorkshire Esk Rivers Trust and the North York Moors National Park Authority are joint hosts for the partnership. The steering group includes Natural England, the Environment Agency, Yorkshire Water, Yorkshire Wildlife Trust, Durham University, local angling clubs and local landowners. The steering group has developed a 3 year action plan to identify issues and priority projects. The top priority issues in the catchment are:

- achieving high ecological status on the Esk is essential for the survival of critically endangered freshwater pearl mussel and Atlantic salmon and sea trout stocks
- reduce diffuse water pollution from agriculture
- removal or easement of barriers to fish migration and improving in-channel habitat to increase populations of Atlantic salmon and sea trout

Contribution to environmental outcomes for 2021

Projects include:

- restoring Freshwater Pearl Mussels (FWPM) in England project for catchment work, including on-farm infrastructure, which is Biffa funded for 2015-2018 (£300,000)
- the Exploited Land project, a Heritage Lottery funded landscape partnership project (over £156,000) to improve riparian habitats and address 2 barriers to fish migration
- discovering the Esk is a People's Postcode Lottery award (£10,000) to deliver community engagement, education activities and invertebrate monitoring
- Glaisdale Beck Restoration Project (£31,000) to address diffuse pollution and prevent deterioration through the Catchment Partnership Action Fund

Future aims

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

- address agricultural diffuse pollution on 7 water bodies upstream of Lealholm and undertake habitat restoration and farm infrastructure improvements (£30,000)
- removal of 1 small fish barrier per year such as Tower Beck Ford (£30,000)
- catchment scale non-native invasive plant eradication (£10,000)
- fund a catchment partnership officer to continue with community engagement and citizen science such as Adopt a Stream and riverfly monitoring (£30,000)

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

- removal of major fish barriers at Danby, Castleton and Westerdale Ford (£350,000).
- habitat restoration works and farm infrastructure improvements on 16 water bodies upstream of Ruswarp (£300,000)
- continue with the FWPM project and set up a local captive breeding centre (£100,000)
- develop a coastal volunteer group, including a marine litter removal scheme (£50,000)
- septic tank project to promote best practice across 200 properties (£34,000)
- detailed environmental monitoring programme for water chemical and biological water quality, including fish surveys (£40,000)
- fisheries/enforcement officer for the Esk and Coastal Stream catchment (£26,000)

For further information on the partnership: <http://www.yorkshireeskriverstrust.org/caba.php>.

Measures in the Hull and East Riding catchment

Catchment partnership: The Hull and East Riding partnership is hosted by Yorkshire Wildlife Trust (lead host), East Yorkshire Rivers Trust (sub host), 3 internal drainage boards, East and North Yorkshire Waterways Partnership, Hull City Council, East Riding of Yorkshire Council, Natural England (including Catchment Sensitive Farming) and the Environment Agency. The priority river basin management issues to tackle in the catchment are:

- diffuse pollution (both agricultural and urban)
- sustainable drainage systems (SuDS)
- restoration of habitats and links to natural river processes

Contribution to environmental outcomes for 2021

- The partnership will be focusing on the following projects. Effort will be targeted at urban issues around green infrastructure, SuDS and connectivity of water bodies, focusing particularly around the Lower River Hull catchment.
- In the headwaters of the River Hull on the chalk stream SSSI we will aim to restore a further 10km of chalk stream habitat. This will cost an estimated £300,000. Tried and tested external funding partnerships exist (for example, currently in 2015 a £380,000 programme is underway with £246,000 from external sources and match of £130,000 from Natural England and the Environment Agency).
- In the River Foulness and Market Weighton Canal work will be undertaken to identify where land use change can be aligned with habitat creation and flood attenuation. An upstream section has already been identified as having potential for works with an estimated cost of between £20,000 and £75,000.

Future aims

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

- A community focused programme in the city of Hull to engage local people more fully with the concept of SuDS and how local people can provide solutions to their own flooding issues and, therefore, also contribute to improved water quality.
- A programme of work with priority landowners where habitat creation opportunities exist to provide long-term benefits (improve water quality, habitat, biodiversity and flood resilience) for flood plain connectivity and river restoration. Building up a map and future plan of actions and remedies.

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

- The partnership could create 2 large scale exemplar wetland sites where holistic land management sits alongside flood plain connectivity to improve water quality, habitat, biodiversity and flood resilience. These would be used as demonstration sites to show that land-use change can be initiated and still provide viable agricultural opportunity that is both economic and sustainable.

For further information on the partnership contact Yorkshire Wildlife Trust at info@ywt.org.uk.

Measures in the Humber Estuary catchment

Catchment partnership: The Humber Nature Partnership (HNP) is the catchment host for the Humber estuary and coastal management catchment. The partnership's vision is as follows:

By 2020 the Humber Estuary's natural environment will be richer in ecological diversity and more able to adapt to the pressures placed upon it than it is today, bringing benefits for wildlife, business and local people.

