A public consultation to inform the development of the second river basin management plan for the Solway Tweed river basin district



Working together to protect and improve our water environment

Contents

	How this consultation works	3
1	Introduction	5
2	Meeting the challenge	7
3	Water quality	13
4	Physical condition of the water environment	24
5	Barriers to fish movement	28
6	Flows and levels	33
7	Invasive non-native species	35
8	Overall outcomes for the Solway Tweed river basin district	38
9	Consultation questions	40
	Annex 1: Changes to water bodies and designations	41
	Annex 2: Economic Analysis for the English area	45

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How this consultation works

This consultation is open for six months, from December 9 2014 to June 9 2015.

It is part of a wider engagement programme and is one way you can influence how we protect and improve the district's water environment in the next river basin planning cycles.

This consultation document is available in print and online. The easiest way to view it and submit a response is online https://consultation.sepa.org.uk/rbmp/solwaytweedplanconsultation on the Scottish Environment Protection Agency (SEPA) website. Throughout this document there are links to further and more detailed sources of information which may be of interest. However, just reading this document will give you enough information to answer the consultation questions.

Supporting information

The Solway Tweed river basin district covers areas of England and Scotland, and both countries have produced national-level assessments to inform the development of the next river basin management plans. This information is referenced throughout the consultation and can be found:

For Scotland, the *Public consultation to inform the development of the second river basin management plan for the Scotland river basin district* https://consultation.sepa.org.uk/rbmp/scotlandplanconsultation contains details of national level priorities and proposals for delivery of improvement measures.

For England, the Environment Agency has produced its consultations in three parts. This document forms Part 1 for the Solway Tweed district.

Part 2 is *The river basin management planning overview and additional information*
http://ea.objective.co.uk/portal/ho/wfd/draft_plans/consult?pointId=s1405417915018#section-s1405417915018
This sets out the detail of the decisions required to produce the proposals for the second plans, linking to further information where appropriate.

Part 3 is the *Economic analysis*
http://ea.objective.co.uk/portal/ho/wfd/draft_plans/consult?pointId=s1405418174455#section-s1405418174455
This illustrates the potential implications of five future management scenarios. Information on costs and benefits is summarised for England and for each river basin district. A brief summary of the economic analysis findings for the English area of the Solway Tweed river basin district is given in Annex 2 of this document.

In addition, the Environment Agency has produced four *Catchment Summaries* for the English area of the district. The catchment summaries provide information at a local level on the health of the water environment, and the measures which may be required to improve it. They are available from solwaytweedrbd@environment-agency.gov.uk or from the Environment Agency offices in Penrith and Newcastle.

Data and maps

The maps and charts shown in this document are produced by SEPA's online data tool. In most cases, you can find more detail and view the mapping at a local scale using the online tool. Information is also available here for the whole of Scotland.

Data and mapping for the English area of the Solway Tweed, and some for the whole of England is available from the Environment Agency:

- via the Catchment Data Explorer, where data and mapping can be viewed at a local scale
  http://environment.data.gov.uk/catchment-planning/
- to download in GeoPDF format
  https://ea.sharefile.com/d/s7e378d3187741f2b

How to respond

This consultation document is available in print and online. The easiest way to view it and submit a response is online on SEPA's website: https://consultation.sepa.org.uk/rbmp/solwaytweedplanconsultation

Responding online will help us to collate and analyse the information you provide and we would prefer responses to be submitted in this format. To make online submission easier, you can:

- download and read a pdf copy of the report first;
- download a word document version of the response form to fill in – which you can then copy into the tool;
- save your online response in the consultation tool at any time and return to it later (and allow other people to read and edit if you're working collaboratively).

You need only fill in the sections which are of interest or are applicable to you.

Alternatively, if you are unable to access the online tool, you can respond by email to rbmp@sepa.org.uk or writing to:

SEPA RBMP Unit,
Strathallan House
Castle Business Park
Stirling
FK9 4TZ

or

Environment Agency
Ghyll Mount
Gillan Way
Penrith 40 Business Park
Penrith
CA11 9BP

or

Environment Agency
Tyneside House
Skinnerburn Road
Newcastle Business Park
Newcastle upon Tyne
NE4 7AR

A paper version of the consultation and response form can also be requested from these addresses.

1 Introduction

River basin management is about protecting and improving our rivers, lakes, estuaries, coastal waters and groundwater. Getting it right is important to ensure we can all enjoy the many benefits – the ecosystems services – a clean and healthy water environment provides to our economy, our health and our social well-being. All our businesses rely on the water environment in some way or another and it plays a prominent role in the success of many, such as tourism, food production and renewable energy generation. We all depend on fresh surface waters or groundwater for our drinking water.

Our rivers, lakes and seas provide the setting for numerous shore-based recreational activities and a venue for a wide range of water-based ones. Some of the best salmon runs in the UK are found in our rivers and many of the best known and most treasured landscapes are associated with our water environment. Our coastal waters, inland waters and wetlands support a great diversity of wildlife, including internationally rare and endangered species. From the smallest becks and burns to the seas around our shores, the water environment remains an important and integral part of our cultural fabric.

River basin management planning is at the heart of sustainable water management, securing widespread improvements in the water environment and, in turn, supporting other priority agendas. Such management requires public bodies, water users and land managers to work together, and to build on the partnerships established during the first cycle. Everyone has a role to play, and we must work together to ensure that improvement and protection of the water environment brings about multiple benefits for businesses and communities.

Some of the key benefits of protecting and improving the water environment include:

- safeguarding and supporting the expansion of businesses that depend on a high quality water environment, such as tourism, fisheries and food production;
- protecting drinking water supplies and avoiding increased purification treatment costs;
- maintaining and expanding opportunities for a wide range of recreational activities;
- contributing to the social well-being and regeneration of areas in which a high quality water environment may be an important community amenity;
- protecting and enhancing wildlife, including rare and endangered species;
- improving our ability to cope with the effects of a changing climate (e.g. more frequent droughts, floods, heat waves etc).

One of the biggest challenges we face is adapting and becoming more resilient to the effects of climate change. We are all familiar with the impact that severe weather events have on communities, individuals and businesses. Flooding events have affected a number of communities over recent years and with climate change, there is an expectation that such events will become more frequent. We also need to consider the increasing possibility of prolonged periods of low rainfall, and the potential effects on communities and businesses.

The river basin management plans should be seen as a key component of the agencies' work with partners in contributing to national climate change adaption programmes on both sides of the border.

In December 2009, the first river basin management plans for all UK river basin districts were published, including that of the Solway Tweed http://www.sepa.org.uk/water/river_basin_planning.aspx. The plans set out environmental objectives for rivers, lakes and lochs, estuaries, coastal waters and groundwater and established a programme of measures designed to achieve them.

Background information relevant to this consultation, including mapping, can be found in the first Solway Tweed plan.

The river basin management plans are reviewed and updated every six years and the second plan will be published towards the end of 2015. This consultation sets out proposals for the second plan, which will drive work through the second cycle (2016 to 2021), and your input will contribute to this. The third cycle of river basin planning runs from 2022 to 2027 and a similar process of consultation will precede the production of the third plan.

As part of the planning process, an assessment of the current state of the water environment and the challenges for its future management *Current condition and challenges for the future* (CCCF) http://www.sepa.org.uk/water/river_basin_planning.aspx was published in 2013.

The CCCF assessment reviewed progress towards the environmental objectives set for 2015. In particular, it identified areas where a step change in the management of particular pressures will be necessary if we are to meet our objectives for 2021 and beyond.

Our main proposals for the second cycle are:

- re-phasing our objectives for 2021 and 2027, to ensure actions to improve the water environment are prioritised to where they will bring the greatest benefits;
- step changes in the effort focused on the key significant management challenges;
- new measures to increase the effectiveness of our delivery programme.

For those areas where a step change in effort is required, we have identified all the measures expected to be necessary to achieve our objectives for 2021 and 2027. A number of different scenarios for how the effort and resources needed to implement those measures might be phased have been developed at a national scale in England and Scotland.

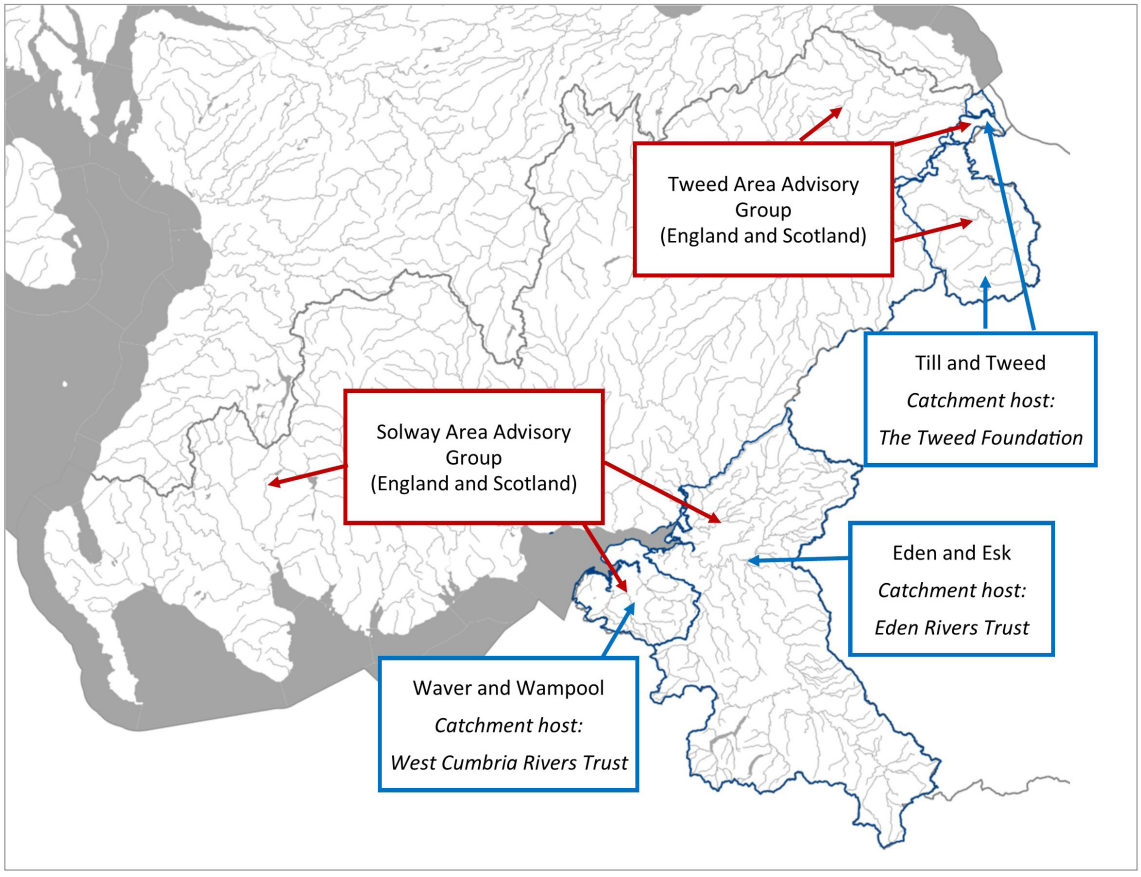
We are seeking your views on these proposed changes. A digest of responses to the consultation will be issued in the autumn of 2015.

The Solway Tweed river basin district

This consultation is an important part of a wider engagement process, the outcomes of which will help to shape the second river basin management plan.

In the Solway Tweed this means that SEPA and the Environment Agency will continue to work closely with industry, business and other key stakeholders with interests in the water environment. Two types of group are focussed specifically on this process: Area Advisory Groups and, in England, Catchment Partnerships. Map 1 shows the area covered by each of these groups, and details the organisations hosting the partnerships in the English catchments.

Map 1: Solway Tweed river basin district, including English management catchments



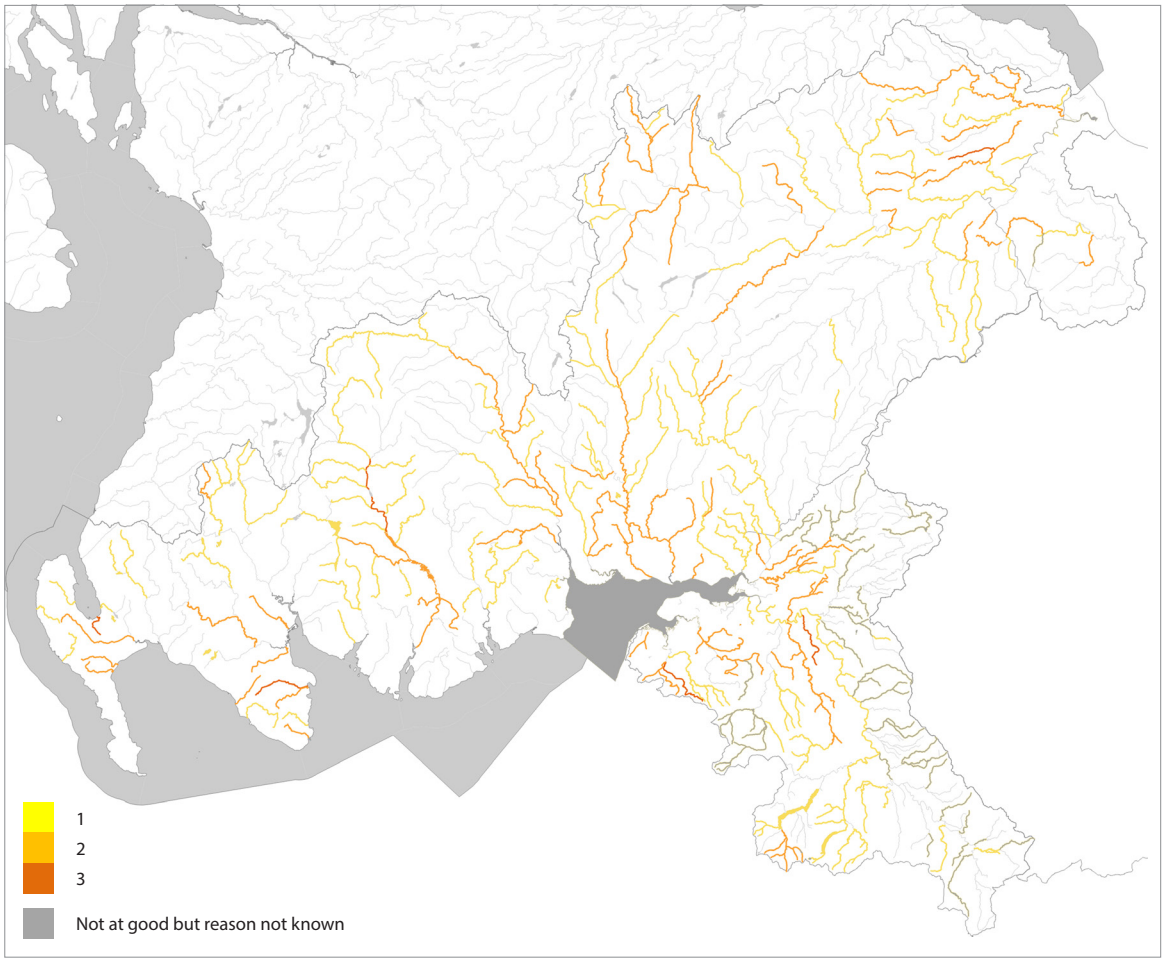
2 Meeting the challenge

The quality of many of the water bodies in the Solway Tweed river basin district is already good or better. However, around half (nearly 280 water bodies) are expected to still be at less than good status at the end of 2015, shown in map 2. Improving these water bodies is the challenge for the second and third river basin management planning cycles.

For rivers, lakes, estuaries and coastal waters, our main aim is to ensure good ecological quality. This requires:

- water quality to be good (i.e. unpolluted);
- the quality of the physical structure of beds, banks and shores to be good;
- removal of significant man-made impediments to the movement of migrating fish;
- water flows and levels to be good;
- protection from invasive non-native species (INNS).

Map 2: Surface water bodies predicted to be at less than good status in 2015



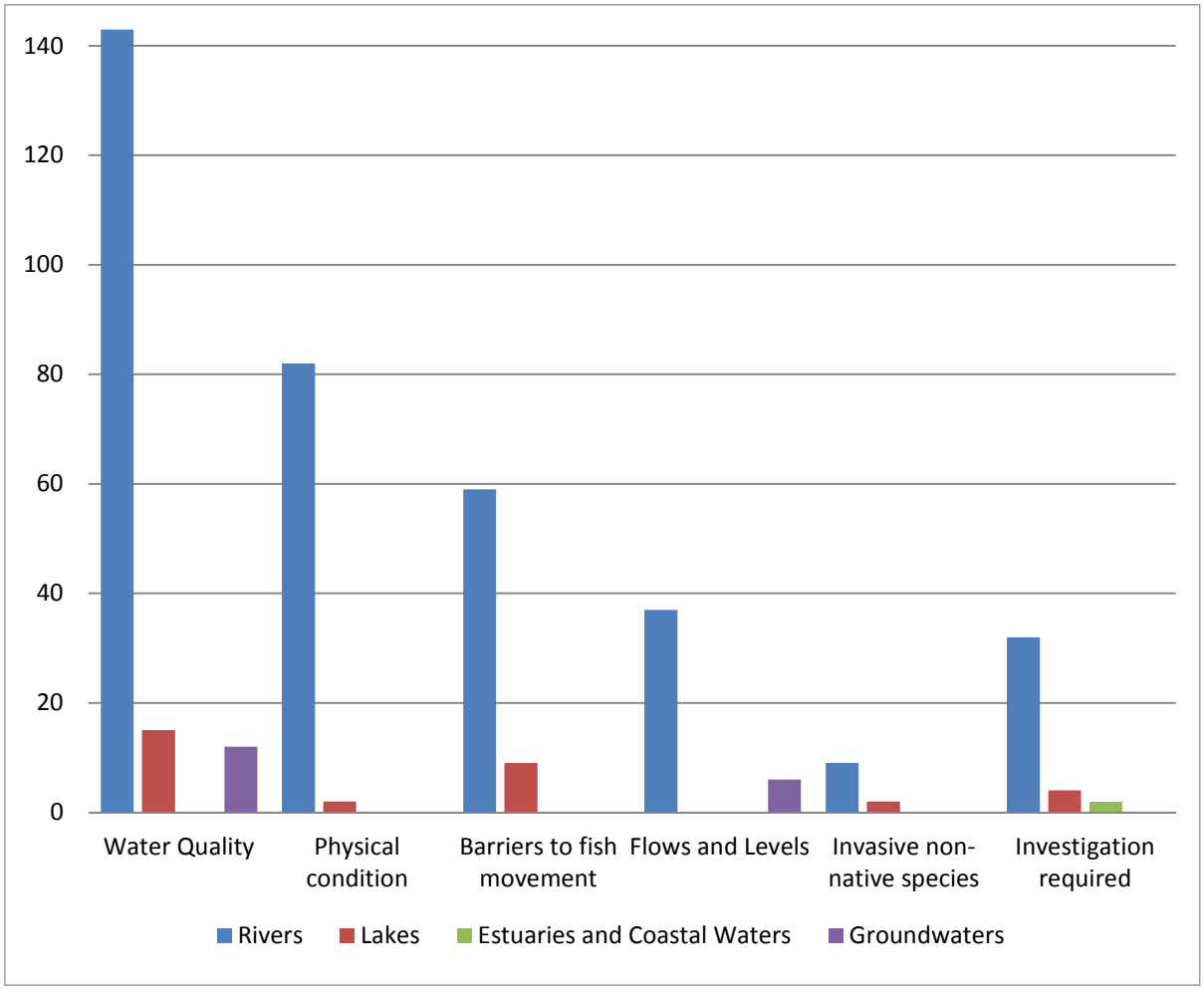
Detailed mapping is available via the online consultation tool.

