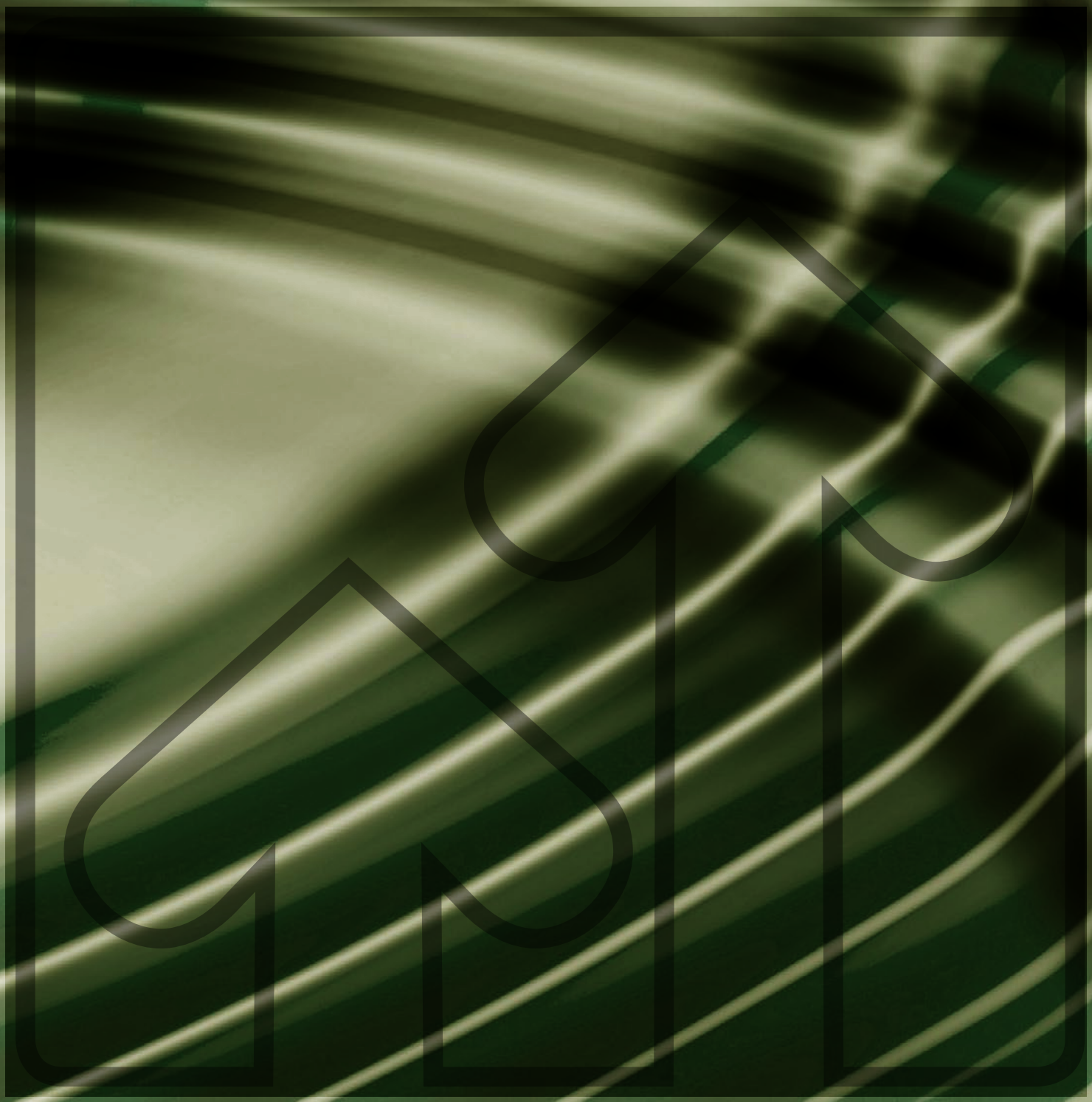
SEVERN TRENT WATER

Changing Course through the sustainable implementation of the Water Framework Directive



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Severn Trent Water Limited
Severn Trent Water Limited is one of the ten privatised water and sewerage companies in England and Wales. We provide water to 7.7 million people and sewerage services to 8.6 million people in the Midlands and mid Wales. Our customers receive some of the best quality water in the country and pay the lowest average prices in England and Wales.

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November 2013

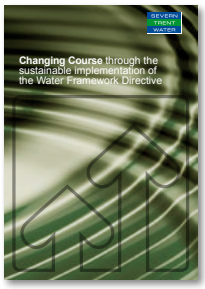
This report is the fourth in our *Changing Course* series. The purpose of the reports is to contribute to the debate about how to evolve a sustainable, customer-focused water industry.

The *Changing Course* series so far comprises the following reports:

Changing Course – Delivering a sustainable future for the water industry in England and Wales (April 2010).

Changing Course through water trading (June 2011).

Changing Course through sustainable financing (Sept 2012). A joint report with National Grid.



Changing Course through the sustainable implementation of the Water Framework Directive (Sept 2013).

We also published a report in October 2012 on designing regulatory incentive packages. All of these reports can be downloaded from: www.severntrent.com/future/policy-regulation/changing-course/

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Foreword

Of all the conditions that sustain healthy societies there is none more important than secure supplies of clean fresh-water. In the UK the fact that good quality water runs from taps perhaps blinds us to the fact that it is not only pipes and reservoirs upon which we rely to meet our needs. Rivers, wetlands and groundwater, all supplied by rain, sustain our needs too.

The water environment also supports a vast array of wildlife, natural services and landscapes that also have immense value to people, and which it is agreed must be maintained, conserved and enhanced. This is not least because these environmental values are increasingly seen as economic assets.