Achieving this vision requires the partnership to work closely with its members and others to coordinate work around the estuary in order to secure the best possible results all round. HNP's membership includes statutory regulators, local authorities, private sector businesses, nature conservation non government organisations as well as individuals with an interest in the positive management of the Humber Estuary. This breadth of membership means that the partnership is able to draw upon a wealth of knowledge and experience about the Humber in developing plans and projects to improve the environment.

The priority river basin management issues to tackle in the catchment:

- coastal squeeze and intertidal habitat loss
- tributyltin contamination in the inner estuary
- dissolved oxygen sag in the inner estuary during summer months

Contribution to environmental outcomes for 2021

The partnership encompasses the Humber Management Scheme. This scheme is geared towards ensuring that the Humber Estuary European Marine Site reaches 'favourable conservation status' as required by the Habitats Regulations. This requirement fits well with the requirement under the Water Framework Directive for the Humber to reach 'good ecological potential'.

Many of the actions identified within the Humber Management Scheme action plan will meet the requirements of both pieces of legislation, including actions that cover issues and necessary measures such as habitat compensation for coastal squeeze, improving flood plain connectivity, awareness raising and carrying out data collection and research.

Future aims

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

- extend existing programmes of data collection to fill gaps and ensure that high quality physical, biological and chemical data and evidence exists to support decision making
- work with landowners and businesses adjacent to the estuary to identify and work towards addressing issues that may be causing water quality problems
- raise awareness of the effects of actions both on the estuary and upstream on the water quality in the Humber Estuary

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

- Further funding would allow the partnership to identify opportunities to implement some of the thinking developed in the Environment Agency's 'Humber Estuary Landscape and Green Infrastructure' study. For example, inclusion of green and blue infrastructure alongside major economic development around the estuary, identification of opportunities to create additional intertidal habitats and inclusion of 'WFD friendly' measures in flood defence works.

Further information on the partnership is available at: www.humburnature.co.uk

Measures in the Idle and Torne catchment

Catchment partnership(s): The Idle catchment partnership is led by Nottinghamshire Wildlife Trust and the Torne catchment partnership is led by Yorkshire Wildlife Trust.

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

- rural diffuse pollution
- urban point source and diffuse pollution
- hydromorphological issues relating to land drainage

Contribution to environmental outcomes for 2021

- The Nottinghamshire Wildlife Trust will lead projects on Rainworth Water and the Rivers Meden and Ryton (£47,500) to reduce phosphate and triclosan. It will also create Biodiversity Action Plan priority riparian habitats to improve ecological status.
- The Yorkshire Wildlife Trust will lead engagement, monitoring and Site of Special Scientific Interest (SSSI) re-wetting interventions on tenanted farms in Sandall Beat Park and the Sandbeck Estate (£28,000). This will provide improvements in phosphate and ammonia, dissolved oxygen and invertebrate populations. Wetland and riparian habitat will also be created and restored through bank stabilisation.
- Additional projects led by Nottinghamshire Wildlife Trust include Clumber Lake scoping and a silt survey and modelling on the lower River Idle.

Future aims

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

- Both partnerships have developed and agreed action plans, which include a list of potential future projects. These cover 5 areas: farming, nature, community, industrial and urban and water management.
- Projects likely to go ahead include production of an opportunity map for a softer approach to capital improvement works at Keadby Pumping Station; riparian buffer strips for water quality and habitat improvements at Hatfield Chase ditches; in-channel habitat improvements and fish passage on weir at Mill Dam, Tickhill.
- Employ a full-time catchment officer to identify and implement projects, work with landowners and communities to prevent pollution reaching the river system.

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

- tackle large scale historical issues relating to heavy metal pollution, subsidence from mining and dredging of lakes
- implement interventions at Keadby pumping station such as river restoration to improve habitat, river ecosystem function and flood resilience
- undertake selective de-silting of the River Idle for ecological benefits and implement the Idle Washlands SSSI water level management plan

Further information on the partnership is available on the catchment based approach [web page](http://www.catchmentbasedapproach.org/humber): <http://www.catchmentbasedapproach.org/humber>.

Measures in the Louth, Grimsby and Ancholme catchment

Catchment partnership(s): There are 2 catchment partnerships in the Louth, Grimsby and Ancholme management catchment. The Northern Becks catchment partnership is hosted by the Lincolnshire Chalk Streams Project, which is made up of Lincolnshire County Council, Lincolnshire Wolds Countryside Service, the Environment Agency, Natural England, Anglian Water, Lincolnshire Wildlife Trust and the Wild Trout Trust. The Ancholme catchment partnership is hosted by the Ancholme Rivers Trust. Members of this partnership include North Lincolnshire Council, Ancholme Users Group, Lincolnshire County Council, Ancholme Rowing Club, Inland Waterways Association and the Environment Agency.