Note to Map 2

*The colouring of each water body indicates **how many** of the five environmental requirements for good status will not be met. These five requirements are: good water quality, good flows and levels, good physical condition of beds, banks and shores, unimpeded fish movement and protection from invasive non-native species. Note that the map does not specify **which** of the requirements will not be met, only the total number.*

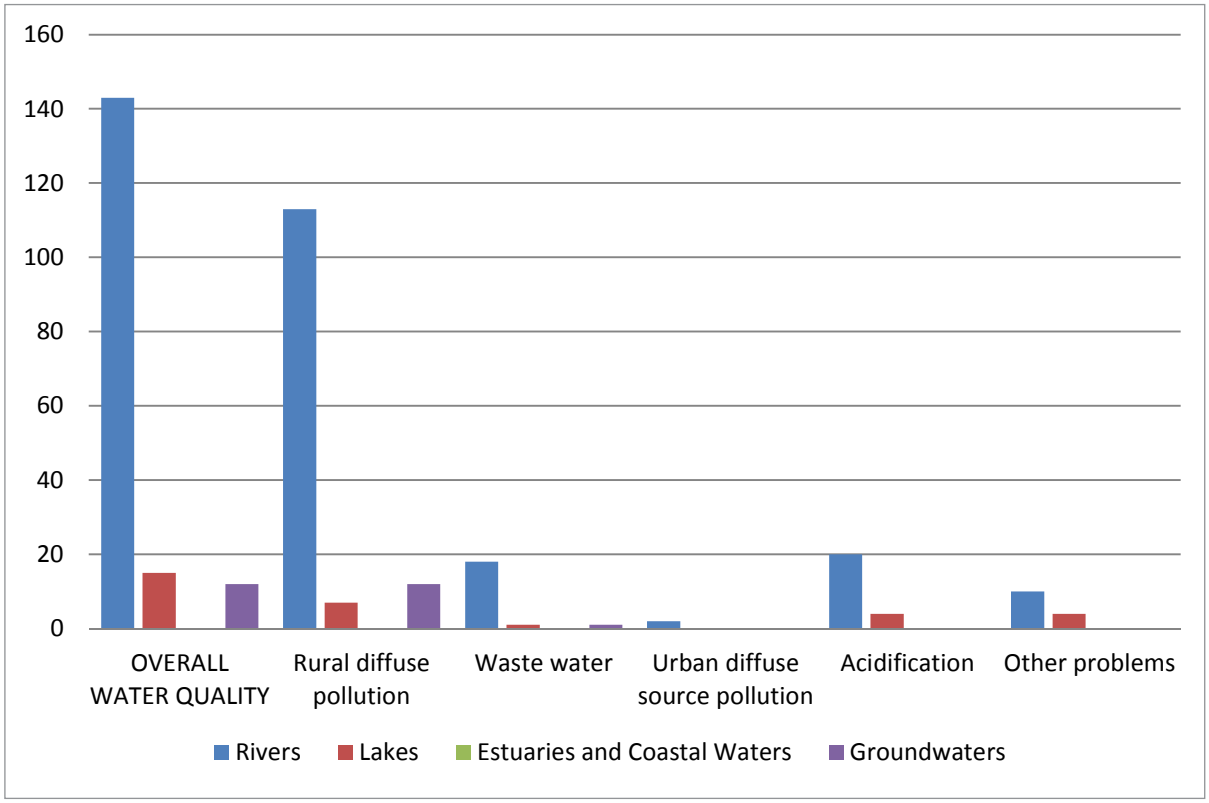
The maps and figures that follow give information on the reasons water bodies will not be at good status in 2015. Figure 1 and map 2 provide an overview, figure 2 and map 3 show the detailed picture for pressures affecting water quality, and figure 3 and map 6, the detail for pressures affecting flows and levels. Maps 4, 5 and 7 show the water bodies at less than good because of their physical condition, the presence of barriers to fish movement and the impact of INNS.

Figure 1: Reasons for surface water bodies not being at good status in 2015



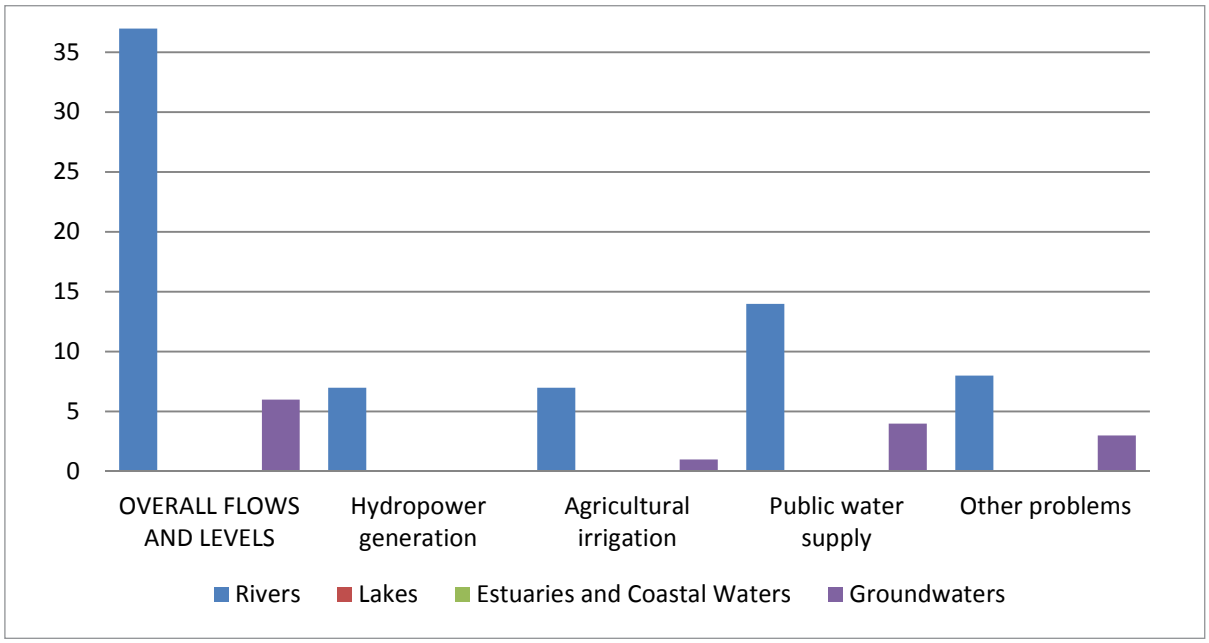
Note to figure 1: For a number of water bodies, there will be more than one reason for not being at good status in 2015. Such water bodies are included in the totals in each relevant column

Figure 2: Sources of pressures on water bodies where water quality is expected to be less than good in 2015



Note that many water bodies have multiple pressures and may feature in several columns.

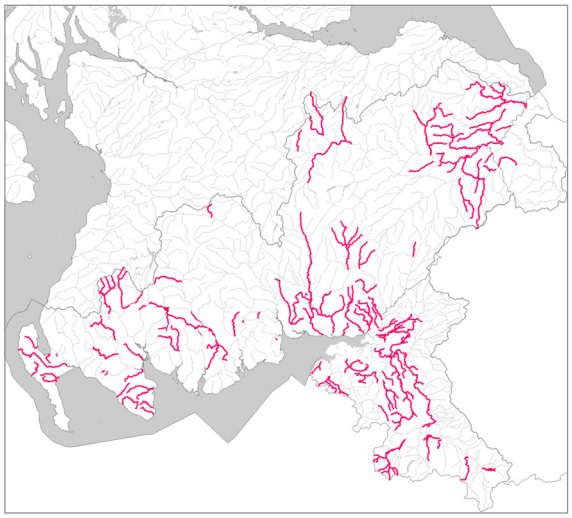
Figure 3: Sources of pressures on water bodies where flows or levels are expected to be less than good in 2015



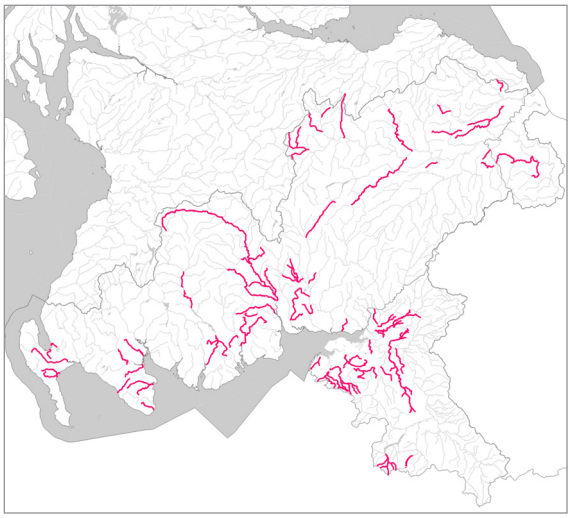
Note that many water bodies have multiple pressures and may feature in several columns.

Sources of pressures on water bodies where flows or levels are expected to be less than good in 2015

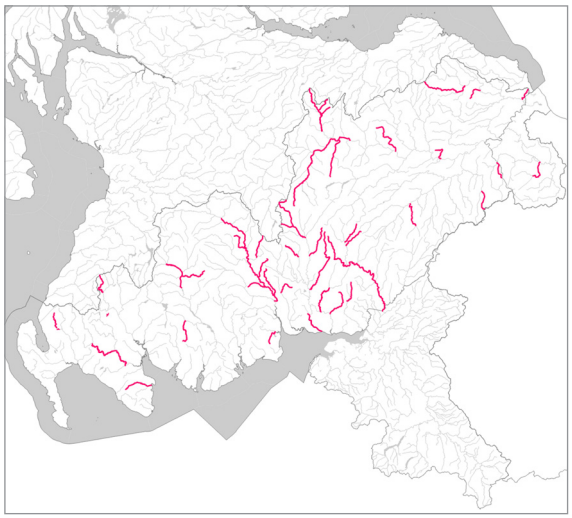
Map3: impacts on water quality



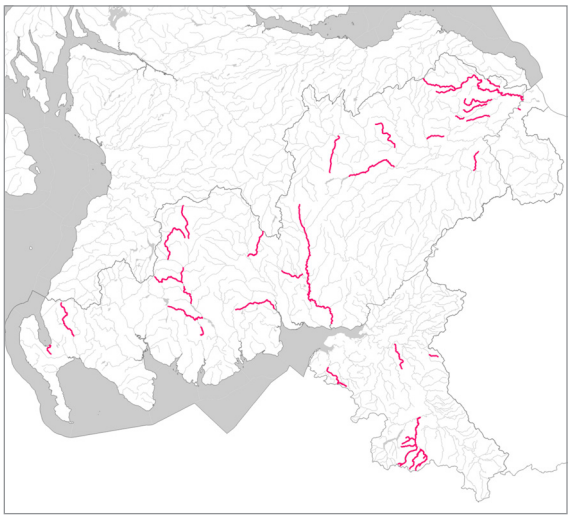
Map 4: impacts on their physical condition



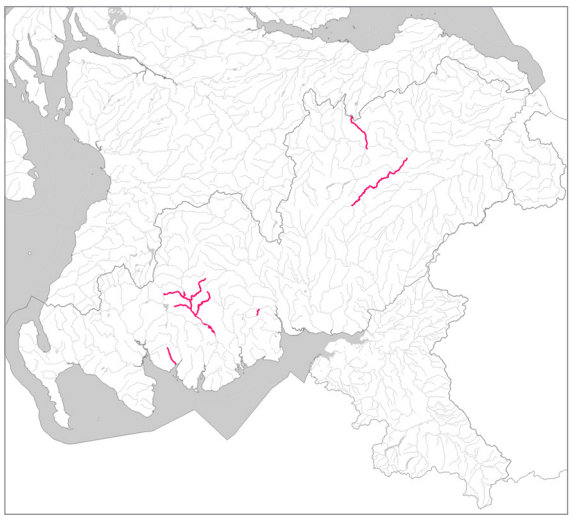
Map 5: impacts of barriers to fish movement



Map 6: impacts on flows and levels



Map 7: impacts of invasive non-native species



Good progress has already been made towards tackling pressures on the water environment since the first plan was finalised in 2009. The approaches established in both countries for pressures resulting from activities requiring a license or permit (e.g. water abstraction, point source discharge of pollutants) are working well and we think this will enable us to achieve our objectives. In the case of other pressures, a number of management challenges which need to be addressed for the next planning cycles have been identified.

The challenges include tackling inputs of toxic pollutants into surface waters from urban diffuse sources; section three provides more detail on proposals for addressing this challenge. The most significant challenges, however, relate to:

- reducing rural diffuse source pollution;
- improving the physical condition of the water environment;
- removing barriers to fish movement.

Important steps forward in managing these pressures have already been made during the first river basin planning cycle, but the scale of the task means we will need to do much more in the second and third cycles. An outline of proposals for addressing these pressures is presented in this consultation, with further detail provided in separate documents:

- For Scotland, in the *Public consultation to inform the development of the second river basin management plan for the Scotland river basin district*
  https://consultation.sepa.org.uk/rbmp/scotlandplanconsultation
- For England, in the *Economic analysis*
  http://ea.objective.co.uk/portal/ho/wfd/draft_plans/consult?pointId=s1405418174455#section-s1405418174455

Investigative work

Where the ecological quality of a water body is found to be less than good, the cause is not always apparent from the monitoring results. Both agencies therefore run investigation programmes so that reasons for not achieving good status can be confirmed.

In the English area of the Solway Tweed, there are currently 38 water bodies which are not at good status and where the reasons for this are being investigated (see map 2). The outcomes of these investigations will inform the development of the final plan.

Proposals

The following sections set out in more detail proposals for addressing pressures on the water environment in the second and third planning cycles.

The proposals describe the route map we will use to achieve our objectives, including when and where effort will be focussed. This is a dynamic process and changes and refinements will occur throughout, as understanding of impacts and their causes continues to improve.

Where proposals are made, an objective date may be shown. This is the date by which the overall status of the water body is expected to be good, or by which its water quality, physical condition, access for fish, flows and levels or protection from invasive species is expected to be good. Possible dates are **2021** (the end of cycle two) and **2027** (the end of cycle three).

If the measures proposed to be taken before the end of 2027 are expected to be sufficient to allow recovery to good, but the natural lag time for that recovery will delay achievement beyond that date, this will be classed as **extended recovery**.

If the measures proposed may not be sufficient to enable the achievement of good, we have indicated that a potential **less stringent** objective may be required. To confirm that a less stringent objective is appropriate, we are required to show that it would be infeasible or disproportionately expensive to achieve good.

A key requirement of the plans is that water bodies which are already at good or high status must remain so, and, where necessary, specific measures to prevent deterioration are proposed.

You can access the proposed objectives for all water bodies in England and the reasons for any proposed alternative objectives in spreadsheet format here:
https://ea.sharefile.com/d/s7e378d3187741f2b

Proposals for achieving protected areas' objectives are considered as part of each section, rather than in a separate chapter. Protected areas are water bodies or dependent features that have additional protection under European directives. They include areas protected as drinking water sources, as shellfish growing waters or as bathing waters, and those designated as either Special Areas of Conservation (SAC) or Special Protection Areas (SPA), and referred to as Natura sites.

Natura protected areas in England have Site Improvement Plans (SIPs) which identify pressures on their water dependent features, and the measures that are required to address them. The Site Improvement Plans can be accessed here:
http://publications.naturalengland.org.uk/category/5908419043131392

3 Water quality

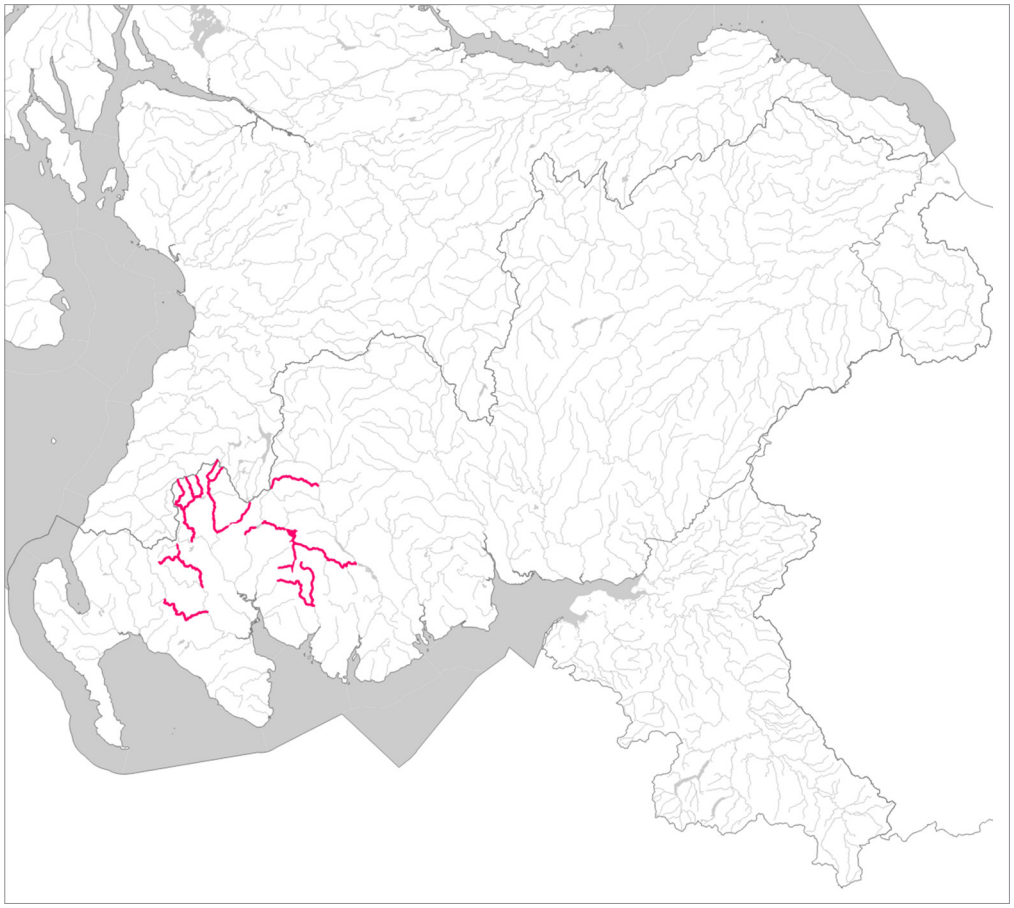
In 2015, it is predicted that around 170 water bodies in the district will not achieve good status because of their water quality.

There are a wide range of environmental and socio-economic benefits to be gained from protecting and improving our water quality, including helping to:

- safeguard and support the expansion of businesses that depend on a high quality water environment such as tourism, fisheries and food production;
- protect drinking water supplies and avoiding increased purification treatment costs;
- maintain and expand opportunities for a wide range of recreational activities;
- contribute to the social well-being and regeneration of areas in which a high quality water environment is, or has the potential to be, an important community amenity;
- protect and enhance wildlife including rare and endangered species

Within the district, 24 water bodies are affected by acidification (map 8). These are all in the Scottish Galloway region, in the Dee, Cree and Bladnoch catchments. The amount of acid deposition has substantially reduced as a result of controls on emissions of acidifying gases within the UK and internationally. However, due to the very sensitive nature of the catchments affected, recovery is likely to be a long process, and of the 24 affected water bodies, only four are expected to improve to good status by 2027.

Map 8: Surface water bodies predicted to be less than good status in 2015 due to impacts of acidification



Detailed mapping is available via the online consultation tool.

There are a number of other significant sources of pollution in the district, including discharges of polluted mine water from abandoned workings. However, the most widespread pressures remaining on water quality are inputs of nutrients, pesticides and bacteria from diffuse rural sources and waste water.