The 2011 National Ecosystem Assessment published by UK Government estimated that the benefits provided by improved river water quality were about £1.1 billion per year, protection provided by coastal wetlands about £1.5 billion and the amenity value of inland wetlands about £1.3 billion annually. Although recent environmental economics enables values to be placed on some aspects of the water environment, the vital services provided by healthy aquatic systems have been appreciated for a very long time, and steps taken to maintain them.

And while it might seem that regulations to protect the environment are a relatively recent phenomenon, legal edicts have been an important force for centuries. In 1388, during the reign of Richard II, laws were enacted to render the dumping of animal waste, dung or litter into rivers illegal. Hanging was among the possible consequences for those convicted of offences.

The River Pollution Prevention Act was passed to deal with river pollution in 1876 and was followed by the River Boards Act 1948 with regulatory powers put in place to deal with water supply and sewage functions. Since then a range of progressively stronger environmental legislation has been enacted, on water pollution, water resources management and more latterly the protection of wetland habitats and wildlife.

While the law today carries less draconian penalties than it did in medieval times, it remains a vital factor in sustaining the public goods that depend on a healthy water environment. And legislation has over recent decades achieved some notable successes. For example, laws to promote better water quality have driven massive investment in water treatment and the control of discharges to water bodies. As a result our rivers, lakes and groundwater are in better condition than they would otherwise be.

Despite the positive progress, and recognizing that many water bodies are still suffering from the effects of pollution and ecological degradation, the European Union in 2000 adopted a Water Framework Directive (WFD). Combining earlier water-related legislation into a single legal vehicle, while adding overall strategic goals, the Directive sets the objective that among other things member states achieve a ‘good’ condition for all surface waters by 2027.

In managing water environments so that the up to 61 indicators that collectively denote ‘good’ status are all met is a complex and challenging undertaking. Demand for water is rising, not least because of population growth. At the same time as steps are necessary to ensure security of supply, sufficient water must be kept in the environment to achieve nature conservation goals. And the water in the environment needs to be clean, with pollution from roads, farming, industry and other sources reduced. All of this is set against the rising challenge of climate change, and the volatility that increased greenhouse gas concentration in the atmosphere is generating in the water cycle. Against this backdrop of environmental challenges, the matter of who should do what by when, and who should pay, are not easy questions to answer.

What is clear, however, is the vital role of water companies in delivering on the requirements in the Directive. In this Changing Course report Severn Trent Water sets out ideas as to how it might be best to meet its demanding goals. In common with other environmental challenges, solutions cannot be found solely through technological improvements. Choices need to be made and these must command the support of different groups, and in the case of water companies their customers are a key constituency.

Considering the economic circumstances prevailing now, the extent to which water prices can be controlled while at the same time making progress in restoring the health of water bodies is a vital question. Water consumers are broadly supportive of efforts by water companies to protect and improve the environment, but will support increased water prices only up to a point. With this in mind, it will be important for water companies to make the case for investment into environmental improvements to their customers and to demonstrate that real value for money is being achieved.

This will in large part rely on making choices that lead to the most effective allocation of investment and ensuring that the biggest improvements can be achieved at the least cost. Meeting this aim will require Ministers to interpret the Directive in practical ways and for partnerships to be formed across river basin catchments, such that all those who must be part of the solution are contributing a proportionate share of the effort.

For instance, if most of the phosphate pollution in a river is coming from farming it may make little sense to invest millions more in making relatively small additional improvements in phosphate levels by upgrading a water treatment plant, when a bigger benefit might be gained at lower cost by reducing the contribution coming from fields.

This context will also require policy to effectively interpret the ‘polluter pays principle’, such that those responsible for pollution pay for prevention and clean up. This is not simple either, but by creating clarity policy-makers can undoubtedly reduce uncertainty, and in so doing encourage investment to the right places, while reducing risk for the different organizations that need to act.

These and other themes are not specific to Severn Trent’s business, and this report will I hope, therefore, be of value in the wider debate as to how best to achieve the important aims of the Directive. You will find in the pages that follow an excellent summary of what the Water Framework Directive sets out to achieve alongside considered views on the issues that need to be addressed as the UK continues on its journey toward achieving what it sets out.

The fact that water has fundamental social and economic importance is underlined by the strength of the Directive that EU member states must now implement. It is not a question of whether it is a good idea to meet its requirements, or whether society gains overall benefits from doing so, all that is very clear and in the affirmative: it is a matter of how.

It is my sincere hope that this report will make a substantial contribution in enabling the demanding goals of the Directive to be achieved, and for the UK to emerge as a leader in the complex job of promoting economic development while improving environmental outcomes. If we can do that, we will be all the richer for it.

Tony Juniper
Writer, campaigner, environmental advisor,
President of The Society for the Environment.

Executive summary

The health of the UK's rivers and other water courses has improved dramatically over the last 20 years. The water industry has invested £30 billion – £1,300 for every household – to help make this happen.

The Water Framework Directive (WFD) was adopted into UK law in 2003 and is designed to drive further improvements.

The objective of seeking healthier rivers and water courses is not in question. The question is: how far and how fast should further environmental improvements be made so that the cost can be kept affordable for water bill payers?

This report sets out the challenges to implementing the WFD and suggests solutions to overcoming those challenges.

In April 2010, Severn Trent Water (STW) published its first *Changing Course* report[1]. This set out how the water industry might look in 2030 from the point of view of our customers, the environment and our investors – and proposed six recommendations for change designed to deliver better outcomes.

One of the six recommendations we made was that the WFD should be implemented flexibly to ensure a better trade off between, on one side, environmental benefits and, on the other side, increased carbon emissions and financial costs. We also recommended that the Environment Agency should adopt a more flexible approach to environmental consents. This report builds on these recommendations.