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

- the extent of historic river modification
- pollution from rural areas
- pollution from waste water

Contribution to environmental outcomes for 2021

- The rural diffuse pollution and river restoration project in the Waithe Beck will restore habitat and improve ecology. The project will restore this important habitat by re-meandering 900 metres of river bank and reconnect the river with its flood plain. This will restore river function and slow the flow of water downstream. Reducing sediment input in the upper reaches will improve flood resilience and benefit ecology downstream. The cost of this measure will be approximately £100,000 over 2 years, with funding secured by the Lincolnshire Chalk Stream Partnership
- Projects are confirmed on 3 water bodies within the Northern Becks sub catchment and 1 water body in the Ancholme catchment, which will focus on restoring important habitat.

Future aims

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

- Continue with an opportunistic approach to delivering habitat restoration and landowner engagement within the Northern Becks sub catchment. Projects would focus on increasing the amount of available habitat within the channel and working to reduce inputs from land use in the catchment.
- Action taken on the River Ancholme to create and enhance fish refuges and spawning ground in addition to habitat restoration alongside the river.
- Investigate and implement action to reduce the impact of river pollution on the River Ancholme and its tributaries for recreational users.

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

- Whole river restoration would be possible on 3 priority water bodies to restore them to their full chalk stream potential. This would include joined up landowner engagement and restoration of historical trout runs on Lincolnshire chalk streams.
- Habitat restoration in the Ancholme Valley including new wetland habitat.

For current information on the partnerships see <http://www.lincswolds.org.uk/chalk-streams/lincolnshire-chalk-streams>

Measures in the Lower Trent and Erewash catchment

Catchment partnership(s): The Lower Trent and Erewash partnership is made up of Severn Trent Water, Trent Rivers Trust, Groundwork Greater Nottingham and the Environment Agency.

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

- diffuse pollution from rural and urban areas
- fish passage
- channel modification

Contribution to environmental outcomes for 2021

- The partnership has developed an opportunity map, overlaying areas of maximum ecosystem service benefits with opportunities to meet catchment objectives.
- Two projects, one focusing on urban and one on rural diffuse pollution will result in improvements in the status of phosphate and invertebrates in the Ouse Dyke, Gedling and prevent deterioration in phosphate in the Dover Beck catchment. The cost of these measures will be £80,000 over 1 year.
- Further projects include the Day Brook urban wetland creation to mitigate flood risk, reduce phosphates and re-naturalising channels (£30,000). A Severn Trent Water funded 'Cash for Catchments' programme for local community groups to bid for grants matched by local businesses to deliver environmental projects (£50,000).

Future aims

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

- Woodborough Wetland; a bid to raise £120,000 for a flagship farm wetland is in place to increase biodiversity, reduce siltation and provide flood resilience benefits to Woodborough.
- Engage communities and businesses to take ownership of their local water environment and provide access to the water environment by supporting the development of Waterside Care groups and local initiatives including Bottesford Beck Improvement Group.
- Work with Coal Field Restoration Trust to identify and support work to restore and reduce impacts from historic pollution.
- Formalise and present the partnership opportunity map to engage the public and promote ideas to partners to ensure shared delivery of actions. Use the opportunity map to develop and support projects that tackle both rural and urban diffuse pollution.

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

- Work with developers, engineers and hydropower companies, particularly at Cromwell Weir, to help fund fish passage projects to resolve fish failures.
- Work with the RSPB in the Lower Trent corridor to restore and reconnect old quarry workings. This will resolve failures in invertebrates and macrophytes; contribute to resolving phosphate failures; elevate flood alleviation capacity; increase recreational opportunities and contribution to Biodiversity 2020 targets.

For current information on the partnership see [Lower Trent and Erewash Catchment Page: http://www.catchmentbasedapproach.org/humber](http://www.catchmentbasedapproach.org/humber).

Measures in the Soar catchment

Catchment partnership(s): The Soar catchment partnership steering group is made up of British Canoeing, the Environment Agency, Leicester City Council, Leicestershire County Council, the National Farmers' Union, Natural England, Severn Trent Water and Trent Rivers Trust.

The priority issues to be tackled in the catchment are:

- diffuse pollution from agriculture and urban areas
- modified river and wetland habitats
- limited understanding of the multiple benefits of rivers, wetlands and sustainable drainage systems (SuDS)

Contribution to environmental outcomes for 2021

- Two projects have been confirmed to address diffuse agricultural and diffuse urban pollution and reduce phosphate levels in 2 water bodies; tributaries of the Willow Brook flowing into Leicester. A third project has been confirmed to improve habitat and reduce silt levels in a water body on the River Eye Site of Special Scientific Interest (SSSI). The total cost of these projects is estimated to be £80,000.