The Solway Firth is a cross-border water body which is at less than good status because of nitrogen pollution. Investigations to determine the sources and work out how to deal with them, are ongoing and include assessment of possible inputs from neighbouring river basin districts.

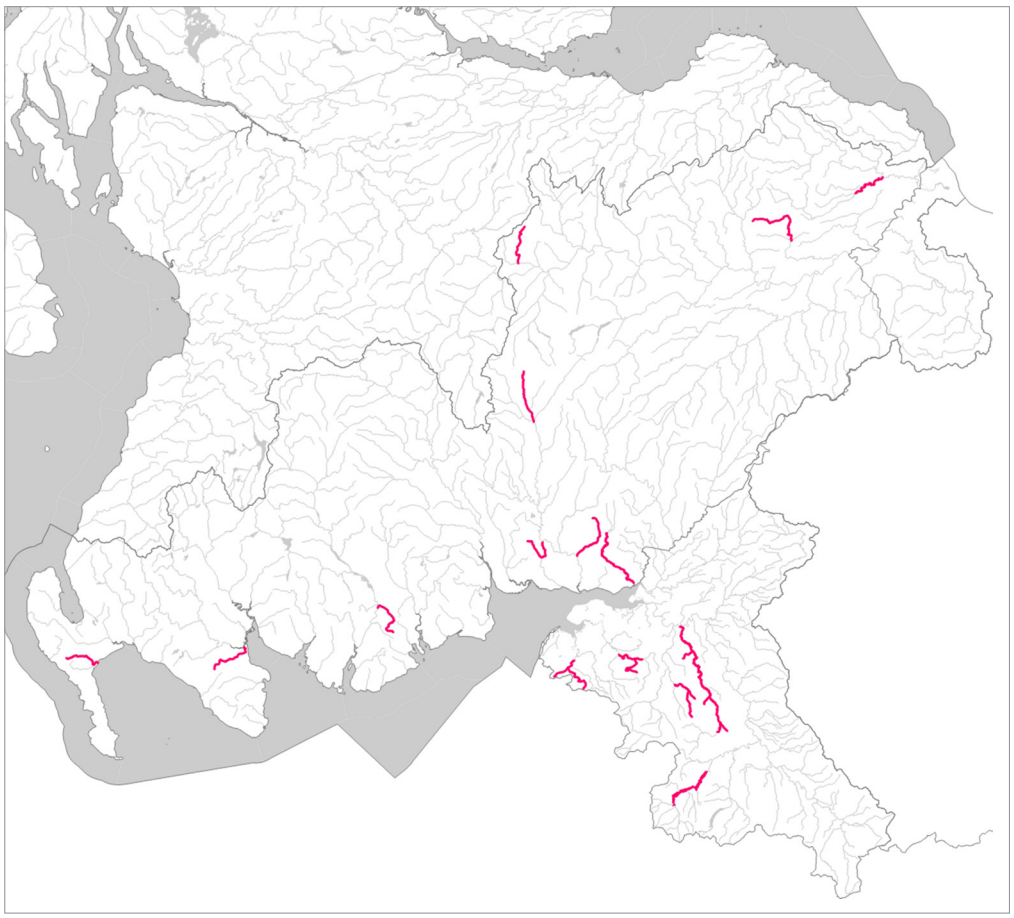
Managing the impacts of nutrient pollution, pesticides and bacteria

Waste water disposal

Up to 20 water bodies in the district are affected by waste water discharges. Addressing the impacts of these discharges can require considerable investment in upgrading sewers and waste water treatment works.

Upgrades are planned to five small waste water treatment works on English rivers. Alongside these planned improvements, 13 water bodies in the Scottish part of the district will be included in a significant study programme being undertaken by Scottish Water. Six of these are also included in our proposals below for tackling rural diffuse sources. The study programme is due for completion in 2018 and will inform the investments needed in the third cycle. However, until the results of the studies are known, some uncertainty remains around the scale of work that will be required.

Map 9: Surface water bodies where waste water discharges are known or thought to be contributing to reduced water quality



Detailed mapping is available via the online consultation tool.

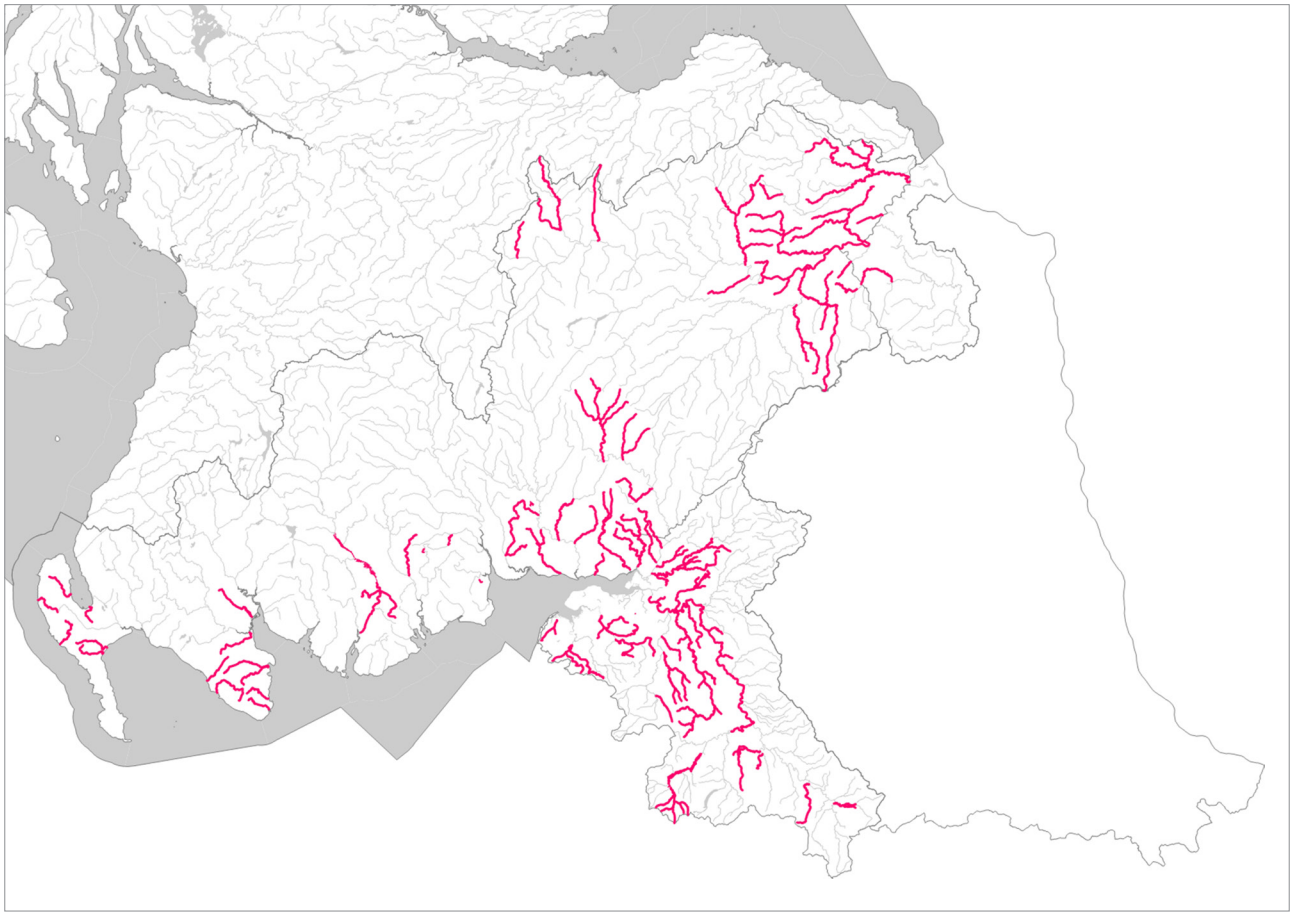
Measures to address the local impacts of septic tanks vary. In some cases it may involve the water company installing first time rural sewerage; in others, individual engagement with householders will be sufficient.

Rural diffuse pollution

The way in which land is managed affects the quality of the water environment. Water bodies become polluted when they receive soil, nutrients or agricultural chemicals from their surrounding land – this is classed as rural diffuse source pollution. Many types of land use can cause this to happen, but across the Solway Tweed district, agriculture and forestry are dominant.

There are currently around 120 water bodies affected by rural diffuse pollution in the district (see map 10). Most of these water bodies are rivers but the figure includes seven lakes and eleven ground water bodies. Rural diffuse pollution is adversely affecting 18 protected areas: three Natura sites, eight bathing waters, two shellfish waters and five drinking water protected areas.

Map 10: Surface water bodies where water quality is expected to be less than good in 2015 and which are subject to rural diffuse source pollution



Detailed mapping is available via the online consultation tool.

Experience gained from work to date has highlighted key principles for successfully addressing rural diffuse pollution:

1. A strategic and **evidence based** approach is required. It is important to know where the pollution is coming from, particularly at a catchment scale, so resources can be targeted sensibly and proportionately.
2. Simple **good environmental practice**, if carried out by every landowner, can make a big difference. In some places work above this minimum will be required, but getting all land managers to work to a good basic level will make a sufficient difference in many areas.
3. **Engagement** with individual landowners and operators is vital. The diffuse nature of the pressure means that many small sources add together to cause an impact in an area, and each of these must be addressed to achieve improvements. **Advice-led regulation** is a highly effective approach.
4. Within a catchment there may be several **different types of land use** creating pollution, and each may need to be targeted. Farming is the dominant land use in many areas, but forestry covers large swathes of southern Scotland and in the Lake District, seasonal peaks in visitor numbers can cause issues. An approach that works with farmers is key, but others will also need advice and sometimes regulation.

The necessary advice and encouragement for land managers is provided in slightly different ways in England and Scotland. Regulation underpins work in most areas of the district; in Scotland a series of General Binding Rules (GBRs)[1] lay down minimum requirements. Across the district farmers who claim under the annual Basic Payment Scheme (formerly the Single Farm Payment) under the Common Agricultural Policy must meet Good Agricultural and Environmental Condition as a Cross Compliance requirement. There are also Nitrate Vulnerable Zones[2] across the district and both countries have regulatory Action Programmes in place to reduce pollution of vulnerable groundwaters and estuaries.

In addition, in some targeted areas **agri-environment payments**, funded through the Scottish and English Rural Development Programmes (SRDP and RDPE), are available to land managers to replace profit foregone when implementing measures that go beyond regulatory requirements or basic good practice. The types of measures funded focus on water quality and biodiversity improvements.

Work to address agricultural pollution and associated habitat issues has been carried out at a local level over many years, by all of the rivers and fisheries trusts that work in the district. This work is often similar to that funded under the RDP schemes, going beyond basic good practice.

Proposals for the Scottish area of the district

SEPA estimates that in the Scottish area in 2015, rural diffuse pollution will still be contributing to adverse effects on water quality in around 87 water bodies and nine protected areas. The protected areas include six bathing waters in the Solway Firth, two drinking water protected areas on the Tweed and one small section of the River Tweed Special Area of Conservation (SAC). Input of pollutants to the Tweed may also be contributing to pressures on the adjacent Spittal coastal bathing water in England.

During the first cycle, SEPA developed a 'priority catchment' approach to reducing rural diffuse pollution. This approach is designed for large areas where land use is dominated by intensive arable or livestock farming, or by forestry. It is proving effective in securing the necessary changes in land management practices; the latter are set out in GBRs. The work is co-ordinated by the Diffuse Pollution Management Advisory Group (DPMAG)[3] whose members represent a cross section of rural, environmental and wildlife conservation interests.

Two of the first cycle priority catchments are in the Solway Tweed: Stewartry and Galloway Coastal. Work in these areas will continue through the next cycle. There are 12 new catchments where the priority catchment approach is needed, together with a small area in the River Tweed catchment where localised effort is required in a 'diffuse pollution focus area'.

[1] In the Water Environment (Controlled Activities)(Scotland) Regulations 2011
[2] https://www.gov.uk/nitrate-vulnerable-zones
http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/Environment/NVZintro
[3] http://www.sepa.org.uk/water/river_basin_planning/diffuse_pollution_mag.aspx

Proposals for the second and third cycles have been developed for Scotland as a whole and include:

- prioritising priority catchments and focus areas, including those in the Scottish part of the Solway Tweed river basin district, according to where we expect work in those areas to deliver the greatest benefits;
- building on the existing approach by increasing the effort focused on tackling rural diffuse source pollution.

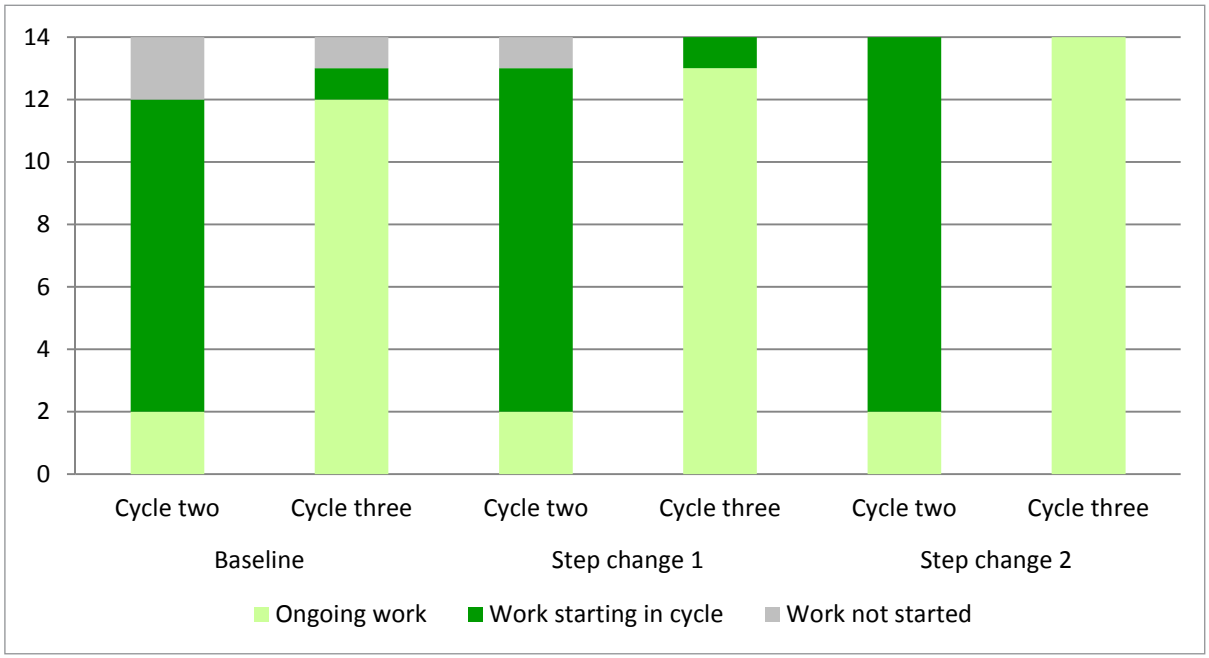
Views are being invited on three scenarios:

- a baseline scenario indicating the work that could be done by rolling forward the existing approach without any step change;
- two scenarios illustrating how different step changes in effort would affect the phasing of work and when we could achieve our environmental objectives.

Further details about the prioritisation and the scenarios are available via the parallel consultation on the second river basin management plan for the Scotland river basin district http://www.sepa.org.uk/water/river_basin_planning.aspx. This includes information on the benefits and risks of each scenario.

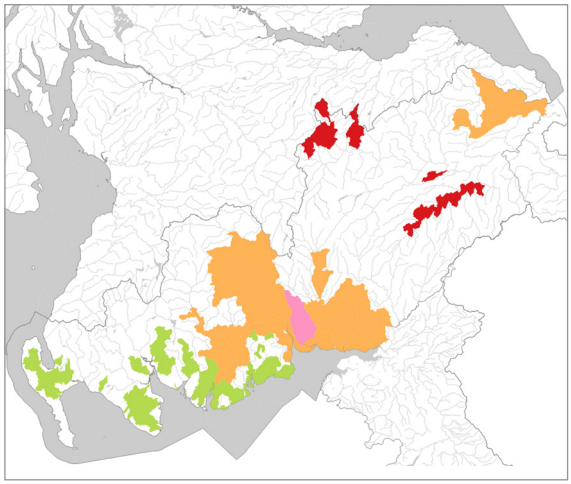
The effort that would be focused on the Solway Tweed priority catchments under each scenario is shown in figure 4 and, with the focus area, map 11. The focus area would have work carried out under both the step change scenarios, but not the baseline.

Figure 4: Phasing of measures in Scottish priority catchments under three scenarios

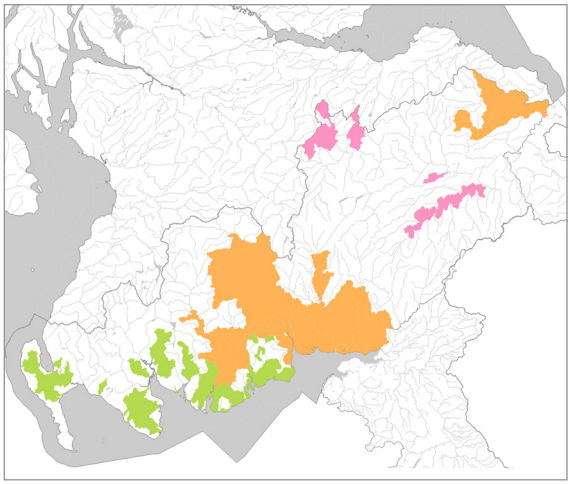


Map 11: Phasing of measures in Scottish priority catchments and focus area under three scenarios

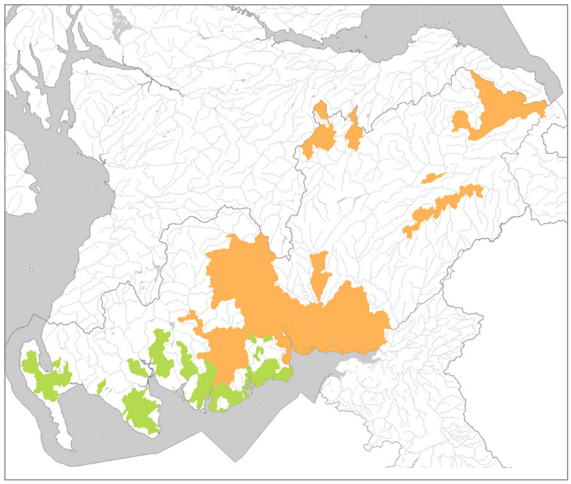
Baseline

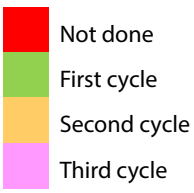


Step change 1



Step change 2

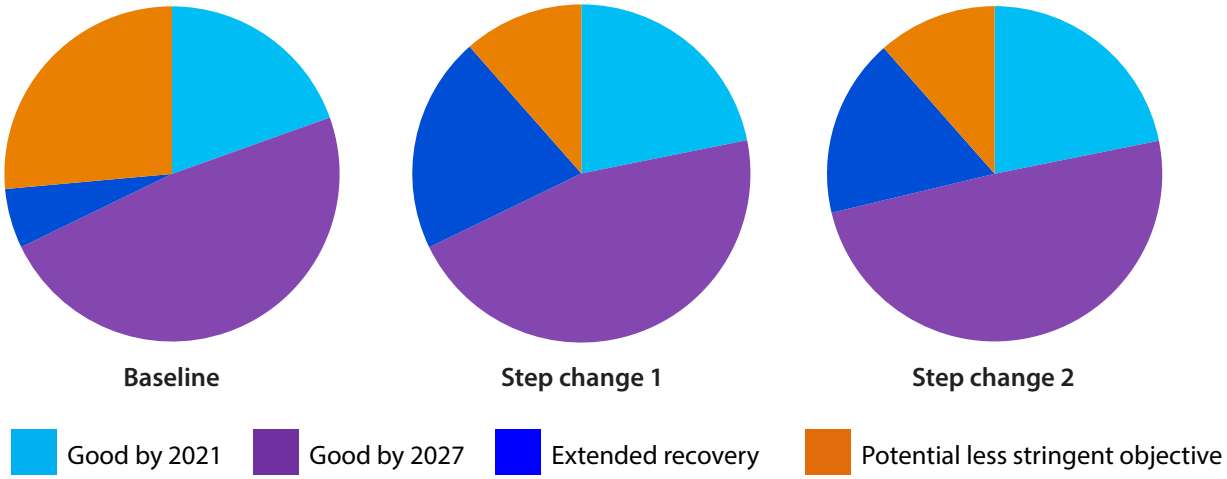




Detailed mapping is available via the online consultation tool.