The Water Framework Directive

The WFD has the potential to drive significant further improvements to the UK's rivers and other water courses. However, two key challenges need to be overcome.

- First, the Directive needs to be implemented in an affordable way.

  Utility bills – including water bills – have increased considerably in recent years, whilst average incomes have fallen[2]. It is essential that future improvements made to the health of our rivers and other water courses are affordable to those who will ultimately be required to pay for them.

- Second, the Directive needs to be implemented in a way that maximises the overall environmental benefits.

  Maximising the environmental benefits means investing in improvements that deliver the greatest environmental returns – cleaning the most polluted rivers first, for example. It also means ensuring that environmental improvements in one area (eg healthier rivers) are not outweighed by environmental costs in another (eg increased carbon emissions associated with traditional water treatment processes).

This report makes three recommendations for how these challenges can be overcome.

1. *Changing Course: Delivering a sustainable future for the water industry in England and Wales*, Severn Trent Water, April 2010.
2. Office of National Statistics.

1. Ministers should set clear priorities for future investment.

This report proposes the following priorities:

- There should be a greater focus on improving the most polluted rivers rather than on trying to make already generally healthy rivers even healthier. A more effective way of measuring progress would help with this process – something that is also proposed in this report.

- Rivers that have the potential to achieve the WFD's "good" status should be prioritised over rivers that have been heavily modified (by building extensive concrete banks, for example) and cannot achieve good status as a result.

2. Ministers should ensure the affordability of further improvements.

This report proposes the following:

- Ministers should set out the appropriate pace and scale for investment. The quicker the investment, the quicker the improvements – but the greater the impact on customers' bills in the short term. Ministers should be explicit about how much progress they would expect to see by 2027 when the WFD is expected to have been fully implemented.

- Ministers should emphasise that only investments that are affordable to customers and provide long-term value for money should be implemented.

- The WFD emphasises that work should not be undertaken if it is disproportionately costly (ie where costs exceed the benefits). Ministers should make it clear that the views of water customers should be the critical factor in determining what constitutes a disproportionate financial cost. In assessing disproportionate cost, the benefit assessment should incorporate the results from water companies' surveys of customers which they have been carrying out for the 2014 price review. This research has the advantage that it reflects willingness to pay for improvements in the current economic climate, and has given customers the opportunity to make choices between river quality improvements and improvements in other aspects of service.

- Ministers should reiterate the principle that investment to improve the health of water courses should be taken at the most cost-effective level, be it by water companies, landowners or others. This will help keep costs down overall.

- Ministers should ensure that only appropriate and balanced technical standards are set by the UK Technical Advisory Group (UKTAG).

3. Water companies should lead the drive for environmental innovation, supported and incentivised by regulators.

Companies should change their approach to risk and take a leading role in driving environmental innovation. They should be supported by the environmental and economic regulatory frameworks. This report makes the following proposals:

- In cases where there is uncertainty about which solutions will work, the lowest cost reasonable option should be tried first. The legal concept of 'best endeavours' should be used to encourage appropriate experimentation.

- The Environment Agency and Natural Resources Wales should publish evidence of the most effective environmental solutions; best practice should be shared.

- The Environment Agency and Natural Resources Wales should also encourage flexible consenting regimes that allow water companies to adjust to the actual environmental conditions experienced. This would reduce their energy usage, with an associated reduction in the amount of carbon used.

- Ofwat should incentivise companies to be less risk-averse, and to innovate and adopt new solutions that have a good prospect of success at lower cost – even if these solutions cannot guarantee success.

Our rivers and water courses have already improved dramatically in recent years. They can be improved further at an affordable price if the WFD is implemented in a flexible way at the right price and with the right end point in mind. With water companies currently finalising their investment plans for the period 2015-2020 and a review of River Basin Management Plans (RBMPs) underway, now is the time to take action.

1

Water companies and the environment

- **The quality of water in our rivers and other water bodies is dependent on a wide range of stakeholders. But since privatisation water companies have led the way in helping to make significant environmental improvements.**
- **The health of rivers in the UK has improved significantly over the last 20 years and the trend is firmly in the right direction.**
- **The views of customers should be a critical factor. If our customers are to be asked to pay for even greater environmental improvements, we need to be able to demonstrate that they are necessary and that they are being delivered in the most cost-effective way.**
- **The most complete and up-to-date surveys of customers' views have been commissioned by water companies as part of the development of their investment plans for 2015-2020.**

1.1 The role of water companies and the environment

The main role of water companies in the UK is to collect, clean and deliver safe drinking water to our customers and then collect and clean waste water before returning it to the environment.

The main ways in which we can affect the health of rivers is by the amount of water we take to meet the increasing needs of the UK's fast growing population, and by the quality of the effluent we return to rivers after treatment.

Water companies play an important role, but the health of our rivers and other water bodies also depends on a broad range of other stakeholders. The health of rivers and water courses can be undermined by rainwater washing pollution from, for example, farmland and roads into rivers; accidental industrial spillages; 'acid rain'; and physical changes made to rivers such as the building of dams or reinforced shorelines.

Diffuse pollution such as water washing fertiliser from farmland and oil from roads to rivers is especially difficult to deal with once it has occurred. The most effective strategy is to prevent polluted 'run off' entering water courses in the first place.