Future aims

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

- A number of potential multiple benefit projects involving Leicestershire County Council, Leicester City Council, Natural England, the Environment Agency and Trent Rivers Trust could tackle poor habitat quality and diffuse pollution while reducing flood risk to downstream communities. Leicester City Council in particular is leading on a range of projects to improve water quality, increase habitat diversity and achieve sustainable drainage solutions.
- Existing partner projects will seek to achieve between 5 and 10 enhanced water management benefits each year of varying scales.
- Establish a catchment based approach project across the urban and rural Willow Brook catchment.
- Complete a SuDS engagement and awareness project across the urban area.

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

- Ensure catchment based approach projects are operating in all sub catchments. Support land managers and others to improve water quality and habitats in rural and urban areas. Actively involve communities and enable them to monitor and support enhancement measures in their local watercourse.
- Protect and enhance priority areas including statutory and non-statutory sites, the River Soar Valley, the Willow Brook and the Wash Brook.
- Support partners to achieve multiple benefits through development, projects and routine maintenance.
- Improve public understanding of the importance of rivers for multiple benefits across the Soar to improve water quality, habitat, biodiversity and some flood resilience. Partners provide access, interpretation and events across the Soar to attract and engage the public.

Further information on the partnership is available at: <http://www.trentriverstrust.org/site/river-soar>.

Measures in the Staffordshire Trent Valley catchment

Catchment partnership: The Staffordshire Trent Valley partnership is hosted by Staffordshire Wildlife Trust, with 10 organisations on the steering group and a wider partnership made up of representatives of public, private and voluntary sector organisations, including local authorities and water companies.

The priority river basin management issues to be tackled in the catchment are:

- diffuse pollution from rural areas resulting in elevated levels of phosphates, pesticides and sediments
- man-made changes to the shape and flow of rivers that include the engineering of river channels, the introduction of barriers to fish and changes to riparian habitat
- diffuse pollution from towns and cities resulting in impacts on fish and invertebrate populations

Contribution to environmental outcomes for 2021

- Following a series of stakeholder events, a steering group has been formed and the partnership is finalising a catchment action plan. This has focused on identifying short, medium and long-term projects and sources of potential funding.
- A river restoration and community engagement project will address the impact of urban diffuse pollution on a 2.5km stretch of river in the Trent headwaters. This will contribute to improving phosphate, fish and invertebrate elements in 2 water bodies by 2021.

Future aims

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

- Set up a stakeholder group identifying priority water bodies to achieve projects that reduce rural diffuse pollution issues. This would be undertaken through a programme of land management advice and other intervention measures such as rural sustainable drainage schemes (SuDS) and river habitat improvements. Reducing pesticides in Blithfield drinking water reservoir is one of the main priorities.
- Continued river restoration work in Trent headwaters to improve habitat for fish and invertebrates, reduce flood risk, restore river function and improve water quality. Targeting the retrofit of SuDS and community engagement initiatives (for example, misconnection campaigns) to reduce urban diffuse pollution.
- Better connect people with their local water environment through the development of 'citizen scientists'. The partnership will train local community volunteers to monitor and provide evidence of improvements/variations in water quality in their locality.

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

- Develop a wide-ranging landscape scale initiative to accomplish integrated collaborative projects across the catchment. This would address the priority issues and provide multiple benefits to address water quality, biodiversity, flood risk, adaptation to climate change and socio-economic outcomes.

For current information on the partnership see <http://www.staffs-wildlife.org.uk/staffstrentvalley>

Measures in the Swale, Ure, Nidd and Upper Ouse catchment

Catchment partnership: The Board of Dales to Vale Rivers Network is made up of the Yorkshire Dales Rivers Trust (lead host), the Environment Agency, Natural England, Nidderdale Area of Outstanding Natural Beauty (AONB), the Yorkshire Dales National Park Authority and Yorkshire Wildlife Trust. Participation in the wider network includes farmers, landowners, local authorities, anglers, canoeists and a growing body of volunteers.

The partnership's top priorities are to tackle diffuse rural pollution, promote natural flood risk management and mitigate the impact of morphological changes.

Contribution to environmental outcomes for 2021

The partnership is supporting the following projects:

- The Mid Swale Tributaries project, led by Yorkshire Dales Rivers Trust, aims to reduce sediment inputs, increase habitat creation, reduce flood risk and improve water quality. The project group includes representatives of the farming community as well as statutory agencies and local authorities. The majority of funding is being sought from the Landfill Communities Fund.
- Reconnecting the Laver project, led by the Yorkshire Dales Rivers Trust, aims to improve nearly 16km of spawning habitat on Kex Beck and the Laver with £250,000 funding from Yorventure.
- In the River Wiske catchment, Yorkshire Wildlife Trust is delivering a diffuse rural pollution and habitat creation project, aiming to restore up to 10km of river in the Northallerton area.