Carrying out the programme of work indicated under each scenario is expected to achieve the improvements in water quality in the Scottish area of the district described in figure 5 below. The improvements shown factor in the effect of the measures to reduce pollution from waste water discharges.

Figure 5: Expected improvements in the 87 surface water bodies within the priority catchments and focus area which are affected by nutrients and pesticides under three scenarios



There are a number of water bodies where the measures planned may not improve water quality enough that the target of good status can be met. These are the ten 'potential less stringent objectives' shown for all scenarios. Good uptake of measures of the type potentially funded under Scotland's Rural Development Programme (SRDP) would be estimated to reduce that to around six water bodies. SEPA will review progress in the second cycle to identify whether any further action is needed.

Of the ten protected areas that rural diffuse pollution is adversely affecting, all but one will have action taken to ensure the impact is sufficiently reduced that they will not be prevented from meeting their targets by 2021. The exception is the SAC which the Focus Area is designed to improve. Under the baseline scenario there would be no work in any Focus Area; under step change two it would be improved by 2027. Under step change one, measures would be in place in the third cycle, allowing recovery by 2033 - extended recovery.

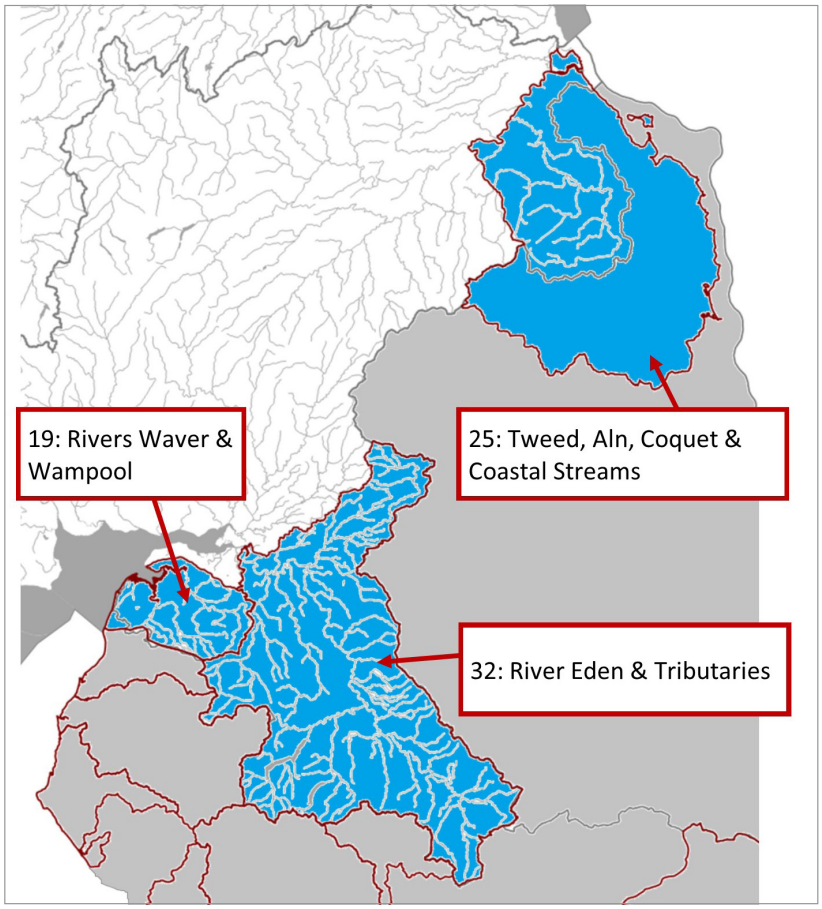
Proposals for the English area of the district

The Environment Agency has identified 35 water bodies as not at good status due to the impacts of rural diffuse pollution. The River Eden is a large Special Area of Conservation (SAC), and several tributaries within it are also affected, along with three drinking water protected areas. Two bathing waters (Silloth and Spittal) and two shellfish waters (Silloth and Solway) are failing to meet their targets; measures to address the problems with Spittal bathing water are largely focussed on the Scottish areas of the Tweed system.

During the first cycle, Catchment Sensitive Farming (CSF) has been the key mechanism for delivering agricultural land-use measures. CSF provides voluntary advice to farmers and includes a capital grant scheme. It is run jointly by the Environment Agency and Natural England, funded by Defra and the Rural Development Programme for England, and works in priority catchments across England. Modelling results indicate that improved management practices resulting from this work achieve significant reductions across a range of pollutants. Much of the English area of the district is covered by CSF Priority Catchments, as map 12 highlights.

Within Environmental Stewardship there are also incentive led schemes, such as those that target resource protection measures at high priority water bodies. The schemes offer farmers incentives to limit their application of fertilisers on land draining into these water bodies.

Map 12: English Catchment Sensitive Farming Priority Catchments



Improvements in the second and third cycles will be delivered through a combination of regulation, advice and funded assistance. Further work will be required to review delivery mechanisms and develop a revised package of tools to support the required reduction in rural diffuse pollution as part of the production of the second plan. In addition, the forthcoming New Environmental Land Management Scheme (NELMS) is likely to provide further opportunity to improve and protect the water environment.

Safeguard Zones are non-statutory areas identifying where measures and actions are targeted to meet drinking water protected area objectives. The Environment Agency develops Safeguard Zone Action Plans with water companies and local stakeholders to identify and implement measures and actions. There are three safeguard zones in the River Eden catchment.

At a local level, the Tweed Forum and Eden Rivers Trust have an excellent record of delivering project-driven work to reduce diffuse pollution in the Till and Eden catchments, respectively. The Eden is also part of a national Defra-funded Demonstration Test Catchment project looking specifically at agricultural diffuse pollution and the impact of measures to reduce it.

As part of Natural England's Site Improvement Plan (SIP) delivery, the River Eden SAC and the River Tweed SAC both have Diffuse Water Pollution from Agriculture plans in place. Existing mechanisms such as CSF, and regulatory visits by the Environment Agency are key tools for delivering water quality improvements in these protected areas. NELMS will also directly target Natura sites, and synergies between protected area status and good ecological status will be a high priority.

The Site Improvement Plan for the River Eden SAC highlights a particular issue for the Lake District and Pennines areas – seasonal pressure on infrastructure during the tourist season. Specifically, Ullswater fails to meet water quality targets as a result of nutrient input, probably from a combination of wastewater and agricultural sources. The strain placed on sewage disposal facilities for public toilets and campsites through the summer months is thought to be a key contributor to this problem. Partly to address the water quality problems (and also to mitigate the likely impacts of future climate change), the Lake District National Park has established a catchment initiative called Ullswater Valley Planning. This is a geographical approach to partnership working to improve delivery of community aspirations; to address economic, environmental and community issues.

Measures delivered under CSF or Environmental Stewardship and by third sector partners are often packaged together as general 'agriculture and land management' work, and may include work to restore habitat and improve the physical condition of the water body. Around half of the water bodies that have water quality downgrades due to rural diffuse pollution also require an element of habitat work.

Economic assessment by the Environment Agency suggests a cost of **£280m over a 37 year period** for full measures to address problems associated with agricultural land management.

The Environment Agency have considered all the measures likely to be necessary to reduce the impact of agricultural land management in the English area of the district as far as it is technically feasible to. Economic assessment of the costs and benefits of such a measures programme has concluded that, overall, there would be a net financial benefit to carrying out the work. The pace at which the improvement measures can be delivered is dependent on affordability. See Annex 2 for further details, and outlines of potential delivery scenarios.

There are, however, some measures which must be delivered by a set time. Those water bodies that are part of or affecting a protected area will require action during the second cycle to address the relevant water quality issues – although this may not be sufficient to meet their Water Framework Directive (WFD) objectives. In summary:

- To improve conditions in the shellfish and bathing waters of the Solway Firth, 32 water bodies require work to reduce inputs from farm animals. Of these, 16 are not at good ecological status themselves, and this work is likely to go some way towards resolving this. Work will also be required in water bodies in the English North West river basin district, and the measures already planned for the Scottish river systems draining into the Firth also have the potential to help. Work will also be carried out to improve the effluent from sewage treatment which reaches the sea.
- Five water bodies require work to address agricultural land use problems which are affecting the River Eden SAC. Four of these water bodies are not at good ecological status for the same reason, and the measures to improve the SAC will improve WFD status.

Managing pressures from urban diffuse source pollution

Toxic pollution arising from diffuse urban sources is emerging as a management challenge for the district. Toxic substances can enter the water environment through a combination of point and diffuse sources. One of the major routes into the water environment is through run-off from roads and other urban surfaces.

On the basis of the agencies' current monitoring information, the scale of pollution from these sources appears limited – only two water bodies in the district risk not meeting good status in 2015 as a result. However, this monitoring does not yet include consideration of a number of pollutants ('priority substances') recently identified at EU level as being of concern and its technical ability to detect some of the most toxic pollutants is currently limited. The UK has also agreed an ambitious objective of aiming to phase out emissions, discharges and losses to the environment of the most hazardous pollutants, known as priority hazardous substances.

The priorities for the second cycle will be to:

- better understand where the water environment is at risk from toxic pollution;
- where it is at risk, identify key sources of the pollutants concerned;
- design and prioritise action to reduce the most significant sources.

Effort will be targeted towards focussed monitoring and assessment work, which will ensure that any action subsequently required is prioritised towards the most serious problems.

The agencies will continue to work together and with other UK and European bodies to raise awareness about pollution risks and how they can be managed, including strengthening legislative controls on the use of specific substances where appropriate.

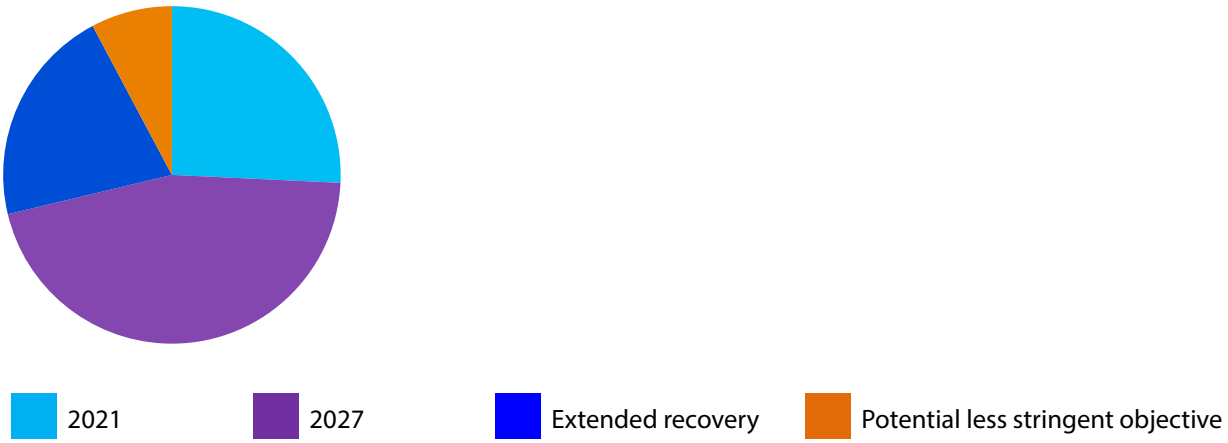
Overall water quality improvements

The scale of water quality improvement achieved in the district in the second and third cycles will depend on the combined effects of the work undertaken across the district to address all sources of pollution.

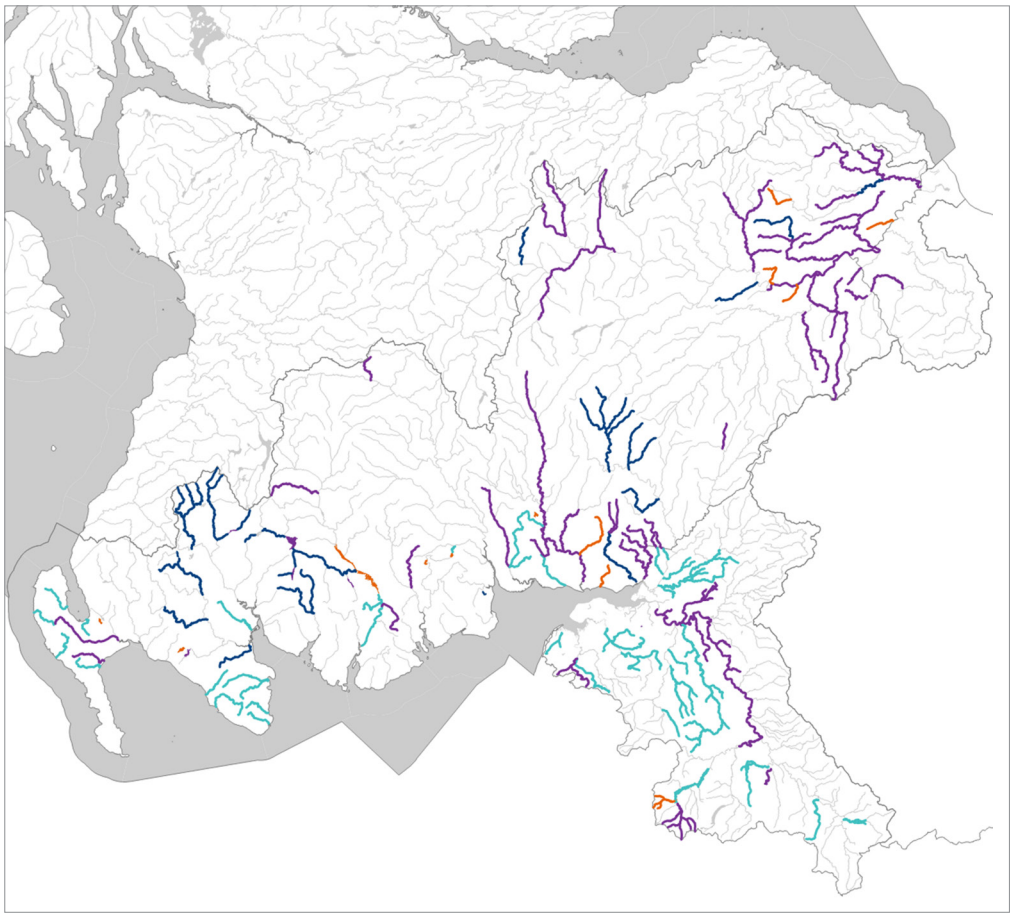
The figures below show what would be achieved based on the combination of the step change 2 scenario for tackling diffuse pollution in the Scottish part of the district and the scenario 4 approach in the English part (scenario 4: all technically feasible and cost beneficial measures are carried out).

Those water bodies affected by acidification are also included here, forming the bulk of the proportion with an extended recovery objective. There are also some water bodies where less stringent objectives have been formally agreed as they have higher than expected nutrient levels due to inputs from natural sources – birds in these cases.

Figure 6: Potential improvements in water quality of 167 surface water bodies at less than good status in 2015, based on step change 2 (Scotland) and scenario 4 (England)



Map 13: Potential improvements in water quality of 167 surface water bodies at less than good status in 2015, based on step change 2 (Scotland) and scenario 4 (England)



Good by 2021 Good by 2027 Extended recovery Potential less stringent objective

Detailed mapping is available via the online consultation tool.

4 Physical condition of the water environment

There are around 95 water bodies across the district where the extent, quality or diversity of habitats for aquatic wildlife has been significantly affected by modifications to their beds, banks or shores (see Map 4). Progress has been made but a good deal more needs to be done. Three of the district's riverine Special Areas of Conservation (SAC) have areas within them where physical condition has been assessed as adversely affecting habitats.

Improving the physical condition of these water bodies is even more of a challenge than tackling diffuse pollution. Progress has been made but a good deal more needs to be done. Restoring more natural habitats in the affected water bodies will provide significant benefits, including:

- Contributing to the social well-being and regeneration of areas where a high quality water environment has the potential to be an important community amenity.
- Restoring wildlife habitats that will contribute to the conservation of rare and endangered species.
- Expanding opportunities for recreational activities.
- Contributing to reducing floods in some areas by, among other things, slowing water flows.

Work to address other rural pressures such as diffuse pollution may require the inclusion of elements of habitat restoration, particularly on smaller rivers.

Many modifications to the physical condition of water bodies are essential to society, and new work will continue to be needed in future. However, planning and regulatory processes now acknowledge the importance of reducing the impact of new schemes on the water environment. SEPA and the EA issue specific guidance to assist with compliance and provide information on good practice for many activities. Where structures are already in place, improvements may also be required to mitigate their effects.

The flood management planning process in particular is closely aligned to that of river basin planning, and the use of natural processes to improve flood management may have restoration benefits. Working with natural processes can include taking action to manage flood risk by protecting and restoring the natural function of catchments, rivers, floodplains and coasts. This could, for example, involve using farmland to store flood water temporarily or reinstating wetlands to store flood water away from high risk areas.

The range of physical modifications made to the beds, banks and shores of the district's rivers and lochs is very broad – running from the effects of historic agricultural drainage to those of modern flood protection. The potential impact on the functioning of rivers (as the main water body type affected) and their ecology, is equally wide ranging, and can be hard to predict. Consequently, there are many pilot studies and trials underway across the UK which aim to improve understanding, and then assess the effects of mitigation and restoration efforts, and several of these projects lie within the Solway Tweed district. Of particular importance in this respect is the potential for natural flood management and this is a focus of all of these projects. Examples include:

- In cycle one, SEPA established the River Nith as one of four pilot catchments across Scotland in order to increase understanding and develop an approach to delivering improvements to physical condition and contribute to natural flood risk management.
- Natural England, in partnership with the Environment Agency and other organisations, produced river restoration strategies for SAC river systems across England. This includes the rivers Eden and Tweed, and two large demonstration restorations are in progress on the Eden.

Work to improve physical condition and restore natural functioning in rivers can produce many benefits beyond purely ecological improvements. It may be possible for several organisations with diverse aims to form partnerships and carry out work which fulfils requirements for all of them. This voluntary, opportunity-led approach has been effective in some areas during the first cycle. Across the district, funding has been put in place to assist with such work – via the Catchment Restoration Fund in England and the Water Environment Fund in Scotland.

Proposals for the Scottish area of the district

In the Scottish area of the district, SEPA's latest assessment is that there are around 60 water bodies requiring improvement to the condition of their beds, banks or shores.

The principles that will underpin work in the second and third planning cycles were outlined in a supplementary plan *Improving the physical condition of the water environment* http://www.sepa.org.uk/water/river_basin_planning/implementing_rbmp.aspx. For the second plan, we are proposing to:

- prioritise water bodies for improvements where the greatest benefits would be delivered;
- work with public bodies, voluntary organisations and businesses to encourage and develop improvement projects;
- expand the role of the Water Environment Fund in supporting measures to improve the physical condition of water bodies;
- work with managers of artificial structures on the beds, banks or shores of water bodies to ensure those structures are appropriately maintained or modified to reduce their impacts on the water environment.