1.2 Environmental improvements

The water industry has invested substantial amounts in making environmental improvements since it was privatised in 1989. Of the £108 billion the industry has invested in improving services over the last 24 years about one-third has been spent on making improvements to rivers, lakes and other water bodies. This investment has helped to deliver impressive results:

- In 2008 (the latest year for which we have comparable results), 72 per cent of English rivers and 88 per cent of Welsh rivers were classified as good or excellent by the Environment Agency for their biological quality. In 1990, the equivalent figures were 55 per cent and 79 per cent.
- In 2008 (the latest year for which we have comparable results), 79 per cent of English rivers and 95 per cent of Welsh rivers were classified as good or excellent by the Environment Agency for their chemical quality, up from 55 per cent and 86 per cent in 1990.

Much of this money has been spent on improving the quality of discharges into rivers and other water courses from sewage treatment works.

1.3 How water companies fund environmental improvements

Unlike most European countries, water companies in England, Wales and Scotland receive almost no funding from the taxpayer. The investments we make are ultimately funded by our customers.

Over the last 24 years we have been able to make many improvements whilst at the same time keeping our customers' bills generally affordable by working more efficiently. But the reality remains that if we invest to make additional environmental improvements to those already planned, we will have less money to invest in other areas – or we will have to put customers' bills up more than would otherwise have been the case.

In our *Changing Course* report of 2010, we estimated that to meet the more stringent WFD standards through further improvements to sewage treatment would push up customers' bills by 19 per cent between 2010 and 2030.

Figure 1: Improving rivers – rivers achieving very good biological standard

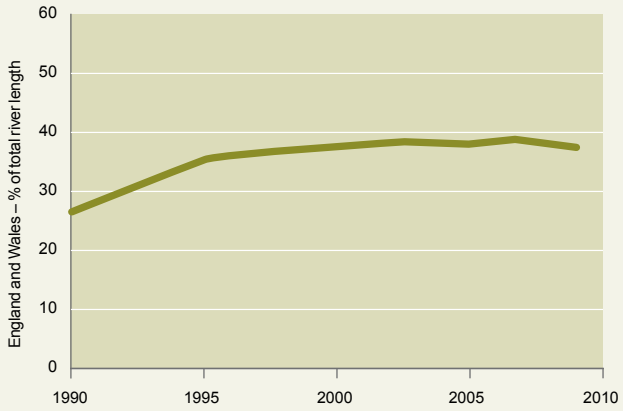
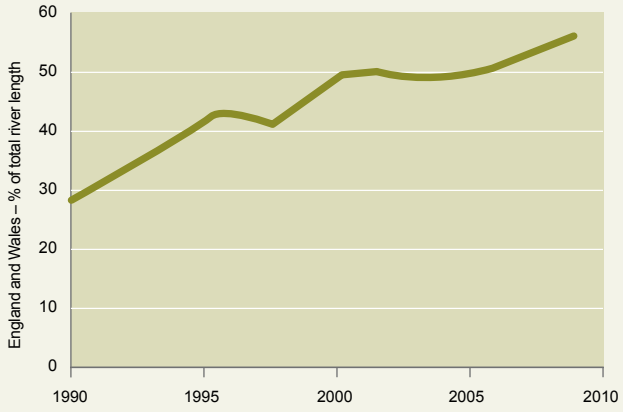


Figure 2: Improving rivers – rivers achieving very good chemical standard



Source: Environment Agency data

2

Water customers and the environment

- **Customers' views should be central to determining the improvements we make a priority. They are the ones who pay the bills.**

- **Our research shows that customers are willing to pay for environmental improvements – but within limits.**

2.1 Customers and the funding of environmental improvements

Water customers in England and Wales have, on average, seen their water bills increase by 49 per cent in real terms since 1989[3]. While higher bills have funded a range of service and environmental improvements, there is a limit to what our customers can afford. We believe that our approach to future investment must be driven by what our customers tell us is important to them.

2.2 Listening to our customers

We know what is important to our customers because we have undertaken extensive research as part of the process of developing our investment plans for the next regulatory period, 2015-2020. To ensure that it is robust, this research has been overseen by our Water Forum, which includes local stakeholders such as the Environment Agency, the Consumer Council for Water and the CBI.

This research has enabled us to establish:

- the priorities customers give to river improvements, relative to other potential improvements such as reducing sewer flooding or water supply interruptions;
- how much customers say they would be willing to pay for improvements, enabling us to compare this with the actual costs of improvement;
- the overall change in bills that would be acceptable to customers – and hence the type of overall package of improvements that we can make.

2.3 What our customers have been saying

The research we have undertaken suggests that our customers support us taking some more action to protect the environment. Our quarterly customer tracker shows that customers give a “high” priority to river improvements – that is, higher than improvements in any other aspect of service we provide.

The Willingness to Pay value for bringing rivers up to good status (£8.32 per customer to improve 14 per cent of rivers) was the highest of any service attribute. However, the key issue is how this compares with the cost of improvements.

The challenge is that whilst customers support improvements to river quality, our Willingness to Pay research also showed that customers are unwilling to see significant increases in their overall bills. When presented with a package of improvements, a majority of customers (60 per cent) were unwilling to pay any increase in bills.

The average amount people were willing to pay was £10.26, or 3%, for households, and 3.6% for business customers. However, for those in low income groups the figure was only £1.71.

Our analysis suggests that the costs of the potential programme for the next five years will be greater than customers are willing to pay for river quality improvements.

The willingness to accept increases in bills is significantly lower than it was when we surveyed customers in 2007. This reflects the current state of the economy. People have less money than they did seven years ago, and the prospects for rising incomes are poor for the next few years.[4]

2.4 The conclusions we have drawn from listening to our customers

The primary conclusions we draw from research like this is as follows:

- Environmental improvements are important to our customers. They are willing on average to pay just over £10 to make these improvements (although it is important to note this is an average figure; 60 per cent of our customers do not want any increases in bills).
- We have a responsibility to spend the money we do have to invest in improving the health of rivers and water courses in the wisest way possible.
- In setting the future programme, we need to take into account the reductions in income that many of our customers have been facing.
- What we spend must be proportionate to the benefits we achieve.