Future aims

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

- Development of a York Urban Becks restoration project to improve water quality, fish and invertebrate populations and deliver benefits for public access and education.
- An agricultural and non mains drainage project to address diffuse rural pollution and point source pollution in the Upper Ouse and Foss catchments, north of York, to benefit nitrate vulnerable zones and drinking water protected areas.

Ideas for additional measures with £1,000,000 per year:

- The Natural Nidd landscape scale project in the Middle and Lower Nidd catchment, led by Natural England, with support from the Environment Agency, Yorkshire Water, Nidderdale AONB and the Yorkshire Farming and Wildlife Partnership. The partnership aims to extend this project to create flood plain meadows. The project will address pressures on fish, invertebrates and macrophytes, ammonia, phytobenthos, phosphate, elevate flood alleviation capacity and contribute to Biodiversity 2020 targets.

Further information on the partnership is available at: www.yorkshiredalesriverstrust.com

Measures in the Tame, Anker and Mease catchment

Catchment partnership: The Tame, Anker and Mease catchment partnership is made up of Severn Trent Water as catchment hosts, Birmingham and Black Country Wildlife Trust, Warwickshire Wildlife Trust, Trent Rivers Trust and the Environment Agency. The Birmingham and Black Country part of the catchment is a Nature Improvement Area (NIA); 1 of only 12 in England. This is included in a catchment management plan (2013) setting out a vision, objectives, priorities and actions for the whole catchment.

The priority river basin management issues for the partnership are tackling diffuse pollution from urban and rural areas, habitat modification and improving stakeholder engagement.

Contribution to environmental outcomes for 2021

The partnership secured funds to undertake the REDUCE (Restore, EDUCate and Enhance) project:

- a sustainable drainage scheme (SuDS) in Measham to improve surface water quality by preventing urban sediments and contaminants entering the River Mease
- an 'Urban Demonstrator' project at Redhill School, Tyseley to test the feasibility of retrofitting water efficiency and reuse technologies
- a project at Boundary Brook in the Tame sub-catchment to improve chemical, morphological and ecological status by increasing in-channel diversity

The measures, costing a total of £87,000, will be achieved in 2015-16, with Measham SuDS costing £46,000; Redhill School SuDS £15,000 and Boundary Brook Improvement £26,000.

Future aims

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

- restoration work on the River Tame and 2 wetland projects focusing on developing habitats for wading birds and community involvement
- improving public access to restoration schemes on the Mease, including re-profiling and habitat enhancement work on watercourses
- expansion of the Freshwater Invertebrate Network across the Upper Tame
- re-profiling of the River Cole to improve water quality and habitat diversity and a community engagement scheme called Waterside Care
- engagement using social media, mobile technology and schools in urban areas

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

- achieve improvements to habitats and watercourse management in Dudley's brooks, in line with Birmingham and Black Country NIA priorities
- enhance riparian strip management across a range of sub-catchments to benefit a range of habitats and reduce diffuse pollution
- achieve improvement work on the significant number of heavily modified, urban watercourses, in line with Birmingham and Black Country NIA priorities
- implement work with local authority contaminated land officers to promote remediation and regeneration to reduce diffuse pollution and improve water quality
- map deprivation and rivers to achieve improvement projects for water, health, amenity and jobs, in line with Birmingham and Black Country NIA priorities

Further information on the partnership is available at:

<http://www.catchmentbasedapproach.org/humber>.

Measures in the Wharfe and Lower Ouse catchment

Catchment partnership: The Board of Dales to Vale Rivers Network is made up of the Yorkshire Dales Rivers Trust (lead host), the Environment Agency, Natural England, Nidderdale Area of Outstanding Natural Beauty (AONB), Yorkshire Dales National Park Authority and Yorkshire Wildlife Trust. Participation in the wider network includes farmers, landowners, local authorities, local businesses, anglers, canoeists and a growing body of volunteers.

The partnership's priority issues in this catchment are fish passage, invasive species and flood risk management.

Contribution to environmental outcomes for 2021

- The partnership is supporting a project on Mill Dike at South Milford in the Lower Ouse catchment, which is being led by the local community, Yorkshire Water and North Yorkshire County Council. The aim is to tackle sediment loading, which is causing local flooding problems. The partnership will aim to address macrophyte and phytobenthos failures being caused by diffuse agricultural pollution.

Future aims

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

- Partners are investigating ways to lower phosphate levels from agricultural diffuse pollution in the Collingham Beck catchment. External funding will be sought to deliver simple, low cost solutions, such as using buffer strips and tree planting.
- The partnership would prioritise improving fish passage in the River Wharfe, focusing on major barriers in the main river channel.
- An agricultural and non mains drainage project to address diffuse and point source nutrient pollution in the tributaries of the Middle Wharfe and Washburn.