The proposals have been developed for Scotland as a whole and full details are available via the parallel consultation on the second river basin management plan for the Scotland river basin district http://www.sepa.org.uk/water/river_basin_planning.aspx. Views are being invited on three scenarios for how work on improving physical condition should be expanded in the second and third cycles. The scenarios are:

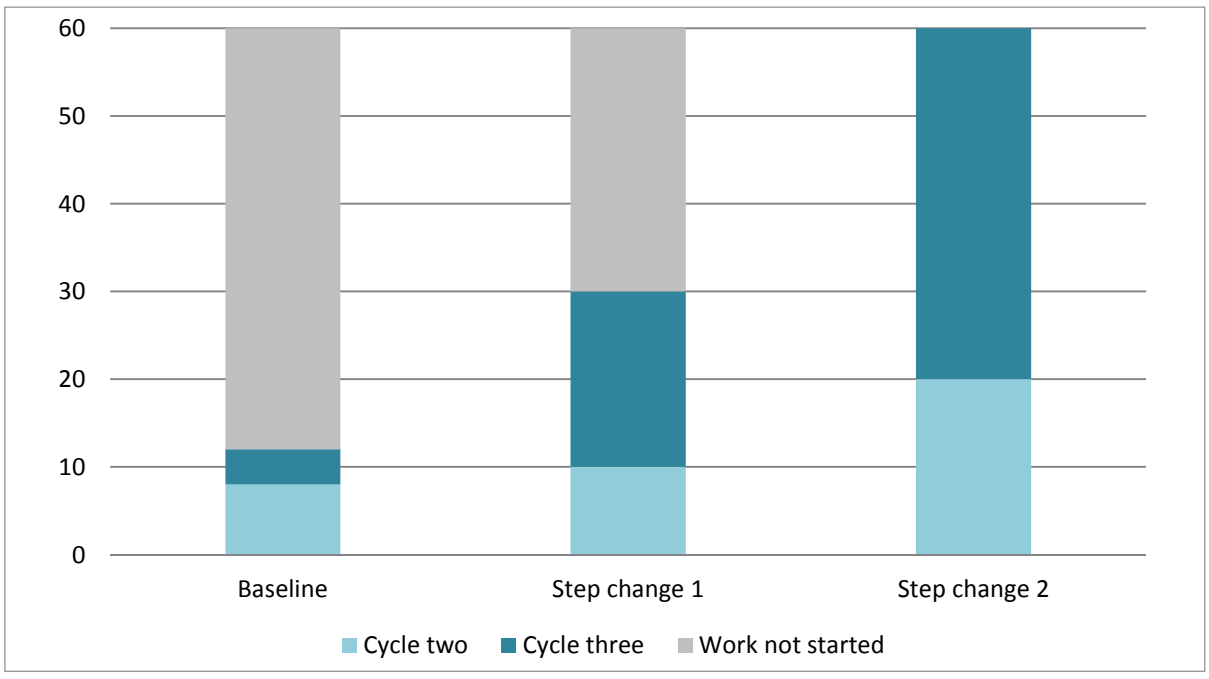
- a baseline scenario indicating the work that could be done by rolling forward the existing approach without any step change;
- two scenarios illustrating how different step changes in effort would affect the phasing of work and hence when environmental objectives could be achieved, subject to the programme of work demanded being feasible to deliver.

The effort that would be directed at improving water bodies in the Scottish part of the Solway Tweed district under each scenario is shown in figure 7. The benefits, risks and feasibility of each scenario are discussed in the consultation on the Scotland river basin plan.

SEPA's information on the extent of modifications to the bed, banks and shores of water bodies is incomplete. Under each of the proposed scenarios, the programme of work in the second cycle will involve detailed studies of all the affected water bodies to confirm impacts. This improved understanding may change priorities at a national scale. We may also need to re-order priorities to take account of the availability of willing partners able to help secure improvements.

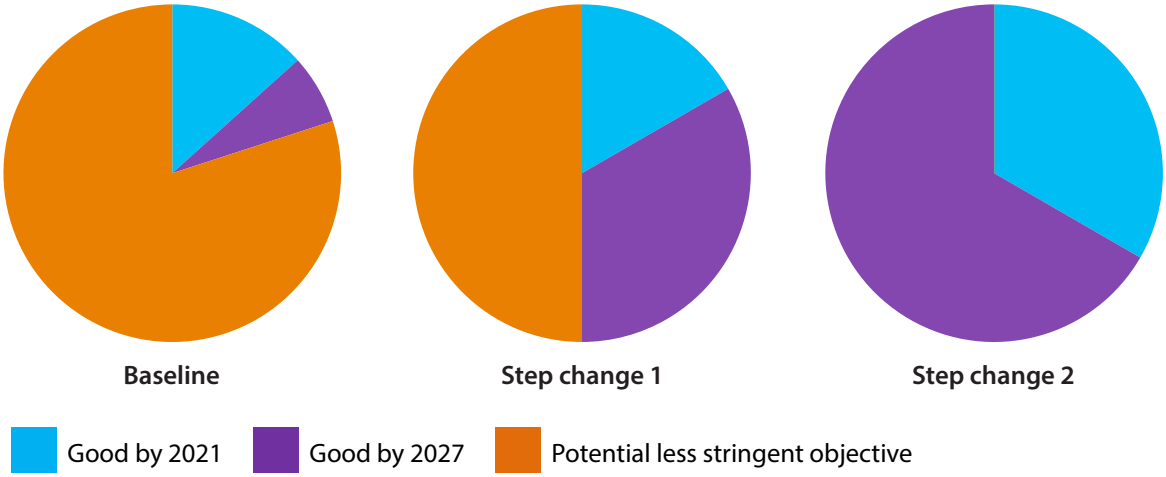
The River Nith pilot catchment water bodies, which have already had substantial scoping and planning work carried out in the first cycle, will continue to be progressed during cycle two under all scenarios.

Figure 7: Phasing of Scottish restoration measures under three scenarios



Carrying out the programmes of work indicated in the above scenarios is expected to achieve the improvements in the physical condition of water bodies described in Figure 8 below.

Figure 8: Expected improvements to the 60 surface water bodies which are at less than good status due to impacts on their physical condition, under three scenarios



Proposals for the English area of the district

In the English area of the district, 24 water bodies have physical condition as a reason for not achieving good status. This is largely as a result of agricultural land management practices: the majority of these water bodies also require work to address rural diffuse pollution.

Significantly, the two main river systems, the Eden and Tweed, are both largely designated as SAC and contain more than 170km of river length assessed as requiring improvements to physical condition.

Natural England have published Site Improvement Plans (SIP) for the River Eden SAC and the River Tweed SAC which include River Restoration Strategies (RRSs) to restore hydromorphological processes. The primary cause of failure to meet favourable condition in the River Till (part of the Tweed SAC) is physical modification. For the Eden, physical modification of the river channel has resulted in 176km of river being included in the Eden RRS as requiring 'assisted natural recovery' or 'significant channel restoration'.

Both restoration strategies provide a detailed assessment of the issues and a comprehensive suite of measures required to address them. Delivery is planned via partnerships between Natural England, the Environment Agency and the Tweed Forum on the Till, and Eden Rivers Trust on the Eden.

Because of the close connection between physical modification and rural diffuse pollution, measures to improve both tend to be delivered as part of a single package, particularly where it is delivered under Catchment Sensitive Farming, Environmental Stewardship or by local river trusts. This work usually targets small to medium rivers, where measures such as fencing off river banks and tree planting in the riparian zone can significantly improve both habitat and water quality. Other restoration techniques, such as the use of large woody debris as bank reinforcement and to alter flows and diversify habitat, are becoming increasingly common.

Economic information for this work is therefore included in the discussion of rural diffuse pollution in section 3.

Specific habitat improvement work is also delivered as part of a package of measures where there is a need to conserve a particular species or community. The white clawed crayfish *(Austropotamobius pallipes)* population is a primary designation feature of the River Eden SAC, and much work is undertaken to protect it, including under the Defra-funded Eden Crayfish Catchment Restoration Project.

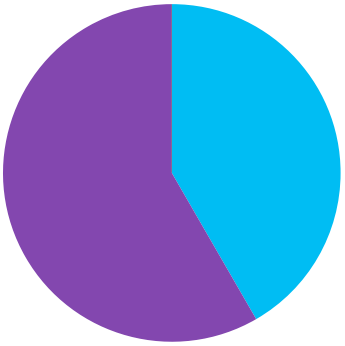
Work will also include:

- more action to ensure that central and local government consider impacts on hydromorphology in decisions of spatial planning;
- providing encouragement and support for partnership work to improve physical condition, particularly with non-governmental organisations.

Overall proposals for the district

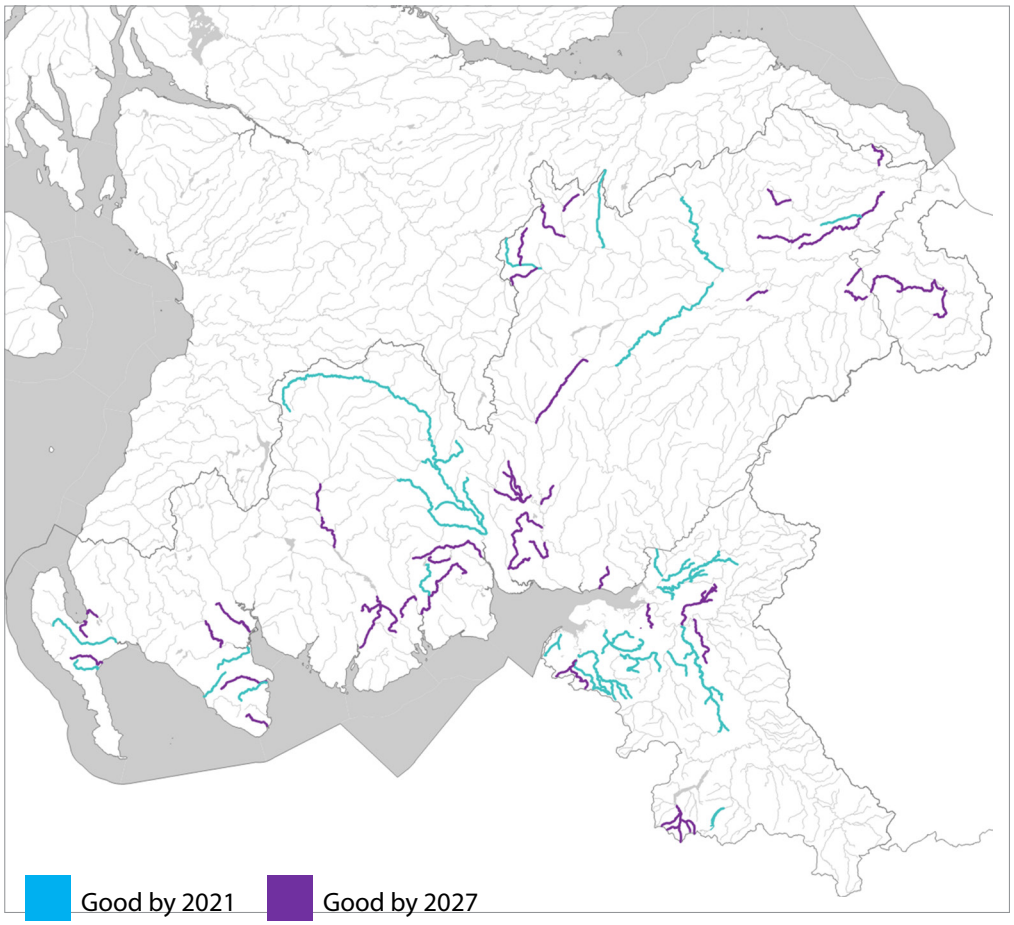
The figures below show what would be achieved based on the combination of the step change 2 scenario for improving physical condition in the Scottish part of the district and the scenario 4 approach in the English part (scenario 4: all technically feasible and cost beneficial measures are carried out).

Figure 9: Potential improvements in the physical condition of the 84 surface water bodies at less than good status in 2015, based on step change 2 (Scotland) and scenario 4 (England)



Good by 2021 Good by 2027

Map 14: Potential improvements in the physical condition of 84 surface water bodies at less than good status in 2015, based on step change 2 (Scotland) and scenario 4 (England)



Detailed mapping is available via the online consultation tool.

5 Barriers to fish movement

There are around 70 weirs, dams or other man-made structures currently known to be posing a barrier to fish migration in the district's rivers (map 5). The vast majority of these are in Scotland. Based on the latest assessments by SEPA and the Environment Agency, the barriers are adversely affecting the status of fish populations in around 47 water bodies

There are significant benefits to be gained from removing or easing barriers to fish movement, including helping to:

- sustain healthy fish populations by allowing access to habitat which would otherwise be inaccessible, particularly spawning and nursery habitat
- sustain economically-important fisheries
- assist in the conservation of fish species: Atlantic salmon, bullhead and lamprey are among the wildlife conservation interests for which Special Areas of Conservation have been designated. Some of the district's Scottish rivers support the rare sparling (smelt), Allis shad and Twaite shad. Eels are also found across the district and the subject of the Solway Tweed Eel Management Plan.
- re-connect partially separated river ecosystems and restore natural sediment movement, where removal of a barrier is a viable option
- optimise conditions for freshwater pearl mussels, which depend on the presence of migratory fish during various stages of their life-cycles
- reconnect populations of river-dwelling fish which may be artificially genetically isolated and at greater risk of local extinction

In the English area of the district, an extensive programme of barrier removal and easement has been carried out over previous decades. There are very few remaining impassable man-made barriers and only one is affecting the status of fish populations. The focus for the next cycles is on identifying and addressing structures that are passable to some but not all species or passable only under particular river flows.

In the Scottish part of the district, work to address barriers in the first cycle has involved a combination of the efforts of licensed operators of dams and weirs and initiatives to provide for fish passage at abandoned structures. Many of the latter have resulted from the joint efforts of the Rivers and Fisheries Trusts for Scotland and SEPA, and have been supported with funding from the Water Environment Fund.

Work to remove barriers and improve fish passage has historically involved cross border working; the fisheries of the Scottish area of the Border Esk are looked after by the Environment Agency, and the English parts of the Tweed system are overseen by the River Tweed Commissioners. The Border Esk fish barriers project, for example, is a partnership between Galloway Fisheries Trust, the Esk and Liddell Improvement Association and the Environment Agency.

The region now has established populations of the invasive and non-native North American signal crayfish, and man-made barriers will not be removed where they are preventing them from spreading to upstream waters. New barriers may potentially be required in future where there is potential to prevent further spread.

Proposals for the Scottish area of the district

Around 23 of the barriers in the Scottish part of the district are weirs and dams operated by public bodies, such as Scottish Water, or by businesses. SEPA will work with the licensed operators of these structures to ensure the necessary provisions for fish passage are made by the end of 2027, as far as reasonably possible.

There are also 17 barriers caused by infrastructure such as road culverts and bridge reinforcements. The remaining 25 structures are primarily old, abandoned weirs and dams that are neither serving an economic purpose nor the responsibility of a public body.

With respect to these barriers, we are proposing to:

- prioritise work to remove or ease barriers based on where the greatest benefit will be expected;
- work with public bodies and businesses responsible for the management of infrastructure to ensure appropriate and proportionate measures are taken to restore fish passage by the end of 2027;
- expand the level of funding and effort focused on enabling fish passage at abandoned structures.

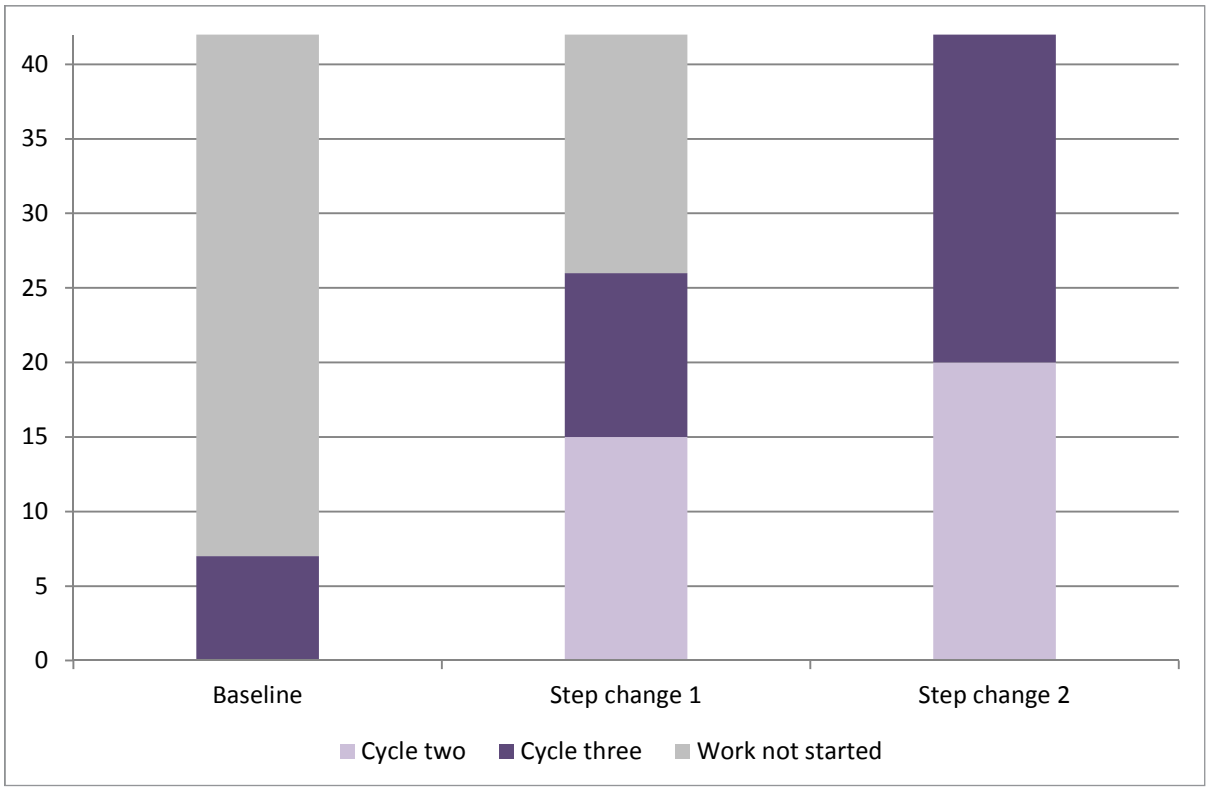
The proposals have been developed for Scotland as a whole and full details are available via the parallel consultation on the second river basin management plan for the Scotland river basin district http://www.sepa.org.uk/water/river_basin_planning.aspx. Views are being invited on three scenarios for how work on these barriers should be expanded in the second and third cycles. The scenarios are:

- a baseline scenario indicating the work that could be done by rolling forward the existing approach without any step change;
- two scenarios illustrating how different step changes in effort would affect the phasing of work and when we could achieve our environmental objectives, subject to the programme of work demanded being feasible to deliver.