3. *Water bills – are they affordable to all?*, House of Commons Library Standard Note, 24 May 2013.
4. Office of National Statistics.

3

The Water Framework Directive

- **The purpose of the WFD is to improve the health of rivers and other water bodies. It includes the target of ensuring that these bodies achieve "good" environmental status.**

- **The directive sets a number of criteria for assessing good status. All of these criteria have to be achieved for a water body to be assessed as good.**

- **The WFD is a pragmatic and flexible directive. It should be implemented pragmatically and flexibly.**

3.1 The Water Framework Directive

The European Water Framework Directive came into force in December 2000 and became part of UK law in December 2003. It consolidates a number of pieces of EU legislation.

The directive is designed to help protect and enhance the quality of:

- surface freshwater (including lakes, streams and rivers);
- groundwaters;
- groundwater dependant ecosystems;
- estuaries; and
- coastal waters out to one mile from low-water.

The specific goal of the WFD is for all Member States to achieve "good" ecological and chemical status for these water courses.

The WFD set an initial deadline of 2015, but provided for delay or for alternative targets to be set, if achieving the original deadline was technically infeasible or too costly.

3.2 How the WFD works

The WFD requires Member States to produce RBMPs for each of their river basin districts. England and Wales have a total of 10 river basin districts; Scotland is designated as a single district.

RBMPs provide the framework for improvement for water bodies within the catchment. They:

1. outline objectives for water bodies – that is, whether they should achieve "good" status or some other level;
2. contain an assessment of the current condition of these water bodies;
3. identify the source of pollutants;
4. identify the most cost-effective measures; and
5. provide for six-yearly reviews – the next review will be undertaken in 2015, with subsequent reviews in 2021, 2027, 2033 and so on.

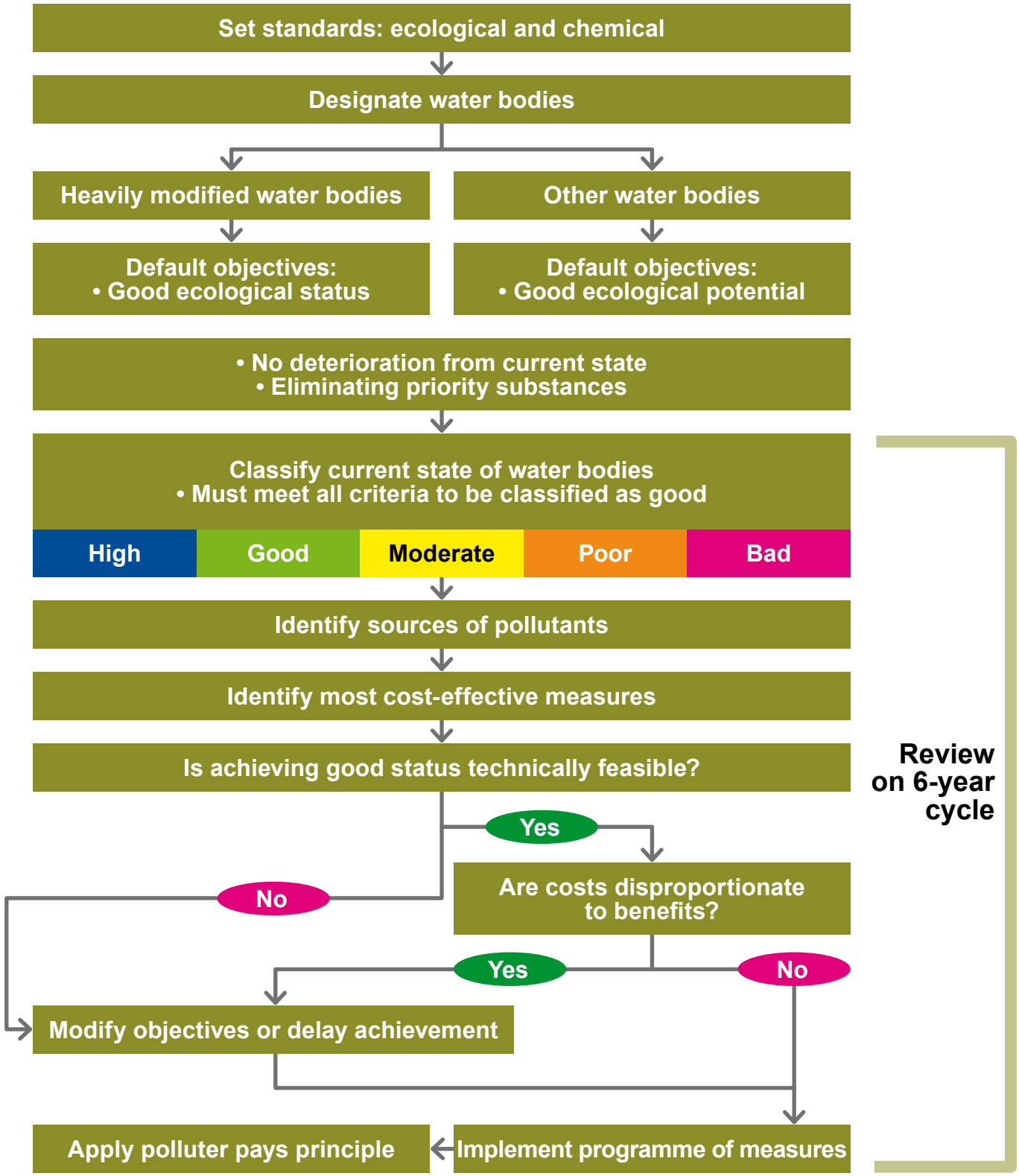
The Environment Agency is responsible for developing these management plans and for ensuring the successful implementation of the WFD in England. Natural Resources Wales has the same responsibility in Wales. The water industry has an important but supporting role.