Ideas for additional measures with £1,000,000 per year:

- Major restoration projects on the Lower River Ouse. This will address pressures on fish, invertebrates and macrophytes; contribute to resolving phosphate failures; elevate flood alleviation capacity; increase recreational opportunities and contribution to Biodiversity 2020 targets.
- The Pennine Peat Partnership is a major project focusing on blocking moorland grips and restoring peat in the Upper and Middle Wharfe catchments to address sedimentation, acidification and the impacts of climate change. Partners, including the Environment Agency, Yorkshire Dales National Park, Yorkshire Wildlife Trust and Yorkshire Water, continue to provide support to this project, with major funding from Yorkshire Water.

Further information on the partnership is available at www.yorkshiredalesriverstrust.com.

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 objective 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	
<ul style="list-style-type: none"> • Improvement to condition of channel/bed and/or banks/shoreline • Removal or easement of barriers to fish migration • Improvement to condition of riparian zone and/or wetland habitats • Change to operations and maintenance • Removal or modification of engineering structure • Vegetation management 	<ul style="list-style-type: none"> • Government (central and local government) • Rural land management • Industry services and infrastructure (non governmental organisations, navigation, industry, manufacturing and other business, urban and transport) • Water industry
Measures to address pollution from waste water	
<ul style="list-style-type: none"> • Mitigate/Remediate point source impacts on receptor • Reduce diffuse pollution at source • Reduce point source pathways (i.e. control entry to water environment) • Reduce point source pollution at source 	<ul style="list-style-type: none"> • Government (central and local government) • Rural land management • Industry services and infrastructure (urban and transport, industry, manufacturing and other

Types of measures envisaged in the river basin district	Main sectors involved in implementing the measures
	business, non governmental organisations, waste treatment, transfer, storage and disposal) <ul style="list-style-type: none"> • Water industry
Measures to manage pollution from towns, cities and transport	
<ul style="list-style-type: none"> • Reduce diffuse pollution pathways (i.e. control entry to water environment) • Mitigate/Remediate diffuse pollution impacts on receptor 	<ul style="list-style-type: none"> • Government (central and government) • Rural land management • Industry services and infrastructure (non governmental organisations, urban and transport, industry manufacturing and other business) • Water industry
Measures to address changes to natural flow and level of water	
<ul style="list-style-type: none"> • Control pattern/timing of abstraction • Improvement to condition of channel/bed and/or banks/shoreline 	<ul style="list-style-type: none"> • Government (local government) • Rural land management • Industry services and infrastructure (non governmental organisations, navigation) • Water industry
Measures to address pollution from rural areas	
<ul style="list-style-type: none"> • Reduce diffuse pollution at source • Mitigate/Remediate diffuse pollution impacts on receptor 	<ul style="list-style-type: none"> • Government (central and local government) • Rural land management • Industry services and infrastructure (non governmental organisations) • Water industry

Types of measures envisaged in the river basin district	Main sectors involved in implementing the measures
Measures to manage invasive non-native species	
<ul style="list-style-type: none"> • Mitigation, control and eradication (to reduce extent) • Early detection, monitoring and rapid response (to reduce the risk of establishment) • Building awareness and understanding (to slow the spread) 	<ul style="list-style-type: none"> • Government (central government) • Industry services and infrastructure (non governmental organisations)
Measures to manage pollution from minewaters	
<ul style="list-style-type: none"> • Mitigate/Remediate point source impacts on receptor 	<ul style="list-style-type: none"> • Government (central government) • Industry services and infrastructure (mining and quarrying)

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 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

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	490	<10%	>90%
Rural land management*	1310	<10%	>90%
Industry, services and infrastructure	140	<10%	>90%
Water industry	1270	40-50%	50-60%

*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 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 –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 - £5 million) and 'Landscape Partnerships' (£100,000 - £3 million) programmes. Calls for applications can be once or twice a year and are often a 2 stage process.
- 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 as more stringent tertiary treatment when needed to protect designated sensitive receiving waters.

Sensitive area designations are currently reviewed every four years, 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 programmes and a preliminary programme of measures to the European Commission, with the aim of achieving good chemical status by 2027. 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.

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 (amongst other things) additional environmental improvements agreed with their customers and the Environment Agency.

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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (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) (<https://ea.sharefile.com/d-sabbd14301a44d5e9>).
- You can find the impact assessment on the river basin management plan [web pages](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).

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.
Economically significant species (shellfish waters)	Shellfish water action plans have been produced for all designated shellfish waters, which include measures aiming to observe the microbial shellfish flesh standards.
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)	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.