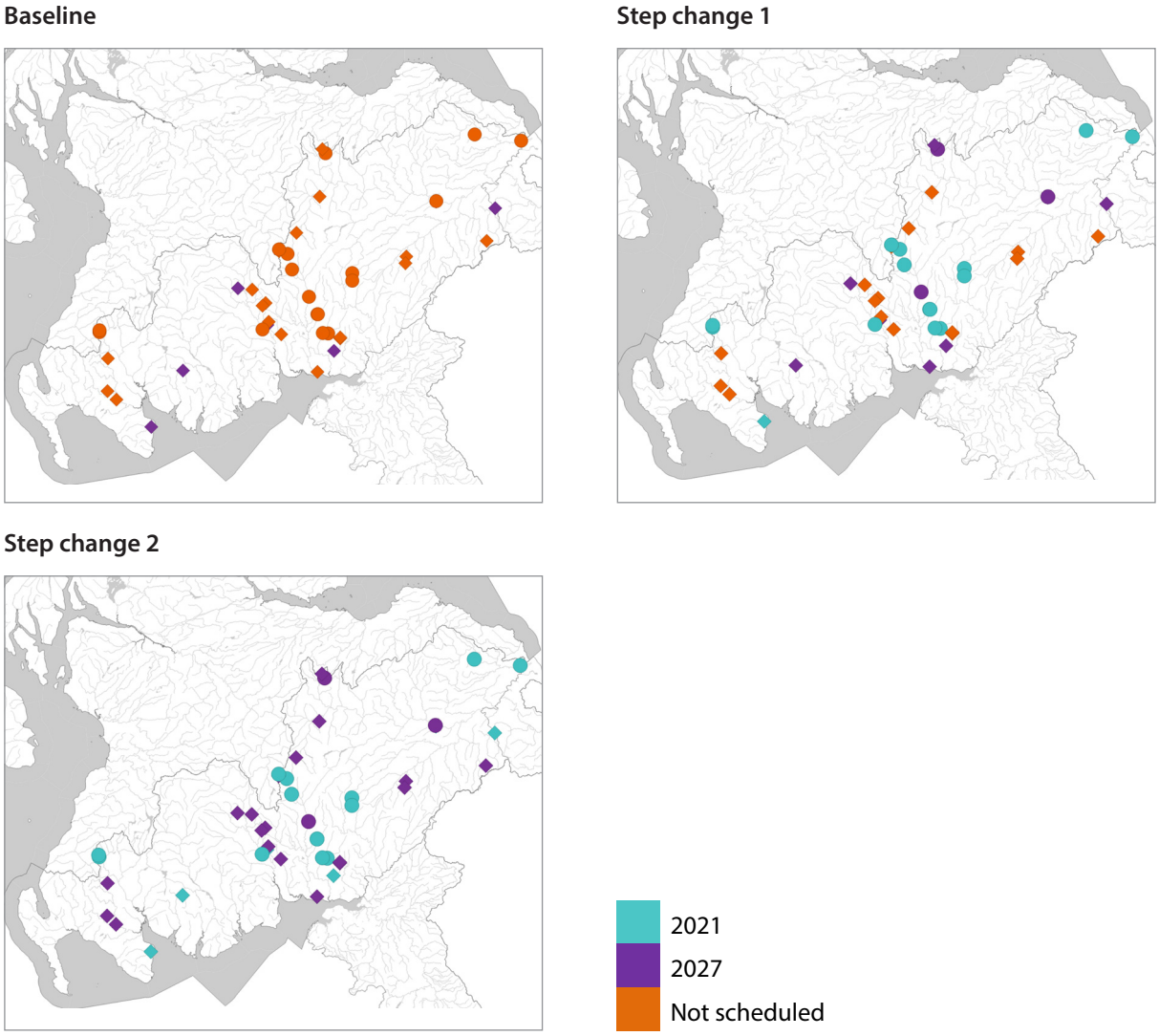
The effort that would be directed at addressing barriers in the Scottish part of the Solway Tweed district under each scenario is shown in figure 10. The benefits, risks and feasibility of each scenario are discussed in the consultation on the Scotland river basin plan.

SEPA's information on barriers and their relative impact on different fish species is incomplete: Some structures may prove less significant than currently thought as, for example, understanding of the extent of good fish habitat upstream improves. Information on barriers that we have not yet identified may also come to light. This may change our understanding of priorities and we will need to adapt accordingly.

Figure 10: Phasing of Scottish measures to remove barriers to fish movement caused by infrastructure assets (other than those in active use) and abandoned structures under three scenarios



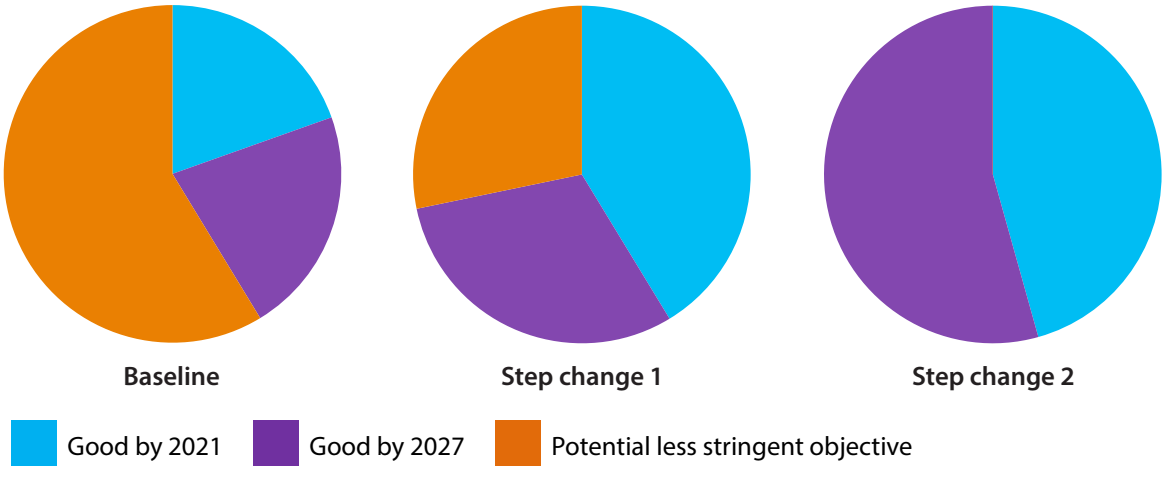
Map 15: Phasing of Scottish measures to remove barriers to fish movement caused by infrastructure assets (other than those in active use) and abandoned structures under three scenarios



Detailed mapping is available via the online consultation tool.

Carrying out this programme of work, in combination with that undertaken at weirs and dams that are licensed and in active use, will create the improvements shown in figure 11.

Figure 11: Expected improvements to the 46 surface water bodies which are at less than good status due to the impact of barriers to fish movement, under three scenarios



Proposals for the English area of the district

All of the completely impassable man-made barriers in the English area of the district have been assessed, and none currently require further work: either they are at good ecological potential if the water body is heavily modified, or they are on water bodies where the cost of removal or easement would outweigh the benefit.

There remain, however, many man-made barriers which are partially passable, whether to some species or just at some flows. Barriers on the rivers Eden, Esk, Wampool and Waver are currently being re-assessed as part of the requirements of the Eels (England and Wales) Regulations 2009. This will provide a better understanding of which of the more minor barriers continue to affect fish populations sufficiently that they are preventing the achievement of good status. Although focused on eels, the Environment Agency consider all native fish species when assessing these barriers.

A full barrier survey of the River Eden was undertaken in 2012 by Eden Rivers Trust in partnership with the Environment Agency, and with Defra funding. Similar work has been carried out by the Tweed Foundation on the Till, and by Galloway Fisheries Trust and the Environment Agency on the River Esk. All of these organisations have also carried out programmes of barrier removal and easement on the river systems they cover.

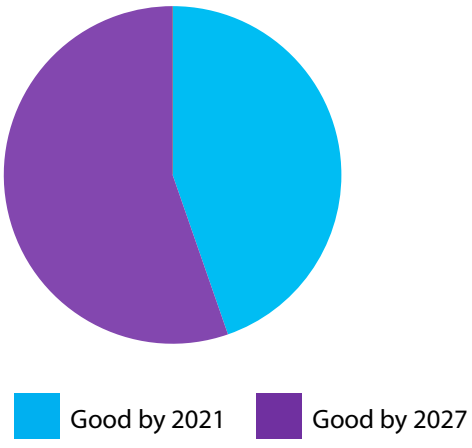
On the Till, one water body, part of the Wooler Water, has three barriers that require action as they are preventing the achievement of good status and affecting part of the River Tweed SAC. Haugh Head ford is the largest of the three and forms an almost completely impassable barrier to fish movement.

There are likely to be barriers that require work in the future, whether resulting from the eel passage assessments, because existing passes fail, or where new structures are discovered. As flows change in response to the changing climate, passability of many obstacles is likely to change. These will be dealt with on a project basis and a range of options for partnership working could be employed.

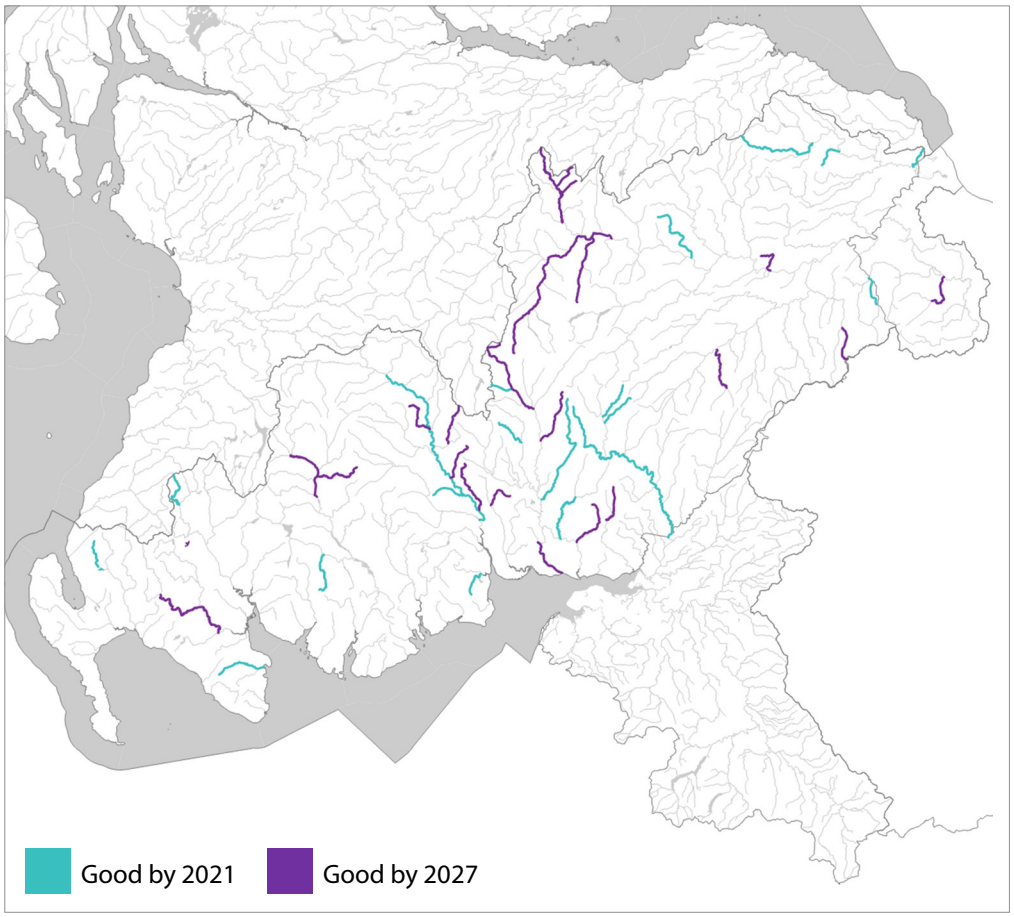
Overall proposals for the district

The figures below show what would be achieved based on the combination of the step change 2 scenario for addressing barriers to fish movement in the Scottish part of the district and the scenario 4 approach in the English part (scenario 4: all technically feasible and cost beneficial measures are carried out).

Figure 12: Potential improvements to the 47 surface water bodies which are at less than good status due to the impact of barriers to fish movement in 2015, based on step change 2 (Scotland) and scenario 4 (England)



Map 16: Potential improvements to the 47 surface water bodies which are at less than good status due to the impact of barriers to fish movement in 2015, based on step change 2 (Scotland) and scenario 4 (England)



Detailed mapping is available via the online consultation tool.

6 Flows and levels

The flows of our rivers and the water levels in our lakes, lochs and aquifers can be affected by abstraction for a variety of purposes, mainly connected to public water supply, irrigation and the generation of hydropower. Structures associated with these types of water management, such as dams and water intakes, can also act as barriers to fish movement.

There are a wide range of environmental and socio-economic benefits of maintaining and restoring good water flows and levels, including:

- helping restore and support runs of migratory fish, such as Atlantic salmon, and so protecting and enhancing fisheries;
- maintaining or restoring the conditions needed to help conserve internationally important wildlife;
- protecting, and expanding opportunities for, water based recreation;
- improving visual amenity by, for example, restoring flows to dry, or nearly dry, rivers.

Around 40 water bodies in the district are predicted to be at less than good status at the end of 2015 as a result of changes to their flows or levels (see map 6). Roughly half of these are affected by water abstraction for public water supply. Improvements will be made to these water bodies where reasonably possible over the next two cycles as part of the investment programmes of Northumbria Water, Scottish Water and United Utilities, to ensure the sustainable management and protection of drinking water supplies. The Environment Agency and SEPA will also work with operators of other abstractions to progressively address impacts on flows and levels[4].

The River Eden system in particular supplies a large volume of water to United Utilities' integrated supply zone, and these major abstractions have recently been amended by the Environment Agency review of consents.

In Scotland, changes are proposed to how improvements to flows and levels are phased over the next two cycles, taking account of SEPA's growing understanding of the impacts of pressures on flows and levels. Efforts in the second cycle will be focused on those water bodies where SEPA has found major or severe ecological impacts due to water abstraction or impoundment. Further details can be found in the consultation on the Scotland river basin management plan. Very few water bodies in the Solway Tweed are affected.

The majority of water abstractions for agricultural irrigation only pose a significant risk to the status of water bodies in years when there is an unusually-dry period of weather. SEPA will work with farmers to ensure that they know when the water environment is vulnerable because of such weather and how they need to limit their abstractions from the affected sources at those times to avoid significant adverse impacts. This work will help secure the protection of seven water bodies in the River Tweed catchment.

Seven water bodies in the Dee-Ken hydro scheme are predicted to still be affected by this pressure in 2015. Six had objectives set for them in the first cycle and retain these. One additional water body is now assessed as at less than good status and has an objective set for 2027.

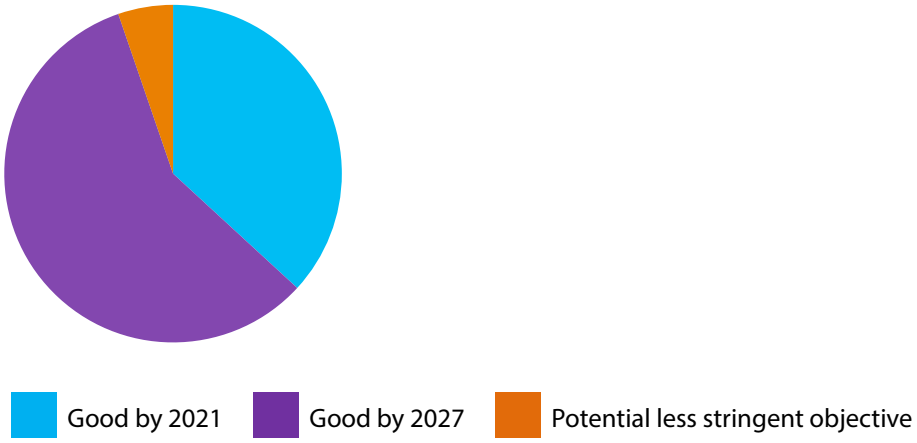
[4] Regulatory controls on water abstraction in the River Till catchment will shortly be taken over by the Environment Agency. Currently, abstractions in this catchment are consented by Natural England

Overall improvements to flows and levels

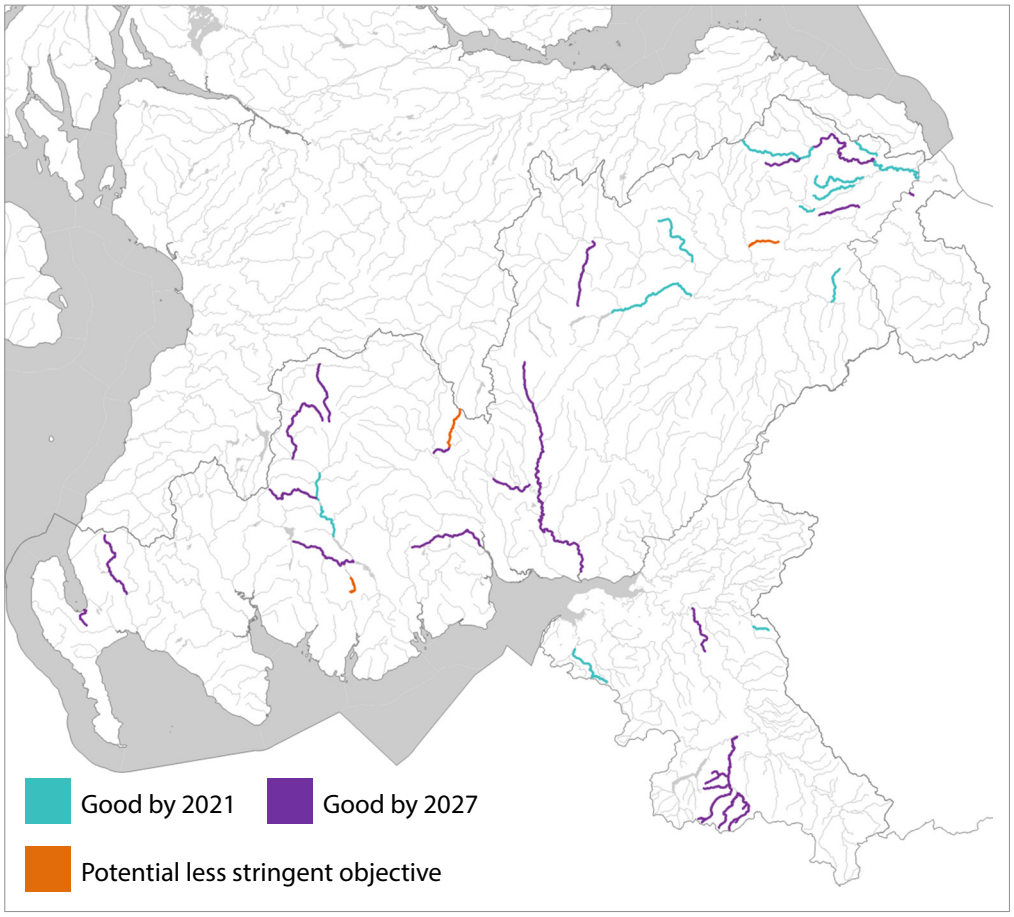
This section shows the predicted water body improvements when the measures for all pressures on flows and levels are considered in combination.

Figure 13 and map 17 show the dates by which water bodies in the Solway Tweed river basin district would be expected to reach Good status following all proposed improvements to their flows and levels.

Figure 13: Expected improvements to the 38 surface water bodies which are at less than good status due to impacts on their flows or levels



Map 17: Expected improvements to the 38 surface water bodies which are at less than good status due to impacts on their flows or levels



Detailed mapping is available via the online consultation tool.