There are two key underlying principles of the Directive:

1. Objectives can be modified or their target dates changed if the cost of compliance would be economically or environmentally disproportionate.
2. It is those who cause pollution that should pay for it to be cleaned up.

The directive consolidates a number of pieces of EU legislation and has introduced a new requirement for member states to produce River Basin Management Plans (RBMPs) for each of their river basin districts. (England and Wales has 10 River Basin Districts; Scotland is designated as a single district.) RBMPs are the frameworks for improvement.

Figure 3. **The Water Framework Directive**



3.3 How the WFD measures "good" status

The WFD sets out five status classes under which Member States must categorise the health of their water courses: high, good, moderate, poor or bad.

The categorisation depends on a range of ecological, chemical and quantitative criteria for assessing the overall status of surface water bodies. Groundwater status is assessed on quantitative and chemical criteria alone.

For a surface water body such as a river to be classified as being good overall, it must have good ecological status and good chemical status.

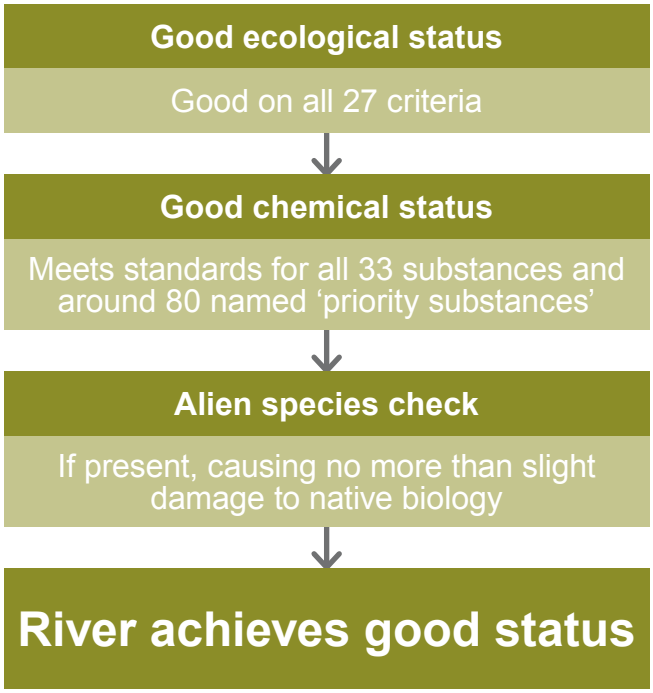
Crucially, the directive adopts a 'one-out, all-out' approach to measurement. So, for example, a river must achieve 100 per cent of the criteria for assessing it as good for it to be officially classified as good. The difficulties caused by this approach are discussed in section 6.2.

The directive recognises that heavily modified rivers are unlikely to achieve good status because of the very nature of their modifications. They can, however, be set an alternative objective of "good ecological potential".

3.4 A flexible directive

The House of Lords EU Select Committee has noted that "an important feature of the WFD is the flexibility built into it"[5].This flexibility is three-fold:

- First, member states are given significant flexibility to adapt the criteria by which their water bodies are assessed to reflect local conditions. In the UK, the UKTAG advises on such matters.
- Second, the directive allows deadlines to be delayed or alternative targets to be set if achieving good status proves to be "disproportionately costly", both in financial and, importantly, broader environmental terms.
- Third, the directive recognises that different standards are appropriate for rivers that are heavily modified. These rivers are not expected to achieve "good" status.



3.5 History of EU water policy

EU water legislation stretches back to 1973. Early directives generally set standards for specific types of water use – the Bathing Water Directive and the Urban Waste Water Treatment Directive, for example.

This approach led to 11 different directives being approved to deal with different problems. There was no joined-up approach and the rules became complex and sometimes contradictory.

The WFD was designed to simplify policy and ensure better coordination. Many earlier directives have now been repealed or subsumed by the WFD.

Key earlier water related directives

- The Bathing Water Directive was originally adopted in 1976 (but was replaced by the revised Bathing Water Directive in 2006).
- The Urban Waste Water Treatment Directive was adopted in 1991 and covers "collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors."
- The Nitrates Directive was also adopted in 1991. It covers the protection of water from nitrate pollution from agricultural sources.

5. Select Committee on European Union Twenty-Seventh Report, Chapter one

4

The implementation of the WFD across the EU

- **While progress in implementing the WFD throughout the EU is patchy, the UK is performing relatively well. All of the RBMPs required for England, Wales and Scotland have been completed and a substantial programme of improvement is already under way.**
- **There is, however, "no realistic prospect" that Member States will achieve good or better status for all water bodies by 2027. Defra officials believe that an achievable target for the UK is 75 per cent of water bodies achieving good status or better by 2027.**
- **The patchy progress being made throughout the EU supports the case for a new approach to implementing the WFD to be developed.**

4.1 The EU-wide implementation of the WFD

In its November 2012 report on the implementation of the WFD[6], the EU Commission said it was difficult to gain a full picture of the progress being made because of the lack of complete and accurate reporting from many member states. It did, however, express the view that progress was in the right direction. The Commission specifically noted that:

- Not all Member States have even completed a full set of RBMPs (p4). The Commission has taken legal action against Portugal, Spain, Greece and Belgium.
- Out of an expected 174 RBMPs from throughout the EU, the Commission had received only 124 (as of November 2012) (p4).
- "...there are cases where reporting contains gaps and contradictions" (p4).
- The chemical status of around 40 per cent of surface water bodies in the EU is unknown (p7).
- The ecological status of around 15 per cent of surface water bodies in the EU is unknown (p7).
- The main reasons across Member States why "good" status is not being achieved are:
  – hydromorphological pressures,
  – pollution, and
  – over-abstraction (p6).