Supporting information:

- You can find more information on the measures in protected areas at the following locations:
 - For drinking water protected areas for [surface water](https://ea.sharefile.com/d-scac3ff7da4a424eb) (<https://ea.sharefile.com/d-scac3ff7da4a424eb>) and for [groundwater](https://ea.sharefile.com/d-sa22fd79de304532a) (<https://ea.sharefile.com/d-sa22fd79de304532a>)
 - For [economically significant species](https://ea.sharefile.com/d-s84c5554e50947dbb) (<https://ea.sharefile.com/d-s84c5554e50947dbb>)
 - You can access more information on recreational waters on the [Bathing Water Explorer](http://environment.data.gov.uk/bwq/profiles/) (<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) (<https://ea.sharefile.com/d-s2c9919e38f04798b>)
 - For Nitrate vulnerable zones visit the [NVZ web pages](https://www.gov.uk/nitrate-vulnerable-zones) (<https://www.gov.uk/nitrate-vulnerable-zones>)
 - The Natura 2000 site improvement plans are available on Natural England's [web site](http://publications.naturalengland.org.uk/category/4878851540779008) (<http://publications.naturalengland.org.uk/category/4878851540779008>)

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.

4.1. Improvements in evidence

Over the last 6 years the Environment Agency 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 pounds has been invested in a new ecological monitoring programme for rivers and an additional £1.5 million pounds invested in chemical monitoring technology. This means that the number of element classification results in the river basin district has increased from 8,998 in 2009 to 9,691 in 2015.
- In the river basin district, more than 3,700 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 can be found on the Environment Agency's [ShareFile Service](https://ea.sharefile.com/d-s3961180e2334409b) (<https://ea.sharefile.com/d-s3961180e2334409b>).
- You can find a spreadsheet containing the reasons for not achieving good status on the Environment Agency's [ShareFile service](https://ea.sharefile.com/d-s0faa355450243538) (<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/) (<http://www.wfduk.org/>).
- The full description of changes to biological methods can be found on the [UKTAG website](http://www.wfduk.org/) (<http://www.wfduk.org/>).

4.2. Measures implemented

Planned measures implemented since 2009

Most of the measures (over 99%) summarised in the 2009 plans have been completed.

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

- 1 measure has been reassessed and is no longer needed or considered effective
- 1 there was no mechanism to implement 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 £19.2 million. Table 25 gives a summary of the issues addressed and an indication of the scale of additional measures.

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

Significant water management issue	Number of measures	Cost (£Million)	Number of water bodies benefitting
Physical modifications	108	12.3	225
Pollution from rural areas	30	4.6	63
Pollution from town, cities and transport	18	1.1	26
Pollution from abandoned mines	0	0	0
Invasive non-native species	5	0.3	10
Other	8	0.9	19
Total	169	19.2	343

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) (<https://ea.sharefile.com/d-s13e5e39caef432d9>).

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.

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 and not just in this river basin district.

Table 26: Summary assessment of the effectiveness of measures for each significant water management issue (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 take up 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 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	26	2%
Surface water chemical status	2	<1%
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. It publishes an annual report detailing compliance with the directive's water quality requirements.

The Environment Agency has established safeguard zones and produced associated actions 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.

Economically significant species (shellfish waters)

The shellfish water directive was repealed in December 2013. Shellfish waters protected areas have been maintained and an equivalent level of protection is being provided by domestic legislation. Monitoring used to assess compliance with the shellfish flesh standards has significantly increased. Although there has been no significant change in the quality of the water environment in the protected areas, the improved monitoring has led to a reduction in reported compliance.

The current status of shellfish protected areas is summarised in section 2.4.

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.

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	21	100	52
2014	23	95	65

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

In 2009 32 Natura 2000 protected areas in the 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, 14 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.

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	18	19	16
Surface water chemical status	10	10	15
Groundwater quantitative status	60	60	82
Groundwater chemical status	54	54	46
Overall status	18	20	17

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 the Environment Agency put additional biological monitoring in place and improved the design of the monitoring network. 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 can be found in section 2.2 of [Part 2: RBMP overview](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).
- 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](http://www.gov.uk/government/collections/river-basin-management-plans-2015) (www.gov.uk/government/collections/river-basin-management-plans-2015).
- You can download spreadsheets 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 2009from the Environment Agency's [ShareFile service](https://ea.sharefile.com/d-s13e5e39caef432d9) (<https://ea.sharefile.com/d-s13e5e39caef432d9>).