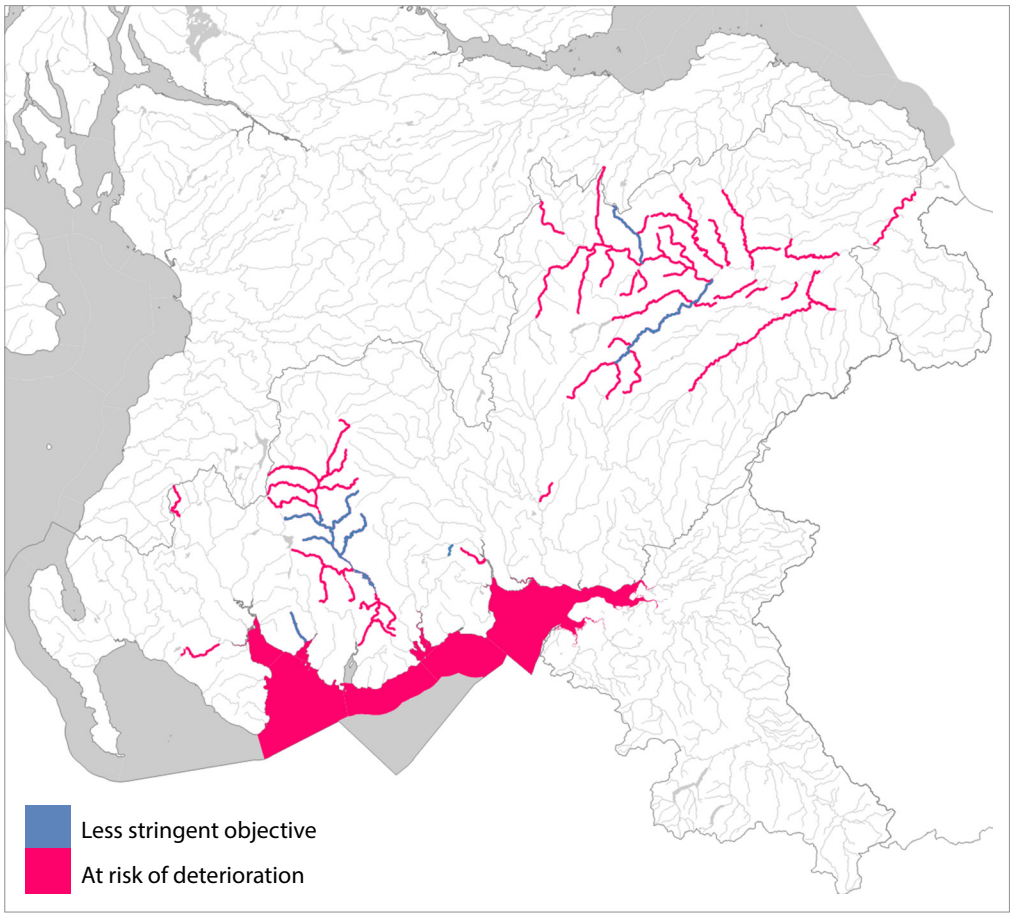
7 Invasive non-native species

There are many non-native plant and animal species in the UK, although only a small number of them become invasive, potentially causing significant impacts on ecological quality, wild fisheries and recreation. Management is challenging as complete eradication is costly and for some species, not possible. Climate change is likely to have an impact on biodiversity in future by affecting the distribution of native and non-native species.

Due to the current understanding of the scale and nature of pressures caused by invasive non-native species (INNS) there are very few water bodies at less than good status in the Solway Tweed river basin district. A number of water bodies are at risk of deterioration because of the potential for invasive non-native species to spread from nearby water bodies where they are already established.

As map 18 illustrates, in the Solway Tweed river basin district, nine water bodies are at less than good status due to the impact of INNS, all of which are Scottish and affected by the presence of North American signal crayfish. For these water bodies, we do not expect to achieve good status by 2027 due to a lack of effective control and eradication methods and a less stringent objective has been agreed. This will be reviewed accordingly, as and when technological advances are made.

Map 18: Water bodies at less than good status or at risk of deterioration as a result of invasive non-native species



Detailed mapping is available via the online consultation tool.

A total of 72 water bodies in the district are potentially at risk of deterioration by 2027 unless appropriate controls and management are put in place. Invasive species have already found their way into some of these water bodies but their populations are not yet at a size that could compromise the bodies' ecological status. Other water bodies are at risk from species invading them from upstream or neighbouring water bodies and catchments unless appropriate controls and management are put in place.

The two populations of North American signal crayfish in the English area of the district are not yet at a level where they are causing a demonstrable impact on the water bodies they have colonised. The water bodies are therefore considered to be at risk of deterioration.

The potential impact of any further spread of signal crayfish within the River Eden would be particularly serious, as it is home to one of the main populations of the native white-clawed crayfish in Britain. Native crayfish are both out-competed by the signal crayfish and susceptible to crayfish plague, which is carried by the signal crayfish.

Both the River Eden SAC and the River Tweed SAC are failing to meet the Natura protected area requirements because of the presence of INNS; both signal crayfish and riparian plants. The Site Improvement Plans for both SACs set out site-specific measures to address the problem.

Current provisions in Great Britain and Europe

When new invasions occur, rapid response is led by the Great Britain Programme Board (made up of senior representatives from across Britain's administrations) who work with partners to eradicate species, where practicable.

Some species cannot be eradicated and, where possible, the aim is to contain these species using good biosecurity measures. In order to be able to implement rapid response of eradication or containment, a national early warning system is maintained for priority species ('Species Alert').

Where it is possible to control some species by reducing their extent or density, the GB Programme Board publishes invasive species action plans that help co-ordinate the response to these key species. Much further work is needed to improve our understanding of how successful various control methods have been for a range of species. This will help determine how control measures are carried out in future. For example, similar groups of invasive species could be managed in a more coordinated way if they all respond similarly to a particular control method.

Stricter rules on non-native species are due to come into force in January 2015 under the new European legislation on Invasive Alien Species (IAS). It follows the same hierarchical approach as the GB Non-Native Species strategy of:

- prevention through identification of priority pathways of introduction and spread and pathway action plans;
- surveillance mechanisms, rapid response and eradication;
- control and containment where eradication is not possible.

Under this legislation, a watch list of species of EU concern is to be drawn up and stronger provisions made for enhancing regional cooperation for species of national concern, even if they are not included on the EU list.

Current provisions in the Scottish area of the district

Since the first plans were published, there have been a number of important developments in Scotland to improve management of INNS including:

- strengthening of the legislation governing the introduction and release of non-native species
- giving key public bodies responsibilities for INNS in specific habitat types
- establishment of a new Statutory Group on Non-Native Species
- publication of a supplementary plan *Managing invasive non-native species in Scotland's water environment* which sets out strategic actions with respect to aquatic INNS and is aimed at habitat leads http://www.sepa.org.uk/water/river_basin_planning/implementing_rbmp.aspx

The individual habitat leads also have responsibilities for putting in place actions to prevent deterioration of water bodies. In the second cycle, they will need to work closely together with the Statutory Group on Non-Native Species to take forward measures to prevent the introduction and control the spread of INNS.

Current provisions in the English area of the district

The Environment Agency and Natural England currently use existing legislative powers such as the Import of Live Fish (England and Wales) Act 1980 and Wildlife and Countryside Act 1981 to control movements of invasive non-native species. A recent change in legislation, implemented in April 2014, introduced a ban on selling five high risk plant species including water primrose and floating pennywort.

Proposals for the next two river basin planning cycles

The main focus in the next two cycles will be on putting effective biosecurity measures in place to prevent deterioration of those water bodies identified as being at risk from the introduction and spread of INNS. To secure this work is needed to:

- raise awareness and promote the importance of biosecurity plans for the fresh water environment, such as those developed by the River and Fisheries Trusts of Scotland http://www.rafts.org.uk/ and the Cumbria Freshwater Invasive Non-Native Species (CFINNS) initiative http://www.scrt.co.uk/cfinns/welcome;
- encourage development of marine biosecurity plans such as the Solway Firth Biosecurity plan, developed by the Solway Firth Partnership http://www.solwayfirthpartnership.co.uk/;
- raise awareness and promote guidance on marine bio-security planning for marinas and construction activities;
- promote the 'Check, Clean Dry' and 'Be Plantwise' campaigns;
- promote the CFINNS Event Biosecurity Support Pack for adventure sports http://www.scrt.co.uk/cfinns/welcome.

For this approach to be successful, everyone who has responsibility for or uses the water environment needs to be involved. This includes water companies and industries which use water, landowners and managers and those organising or promoting recreational access to water. Local and catchment groups can be particularly effective in promoting the biosecurity message, and there are excellent examples of this across the district.

Further research is also required, focussed on improved biosecurity strategies, pathways of introduction, control and management, and defining and predicting the impact of invasive non-native species. In Scotland, RAFTS (the River and Fisheries Trusts of Scotland) is currently undertaking evaluation work to map the progress of a Scotland-wide long-term INNS project, and this will play an important part in determining future management approaches.

Where INNS have arrived and are established, management will be required. Across the district there are good examples of local groups managing INNS at a tributary or catchment scale, often through the use of volunteers and with some success.

8 Overall outcomes for the Solway Tweed river basin district

This section summarises the combined effect of all the measures proposed to tackle pressures on the water environment in the Solway Tweed river basin district in the second and third cycles. The scale of that programme of measures depends on the scenarios chosen in each country to address rural diffuse pollution, damaged bed, bank and shore habitats and barriers to fish movement (see sections 3, 4 and 5). The choice of scenario will also influence the achievement of protected area objectives.

The figures below show what could be achieved by 2027 based on the combination of the step change 2 scenario in the Scottish part of the district and the scenario 4 approach in the English part (scenario 4: all technically feasible and cost beneficial measures are carried out).

Figure 14: Potential overall improvements to the 280 surface water bodies which are at less than good status in 2015 based on step change 2 (Scotland) and scenario 4 (England)

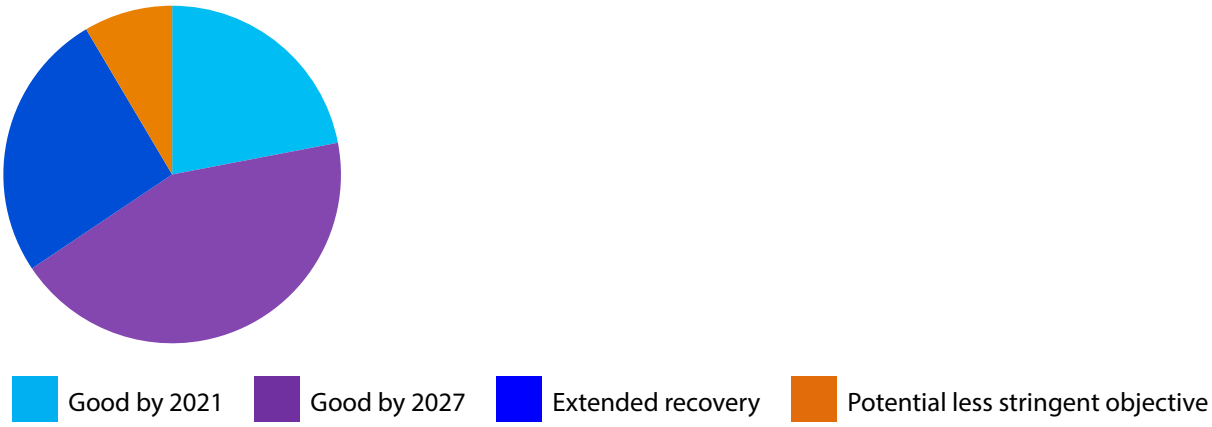
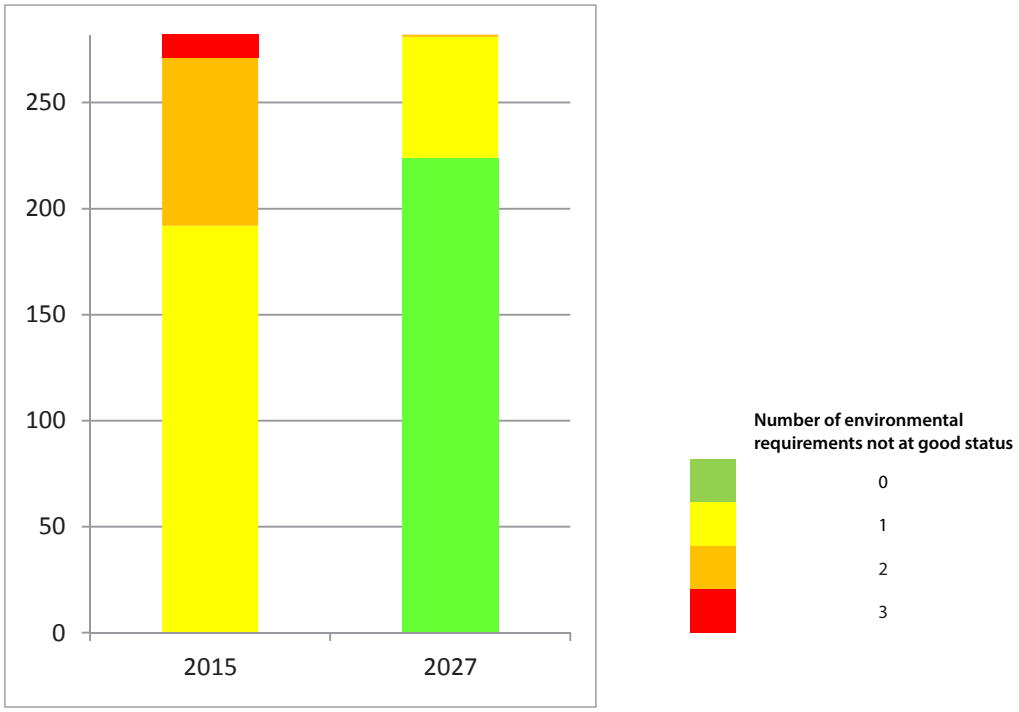


Figure 15: Comparison of 2015 to potential overall improvements by 2027 to the 280 surface water bodies which are at less than good status in 2015 based on step change 2 (Scotland) and scenario 4 (England)

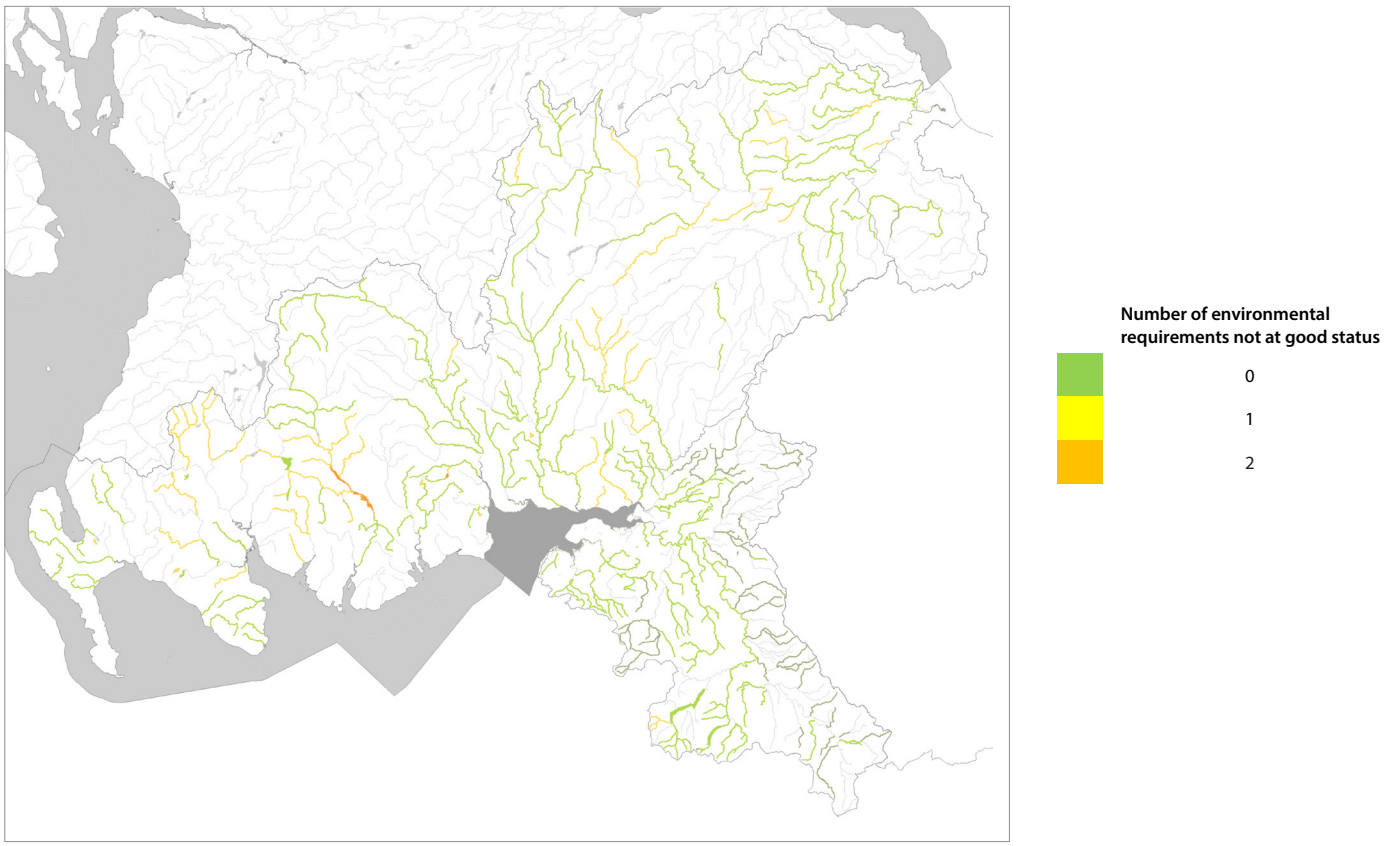


Note to Figure 15 and Map 19

The colouring of each water body indicates how many of the five environmental requirements for good status will not be met. These five requirements are: good water quality, good flows and levels, good physical condition of beds, banks and shores, unimpeded fish movement and protection from invasive non-native species. Note that the figure/map does not specify which of the requirements will not be met, only the total number.

Those water bodies appearing as green in 2027 were at less than good in 2015.

Map 19: Potential overall improvements by 2027 to the 283 surface water bodies which are at less than good status in 2015 based on step change 2 (Scotland) and scenario 4 (England)



Detailed mapping is available via the online consultation tool.

9 Consultation questions

Q1

Do you agree with the long-term level of ambition proposed for water bodies and protected areas?

Q2

Do you agree the correct approaches have been identified for:

- Rural diffuse pollution
- Urban diffuse source pollution
- Physical condition of the water environment
- Barriers to fish movement
- Flows and levels
- Invasive non-native species

Please tell us why or why not, and what you think is the best way of implementing them.

Scottish options:

Q3

For the Scottish scenarios outlined, which do you think strikes the most appropriate balance between effort and feasibility in addressing:

- Rural diffuse pollution
- Physical condition of the water environment
- Barriers to fish movement?

English options (based on annex 2):

Q4

Do you have any comments on the scenarios for England and how they have been produced?

Q5

How could scenario 5 be developed to present a preferred option for the impact assessment?

Please provide any supporting evidence of your recommendation on different sectors, how it should be funded and the likely outcomes.

Changes within the river basin district:

Q6

Do you agree with the proposed changes to the river basin district and catchment, water body boundaries and artificial and heavily modified water body designations?

Annex 1: Changes to water bodies and designations

1a. Scotland

In the *Public consultation to inform the development of the second river basin management plan for the Scotland river basin district* https://consultation.sepa.org.uk/rbmp/scotlandplanconsultation, SEPA includes an appendix detailing proposed changes to heavily modified water body (HMWB) designations for agricultural land drainage, and for other individual water bodies across Scotland. In total, these affect 10 water bodies in the Scottish area of the Solway Tweed river basin district.

Please see the Scotland river basin district consultation if further information is required.