Eleven out of 27 Member States provided RBMPs from which the European Environment Agency could draw adequate data in order to make comaprisons. The table below shows the progress these Member States have made towards achieving good status for surface water (the others provided insufficient data for comparisons to be made). The table shows that even those countries with over 90 per cent good status for chemical status have more than one-third of their surface water failing to meet good ecological status.

Water Framework Directive Surface Water

Ecological status or potential

Country	Achieved at least good status	High	Good	Moderate	Poor	Bad	Unclassified	Unreported
Slovakia	63.8	27.7	36.1	32.8	2.9	0.4	0.0	0.0
Sweden	56.0	8.7	47.2	34.4	6.9	2.2	0.5	0.0
Bulgaria	42.7	5.1	37.5	32.1	14.0	11.1	0.1	0.0
Austria	42.0	18.0	24.0	51.5	5.3	1.0	0.2	0.0
France	41.5	6.5	35.0	39.8	12.5	4.1	2.1	0.0
Greece	38.0	15.0	23.0	23.5	7.3	0.8	30.4	0.0
UK	36.6	4.0	32.6	47.6	12.4	3.4	0.0	0.0
Finland	30.1	11.1	19.1	13.8	3.6	0.9	51.5	0.0
Czech Republic	16.9	0.0	16.9	13.6	68.5	0.0	1.0	0.0
Germany	10.0	0.8	9.2	29.9	34.4	22.7	3.0	0.0
Netherlands	0.4	0.0	0.4	34.4	43.5	20.6	1.1	0.0

Chemical status

Country	Good	Less than good status	Unknown status
Austria	99.5	0.2	0.3
Slovakia	95.1	4.9	0.0
Germany	88.2	8.2	3.6
Bulgaria	78.7	3.0	18.3
Czech Republic	70.4	28.9	0.6
Netherlands	69.9	24.7	5.4
Finland	64.0	0.4	35.6
France	43.2	22.8	34.0
UK	35.7	1.6	62.7
Sweden	0.0	100.0	0.0
Greece	0.0	0.0	100.0

Based on date provided by the European Environment Agency, WISE. WFD database November 2012.

6. Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans', November 2012.

In its 2012 report on EU Freshwater Policy[7], the House of Lords EU sub committee concluded: "It is too soon to assess the overall implementation of the Directive with any degree of certainty, though it is clear that Member States are finding it challenging to implement". The committee went on to conclude that there was "no realistic prospect" that Member States will secure good or high status for all water bodies by 2027 – although it also noted that the aspiration for doing so was an important driver for change.

4.2 The UK wide implementation of the WFD

RBMPs for all 11 regions in England, Wales and Scotland have been completed and submitted to the EU Commission. A substantial programme of work to improve yet further the quality of our water courses is already under way.

The water industry has invested over £1,300 per household over the last 24 years to improve water courses. Further investment is being planned as water companies in England and Wales develop their business plans for the 2015-2020 regulatory period.

In evidence to the House of Lords' 2011/12 inquiry into EU Freshwater Policy, the Water Minister and his officials made it clear that 100 per cent of UK waters would not reach good status by 2027, but that this was in keeping with the directive because of allowances for technical infeasibility of disproportionate costs. Officials suggested that they were hoping that 75 per cent good status by 2027 was achievable.

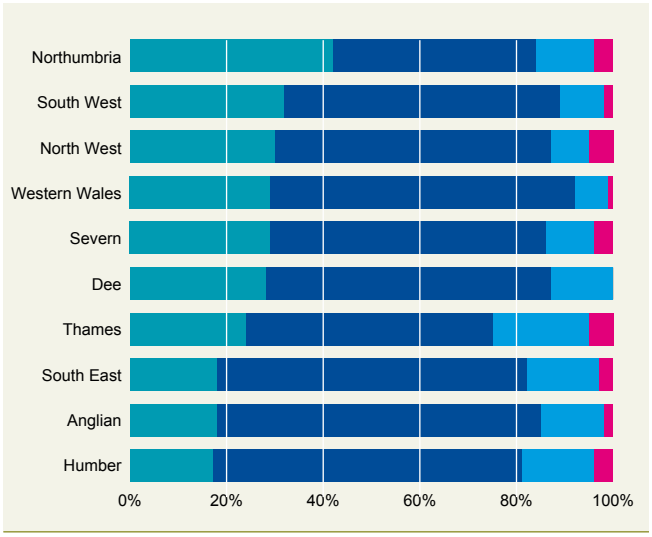
4.3 A new approach is needed

It is clear that the current way of implementing the WFD is meeting with limited success. A more flexible and cost-effective approach would make implementation of the directive more palatable for customers which in turn would increase the chance of successful implementation.

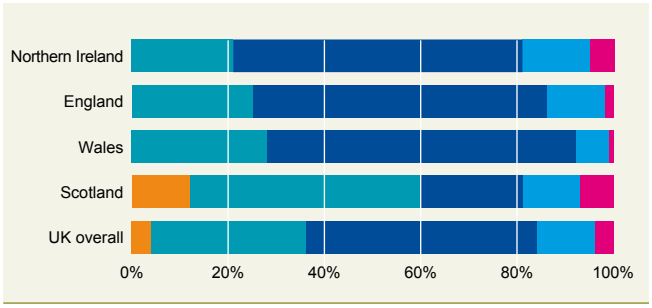
7. EU Committee – Thirty-third report, *'An Indispensible Resource: EU Freshwater Policy'*, Chapter 2, House of Lords, April 2012.