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 Humber 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 predicted outcome by 2021 and the objective.
- **Table 31: Summary statistics for the Humber 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.
- **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 Humber 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	15%	12%	29%	0%	15%		
% of water bodies predicted to be at good ecological status/potential or better by 2021	18%	13%	29%	0%	17%		
% of water bodies with an objective of good ecological status/potential or better	73%	75%	57%	100%	73%		
% of water bodies at good chemical status now							
% of water bodies at good chemical status now	96%	100%	86%	100%	97%		
% of water bodies predicted to be at good chemical status by 2021	96%	100%	86%	100%	97%		
% of water bodies with an objective of good chemical status	>99%	100%	100%	100%	>99%		
% of water bodies at good chemical (groundwater) status now							
% of water bodies at good chemical (groundwater) status now						51%	
% of water bodies predicted to be at good chemical (groundwater) status by 2021						53%	
% of water bodies with an objective of good chemical (groundwater) status						86%	
% of water bodies at good quantitative status now							
% of water bodies at good quantitative status now						75%	
% of water bodies predicted to be at good quantitative status by 2021						80%	
% of water bodies with an objective of good quantitative status						86%	
% of water bodies at good or better overall status now							
% of water bodies at good or better overall status now	15%	12%	29%	0%	15%	43%	16%
% of water bodies predicted to be at good or better overall status by 2021	18%	13%	29%	0%	17%	47%	18%
% of water bodies with an objective of good or better overall status	73%	75%	57%	100%	73%	76%	73%

*SWTs are surface water transfers

Table 31: Summary statistics for the Humber 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)	77%	63%	76%	100%	77%		
% of ecological elements predicted to be at good status or better by 2021 (biological, physico-chemical and specific pollutants)	79%	63%	76%	100%	79%		
% of ecological elements with an objective of good status or better (biological, physico-chemical and specific pollutants)	94%	85%	93%	100%	94%		
% of chemical elements at good status now							
% of chemical elements at good status now	98%	100%	97%	100%	98%		
% of chemical elements predicted to be at good status by 2021	98%	100%	97%	100%	98%		
% of chemical elements with an objective of good status	>99%	100%	100%	100%	>99%		
% of chemical (groundwater) elements at good status now							
% of chemical (groundwater) elements at good status now						87%	
% of chemical (groundwater) elements predicted to be at good status by 2021						87%	
% of chemical (groundwater) elements with an objective of good status						97%	
% of quantitative elements at good status now							
% of quantitative elements at good status now						91%	
% of quantitative elements predicted to be at good status by 2021						93%	
% of quantitative elements with an objective of good status						95%	
% of elements at good or better status now							
% of elements at good or better status now	81%	70%	86%	100%	81%	89%	82%
% of elements predicted to be at good or better status by 2021	83%	70%	86%	100%	83%	90%	83%
% of elements with an objective of good or better status	96%	88%	96%	100%	95%	96%	95%

*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 Humber 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	17	7	1	5	1	56	0	0	0	0	2	6	11	106
Chemicals	36	18	62	1	16	25	0	7	0	1	2	9	103	280
Biochemical oxygen demand	2	6	0	0	10	37	0	4	0	0	0	0	0	59
Dissolved oxygen	43	7	3	1	26	65	2	3	0	4	2	8	25	189
Ammonia	26	12	2	0	47	166	0	4	0	3	1	3	15	279
Fine sediment	117	7	6	1	22	2	1	0	0	0	1	7	5	169
Invasive non native species	0	0	0	0	0	0	0	0	0	0	0	7	0	7
Nitrate	0	0	0	0	0	1	0	0	0	0	0	0	1	2
Phosphate	390	12	0	0	179	543	2	35	1	4	5	10	37	1218
Physical modification	169	32	1	17	182	162	203	4	14	0	15	16	46	861

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 Humber 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	194	33	1	19	184	168	206	4	14	0	17	0	46	886
Pollution from waste water	6	36	0	0	23	864	2	58	1	11	5	0	1	1007
Pollution from towns, cities and transport	2	31	1	0	307	3	0	0	0	0	6	0	5	355
Changes to the natural flow and level of water	21	6	0	5	0	57	0	0	0	0	2	0	3	94
Invasive non-native species	0	0	0	0	0	0	0	0	0	0	0	7	0	7
Pollution from rural areas	615	0	0	0	0	0	0	0	0	0	0	0	0	615
Pollution from abandoned mines	0	0	72	0	0	0	0	0	0	0	0	0	0	72

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 Humber 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	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Chemicals	0	1	0	2	0	0	0	0	0	0	0	0	2	5
Biochemical oxygen demand	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissolved Oxygen	6	1	0	0	0	7	0	0	0	0	0	5	5	24
Ammonia	4	0	2	0	4	13	0	0	0	0	0	0	2	25
Fine sediment	5	1	0	0	1	0	1	0	0	0	0	0	1	9
Invasive non native species	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrate	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Phosphate	6	0	0	0	1	12	0	0	0	0	0	0	12	31
Physical Modification	9	1	0	1	3	0	2	1	0	0	3	0	0	20

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