Table A1.1: Changes to Scottish HMWB designations

Water Body	New Designation Reason	De-designation reason	Reason for change
New Designation – water body becomes HMWB			
5101 : Whiteadder Water (Dye Water to Billie Burn confluences)	Drinking water supply	None	WB status changed to HMWB due to impacts of drinking water storage at Whiteadder Reservoir u/s.
5268 : Turfford Burn	Flood protection and/or urban land use	None	WB status changed to HMWB due to impacts of flood defence modifications through Earlston, including flood bypass channel.
5280 : Gala Water (Armet Water confluence to River Tweed)	Flood protection and/or urban land use	None	WB status changed to HMWB due to impacts associated with flood defence around Galashiels.
5298 : Caddon Water	Drinking water supply	None	WB status changed to HMWB due to impacts of drinking water storage at Stantling Craigs Reservoir.
10630 : Cample Water (u/s Chrichope Linn)	Drinking water supply	None	WB status changed to HMWB due to impacts associated with drinking water storage to supply Kettleton WTW.
10665: Dornock Burn	Agricultural land drainage	None	See consultation document
De-designation – water body no longer HMWB			
10551 : Pullaugh Burn	None	Hydropower generation	Dedesignated as Galloway hydroscheme activities are not preventing the achievement of good status.
10573 : Black Water	None	Hydropower generation	Dedesignated as Galloway hydroscheme activities are not preventing the achievement of good status.
10547 : Black Water of Dee (Loch Dee to Clatteringshaws Reservoir)	None	Hydropower generation	Dedesignated for hydropower as the impacts associated with Galloway hydroscheme are not preventing the achievement of good hydromorphological status.
Existing HMWB with altered designation			
200316 : Nith Estuary	Flood protection and/or urban land use	None	HMWB designation category of 'Flood Protection' added, due to the presence of embankments preventing the achievement of good status.

1b: Proposed new water body network, boundaries and designation changes in England

In 2013 the Environment Agency proposed a revised water body network and an enhanced river monitoring network, known as the Ecological Status Indicator Network. Many of the changes are based on feedback from stakeholders. This proposed new network of water bodies and monitoring sites form part of the new building blocks classification system.

The revised water body boundaries may lead to a greater proportion of river water bodies achieving good status due to the removal of small water bodies around the coastal fringes.

Where removal of small water bodies is proposed, this is in line with European guidance on minimum sizes of water bodies to ensure the Water Framework Directive is implemented proportionately. Irrespective of whether a brook or stream is formally a WFD water body, they are protected by domestic legislation, as it applies to all controlled waters.

There are also proposed revisions to the heavily modified water body designations. If the proposals are approved some heavily modified water bodies designations will be removed.

The proposed changes in designation are due to:

- the water body boundary review described above;
- the identification of uses that were present in 2009 but had not been previously attributed to the water body;
- where a previously identified use has since been deemed to be not applicable.

The new water body boundaries better reflect the character of the local environment, simplify the water body network and facilitate activities to improve river basin management.

The proposed changes to heavily modified and artificial water body designations can be found on the Environment Agency's ShareFile platform https://ea.sharefile.com/d/sf455f6efe3d41d89.

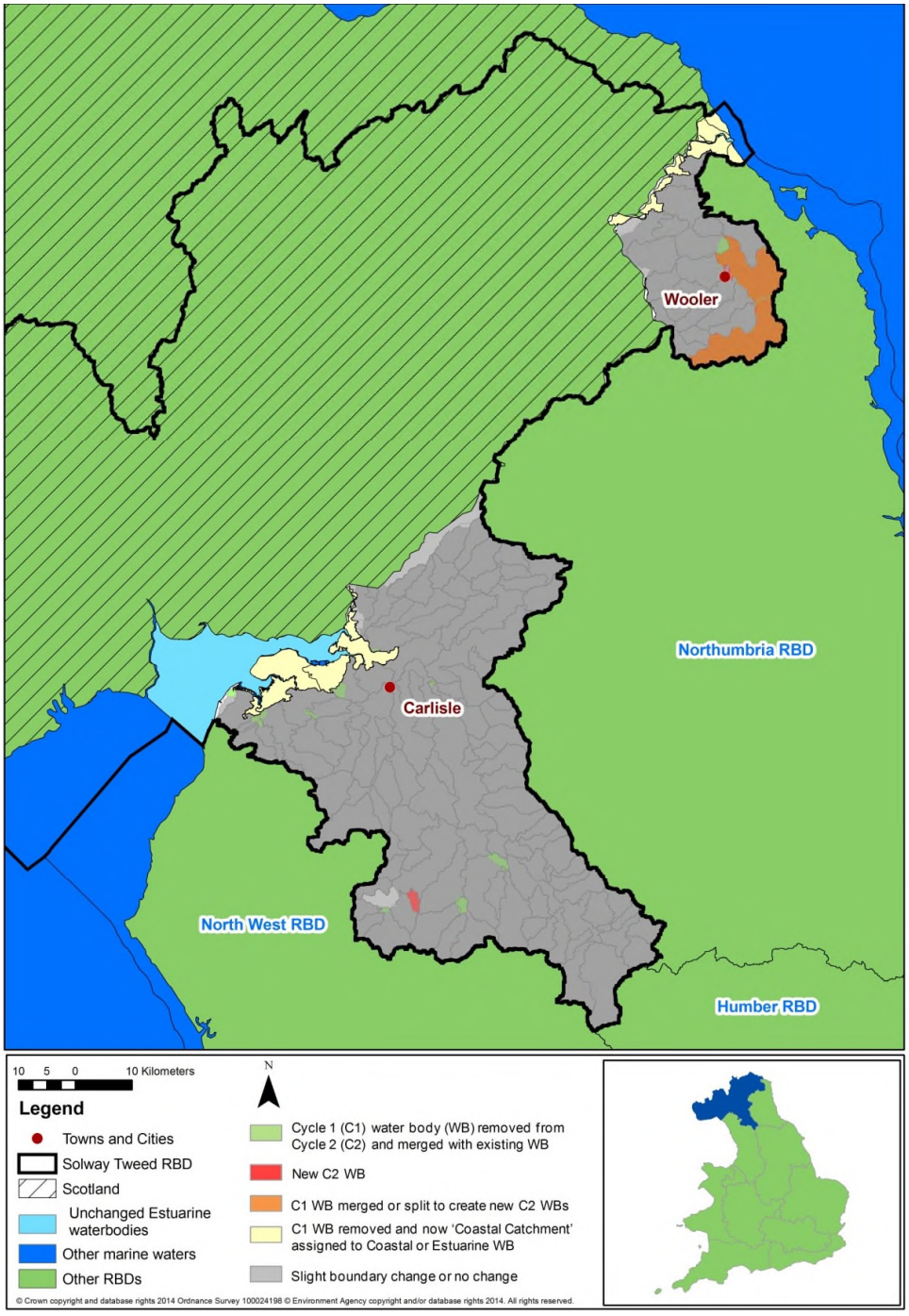
Revised water body boundaries are also proposed for groundwater bodies using more accurate mapping information and new data on flow and groundwater chemistry.

The changes that are proposed for the water bodies are shown in map A1.2 and are also available to view on a map in the river basin district data download from the Environment Agency's ShareFile platform https://ea.sharefile.com/d/sacfc8f5288f4ce4b. Additional information is available in Part 2 of the consultation.

Table A1.2: Number of water bodies in the river basin district (Cycle 1 and 2)

Water body category	Cycle 1 (Old Building Blocks)	Cycle 2 (New Building Blocks)
River	141	126
Canal	0	0
Surface Water Transfer	6	0
Lake	10	10
SSSI Ditch	0	0
Coastal	0	0
Estuarine	2	2
Groundwater	5	5
Grand Total	**164**	**143**

Map A1.2: proposed water body and boundary changes



The heavily modified and artificial water body designation changes are available to download in a spreadsheet on the Environment Agency's ShareFile platform https://ea.sharefile.com/d/sf455f6efe3d41d89.

Consultation question

Do you agree with the proposed changes to the river basin district and catchment, water body boundaries and artificial and heavily modified water body designations?

Annex 2: Economic Analysis for the English area

The funding challenge

This draft plan focuses on a scenario which sets out water body objectives that could be achieved in the long-term if all measures that give rise to more benefits than cost were implemented. However, currently in England, the private and public sector spend about £5 billion per year to protect the benefits society receives from the water environment.

Achieving the protected area objectives and proposed water body objectives set out in this plan and in similar plans covering the rest of England, will cost an additional £16-18bn (total undiscounted 2015-2052). It is unlikely that this level of funding will be available in the short term. Therefore choices will need to be made about which of the proposed water body objectives are achieved first and how the improvements should be funded.

One of the issues that will determine the scope and ambition of the updated plans will be the availability of funding and mechanisms to require action.

The hierarchy for funding measures and requiring action to resolve or mitigate a problem is:

- Polluter pays. The person whose activity causes (or is at risk of causing or has caused) an environmental problem pays.
- Beneficiary pays. The person who will benefit from the improvement (or reduced risk) to the environment pays. This is sometimes called payment for ecosystem services.
- Government pays. The UK government directly or indirectly (via EU, central and local government) pays.

In addition to this hierarchy, there are voluntary or grant giving funding mechanisms.

Impact assessment

To support this consultation and inform the sectors that will potentially need to fund future measures, we, the Environment Agency, have produced an economic analysis. This consultation seeks to gather views and additional evidence to inform the impact assessment that will accompany the updated plan.

The economic analysis illustrates the costs to each of four sector groups and the benefits of five scenarios for the future management of the water environment.

The sectors are combined within the following groups: (1) government, (2) rural land management, (3) water industry, and (4) industry, services, infrastructure and the voluntary sector. Further details of the sectors within each of these groups can be found in the economic analysis.

The scenarios considered are:

Scenario 1 **– No new measures (2013 baseline)**
Ongoing measures, but no new measures to mitigate the trends (population growth, climate change and the spread of invasive non-native species) that will change the environmental baseline (2013 interim classification) by 2027.

Scenario 2 **– Aim to prevent deterioration and achieve protected area objectives**
Additional measures to prevent deterioration in status and achieve protected area objectives up to 2027.

Scenario 3 **– Aim to prevent deterioration, achieve protected area objectives and all technically feasible improvements towards good status. No affordability constraint**
Scenario 2 plus all technically feasible measures needed to deliver good status. No measures needed to deliver good status ruled out on the basis of costs, affordability or available funding.

Scenario 4 **– Aim to prevent deterioration, achieve protected area objectives and improvements in status where benefits exceed cost. No affordability constraint.**
Scenario 2 plus all technically feasible measures needed to deliver good status that will deliver benefits greater than the costs. No measures ruled out on the basis of affordability constraints or available funding. This is the scenario on which the proposed water body objectives in this consultation are based.

Scenario 5 – Illustration of potential progress towards scenario 4 by 2021

Scenario 5 provides an illustration of the scale of action and improvements that might be achieved by the end of the second cycle (2021). This illustration is based on an assumed level of available national funding (up to and including 2021) related to the most directly relevant programmes and an assumed level of additional voluntary action through local efforts.

This scenario illustrates the impact of funding constraints on progress towards the proposed water body objectives (scenario 4). It is not a prediction of the actual level of funding available or voluntary action that will be taken in the second cycle. This scenario is based on guidance from Defra to consider just the largest funding sources and to use planning information that has been made public, provided by others, or estimated by the Environment Agency. The funding assumptions are summarised in Table A2.1.

Scenario 5 has been designed to inform stakeholders and provide the opportunity to comment on the scale of ambition for the updated plans.

Table A2.1: Preliminary funding assumptions

Sector Group	Preliminary funding assumptions
Government	Grant in aid funding at current level (including WFD catchment restoration fund) until 2016. For the purposes of this illustration, no assumption has been included on additional grant in aid funding on WFD from 2016 as this is the next government spending review period Flood and Coastal Risk Management funding previously announced. Funding for environmental outcomes in draft Medium Term Plan New Environmental Land Management Scheme and other CAP measures. Most likely funding level and targeting criteria
Rural land management	Current regulatory controls Current level of voluntary funding
Water industry	Programme level cost estimates provided by water companies based on business plans (2015-20) submitted to Ofwat in December 2013. The final determination of prices will not be made by Ofwat until December 2014. Therefore these cost estimates, while the best available, have some uncertainty associated.
Industry, services, eNGOs	Current regulatory controls Current level of voluntary funding

The cost of measures for scenarios 2, 3 and 4 have been allocated to sectors on a 'polluter pays' basis. Scenario 5 reflects the improvements which, in this illustration, it is assumed sectors will fund.

Economic analysis results

This section presents a summary of the outputs in the economic analysis for the river basin district. The economic analysis uses information from the economic appraisals carried out in each of the operational catchments as well as from national analyses connected with the work on the major programmes of measures and from a range of other relevant studies.

More detailed results and a description of the methods used to produce the estimates are contained in the economic analysis (Part 3).
http://ea.objective.co.uk/portal/ho/wfd/draft_plans/consult?pointId=s1405418174455#section-s1405418174455

The estimated costs and benefits of scenarios 2, 3 and 4 are given in tables A2.2 and A2.3. Costs and benefits for scenario 1 and 5 are available at an England-only level, as there is insufficient evidence at this stage to split at the river basin district level.

Table A2.2: Estimated costs and benefits in English area of the Solway Tweed River Basin District to achieve good ecological status and potential and groundwater good status

Sector group	Scenario 2[1] Total 37 yr cost, £m	Scenario 3[1] Total 37 yr cost, £m	Scenario 4[1] Total 37 yr cost, £m
Government	20	20	20
Industry, services and infrastructure	3	10	10
Rural land management	190	280	280
Water industry	80	90[3]	90[3]
Total Costs	**290**	**400[3]**	**400[3]**
NPV of Scenario[4],[5]	**+210**	**+230**	**+230**

Notes:
Scenarios 3 and 4 are extensions of and therefore include the outcomes of scenario 2; they are not in addition to scenario 2.

(1) Scenarios 2-4 over 37 years (2015-2052). This is the appraisal period Defra has asked the Environment Agency to use for WFD analysis. This was 43 years in 2009 (the start of cycle 1), made up of the three 6 year cycles of the planning process, plus 25 years

(2) Costs of measures when implemented would include payments under the EU Common Agricultural Policy

(3) These are mid-point costs estimates. They have at least +/- 30% range reflecting the uncertainty of the estimates which should be considered when reading this information.

(4) Numbers may not sum to totals due to rounding. Totals include costs for unidentified sectors.

(5) Net Present Value – the benefits remaining after costs are deducted, discounted (3.5% for 30 years, then 3% for the last 7 years) over the appraisal period in order to compare future costs and benefits in today's terms

Table A2.3: Estimated costs in the English area of the Solway Tweed River Basin District (good chemical status)

Sector group	Scenario 3 Present Value* cost £m	Scenario 4 Present Value cost £m
Government	5	<1
Industry, services and infrastructure	0	0
Rural land management	0	0
Water Industry	0	7
Total	**5**	**<1**

Notes:
These are primarily Present Value costs from Chemicals Investigation Programme (CIPi). The PVs were calculated for a 20yr appraisal period using a discount rate of 3.5%
*Totals rounded to nearest £10m

For chemical status, there are no additional measures required to prevent deterioration or achieve protected area objectives. There is therefore no scenario 2. For the economic analysis, it has not been possible to assign a monetary value to the benefits of improving chemical status.

For four chemicals (Brominateddiphenylethers (BPDE), Fluoranthene, Mercury, and PAHs) there is insufficient information to produce a reasonable estimate of the scale of non-compliance and the potential cost of measures. Environmental monitoring is being carried out that will inform the update to the river basin management plans and final impact assessment in 2015. Current indications are that non-compliance will be widespread. If it is technically feasible to achieve compliance, scenario 3 costs could be high.

To provide context for the monetary costs and benefits, the changes to the wider benefits and uses predicted under the scenarios are shown in Table A2.4.

If the change to a benefit or use is likely to be significant, two arrows are shown pointing up for a positive change or benefit and down for a negative change or disbenefit. If the change is likely to be noticeable but not significant, then one arrow is shown, again pointing up for benefits and down for disbenefits. If there is likely to be no net change, a 'o' is shown.

Table A2.4: Significance of change between baseline and scenario

Significant	^^
Noticeable	^
No net change	o
Noticeable	v
Significant	vv

Ecosystem Service Category	Significance of change between baseline and scenario: RBMP Impact Assessment Scenarios 1	2	3	4	5
Provisioning services					
Fresh water	v	^^	^^	^^	^^
Food	o	o	^	^	o
Water for non-consumptive use	o	^	^	^	o
Regulating services					
Climate regulation and climate adaptation	v	v	^	^	o
Water regulation	v	^	^^	^^	^
Erosion regulation	vv	o	^^	^^	^
Water purification and waste treatment	v	^	^^	^	^
Cultural services					
Cultural heritage	o	o	v	v	o
Recreation and tourism	v	^	^^	^	^
Aesthetic value	v	o	^^	^	o
Existence value	vv	^	^^	^	o
Supporting services					
Provision of habitat	vv	^	^^	^^	^

The catchment summaries provide an assessment of the possible scale of improvement which could happen in each operational catchment by 2021. This is based on current knowledge of plans and actions. They are available from solwaytweedrbd@environment-agency.gov.uk, or from the Environment Agency offices in Penrith and Newcastle.

For the English area of the Solway Tweed river basin district, the economic analysis estimates that around 80 water bodies would deteriorate under scenario 1 and an additional 10 water bodies could improve to good status by 2021 under scenario 5. The scenario 5 estimate is, however, optimistic. It assumes that funding for actions is allocated in a way that maximises benefits, when in practice the ability to target action in this way is limited.

An illustration of water body status changes for the scenarios is shown in Figure A2.1. Table A2.5 provides an estimate of the percentage of water bodies at good or high status for the scenarios.

Figure A2.1: Illustration of water body status changes from the 2013 baseline for each scenario



Table A2.5: Estimate of the percentage of water bodies at good or high status for the scenarios

	Baseline	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Ecological status or potential and groundwater status	43	22	55	94	93	48
Chemical status	93	93	93	98	94	93

Conclusions

The scenarios presented in this section are illustrative and not recommendations. For example:

- Scenario 1 will result in significant deterioration in the quality of the water environment and associated loss of benefits. It does not comply with WFD requirements.
- Scenario 2 will prevent deterioration and achieve the protected area objectives proposed in this consultation, but it does not make much progress in improving the status of water bodies.
- Scenario 3 will result in the best outcomes for the water environment but at an overall cost in excess of benefits. It may go beyond the requirements of the WFD and could be seen as 'gold plating'.
- Scenario 4 will result in significant improvement to the water environment, with benefits in excess of costs. The scale of improvement is probably not technically feasible or affordable to achieve by 2021. Scenarios 2 and 4 therefore represent the extreme lower and upper limits of the scale of environmental improvement and associated cost that might be included in the updated river basin management plans.
- Scenario 5 illustrates a further point within the boundaries of scenarios 2 and 4. Measures in addition to scenario 2 are voluntary or are funded by government taxes and those who pay water bills.

This consultation seeks your views on whether scenario 5 represents an appropriate level of environmental improvement to be achieved by 2021. If not, how could it be built on and developed to produce a preferred option for the updated river basin management plans and the associated impact assessment?

To access the draft economic analysis visit the Environment Agency's consultation webpage:
http://ea.objective.co.uk/portal/ho/wfd/draft_plans/consult?pointId=s1405418174455#section-s1405418174455

The draft plan detail for the English area of the Solway Tweed district will be developed following consideration by the Environment Agency of updated evidence, responses to the consultation, and further views and decisions of ministers. Decisions around priorities and use of WFD exemptions including disproportionate costs and what each sector should contribute will be made by ministers based on a range of evidence including in particular the impact assessment, feedback from this consultation, progress on parallel policy initiatives including the agriculture and water project, Defra's own research on sector affordability, and the government's wider policies around economic growth.

Consultation questions

Do you have any comments on the scenarios and how they have been produced?

An impact assessment will be produced in 2015 based on updated evidence, including the information provided in response to this consultation. The impact assessment will include a preferred option that will correspond to the updated river basin management plans that the Environment Agency will submit to UK ministers.

How could scenario 5 be developed to present a preferred option for the impact assessment that will accompany the updated plans in autumn 2015?

Please provide any supporting evidence on the impact of your recommendation on different sectors, how it should be funded and the likely outcomes.