The condition of the UK's (improving) rivers

Area



Country



Source: Data adapted from the European Environment Agency
http://www.eea.europa.eu/themes/water/interactive/soe-wfd/wfd-surface [18/10/11]

5

Emerging practice for improving the health of rivers

Many new ways of achieving the requirements of the WFD are currently being trialled, including catchment management and the concept of flexible consenting. These initiatives have the potential to deliver what is required in an environmentally and financially sustainable way.

5.1 Working in partnership

In some cases improvements in river water quality will be achieved most cost-effectively by carrying out additional sewage treatment. For example, we estimate that 40 per cent of phosphorus in rivers arises from the effluent of sewage treatment works. Therefore additional treatment processes will often be needed to remove it. However, other initiatives could allow river quality to be improved at lower cost, and bring wider environmental benefits.

The Environment Agency, Natural England, water companies and other stakeholders are already trialling many promising initiatives to help improve the quality of our rivers and water bodies. Many of these initiatives need to be rolled out further if compliance with the WFD is to be achieved.

The following sections outline emerging best practice for:
- catchment management,
- flexible consents, and
- sewage treatment.

5.2 Catchment management

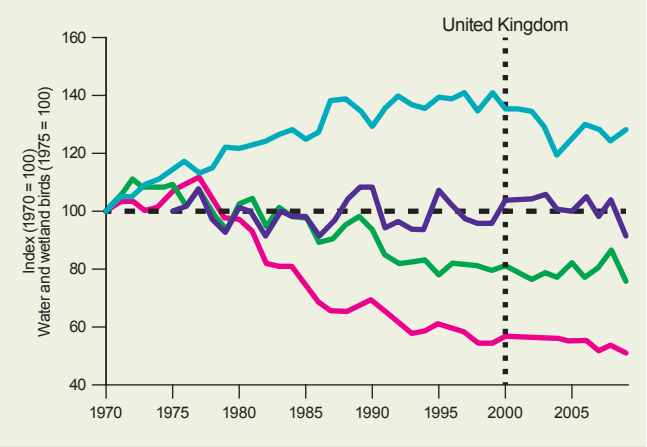
The idea of better managing river catchment areas to tackle diffuse pollution and prevent pollutants from entering water courses was heavily supported in the Government's White Paper of December 2011, *'Water for Life'*. This approach has the attraction of being a cheaper, environmentally more sustainable and fairer solution to improving the health of rivers and other water courses than traditional engineering methods.

As an example, Wessex Water believes its catchment based approach has delivered benefits for one-sixth of the cost of traditional engineering solutions[8].

In this section, we outline a case study to illustrate practical ways in which we have been able to improve water quality at lower financial and environmental cost than would have been possible using traditional engineering methods. The approach relies on working in partnership with farmers and other landowners. EU grants are often available to farmers who wish to move to more sustainable farming practices.

An additional benefit of catchment management is the potential it provides to bring broader environmental benefits. The evidence shows that farmland birds have suffered the greatest decline of all water and wetland birds in recent years. A switch to a broader, more sustainable approach to land management would not only reduce the flow of pollutants into the country's water courses, it could also enhance biodiversity.

Figure 4: Catchment management the prospect of broader benefits



Notes: Figures in brackets show the number of species included in each measure.
Source: Royal Society for the Protection of Birds, British Trust for Ornithology, Defra, Joint Nature Conservation Committee.

8. '*From catchment to customer; Can upstream catchment management deliver a better deal for water customers and the environment?*' (2011) Ofwat focus report, 2011.

Catchment-management partnerships at Tittesworth Reservoir

Tittesworth Reservoir, near Leek in Staffordshire, is used for drinking water and in the past has suffered from relatively high levels of pesticides and nutrients. The traditional method would have been to install 'end of pipe' treatment which would cost several millions to build and several tens of thousands to run each year.

We decided a different approach was needed, however. We began working with stakeholders in the catchment to tackle the problem at source and to reduce the flow of pesticides and nutrients into the water environment. We have been working with staff from the English Catchment Sensitive Farming Delivery Initiative and local farmers over the past three years to reduce pollution entering the water in this catchment. We now fund a full-time officer, with the Trent Rivers Trust, to work in this catchment. We have bought a weedwiper so that local farmers can also apply pesticides to grassland weeds more efficiently.

Working together with our stakeholders, we have reduced peak pesticide concentrations by 50 per cent. We are using improvements in the way we manage catchments to protect the quality of drinking water, at a lower cost than traditional end-of-pipe treatment. The approach will also bring benefits for farmers and the environment.

5.3 Flexible consents

We have been working with the Environment Agency to investigate environmentally sustainable ways to enhance water quality. The aim has been to maximise ecological benefits whilst minimising the energy (and hence carbon) we use to achieve these benefits.

One of the areas of greatest potential is the idea of flexible consents – an idea we first promoted in our April 2010 *Changing Course* publication. The principle is that controls governing discharges from sewage treatment works should be varied to reflect the prevailing environmental conditions. When a river is flowing at a lower level, the standards governing discharges need to be higher as they will be less diluted. When a river is in flood, the standards governing emissions can be relaxed.

There are different types of existing or potential flexible consenting:

- Seasonal consents are well established and allow water companies to vary emission standards in a way that is appropriate to seasonal conditions. This approach helps water companies to reduce their carbon use (and energy bills) in the winter.
- Dynamic consents is the term given to the idea of monitoring river conditions and adjusting discharges accordingly in real time. The difficulty so far has been a technological one – although over time, and with the right incentives, the technology can be expected to improve.
- Catchment consents consider a river catchment as a whole, not just individual sections of a river. The idea is that greater overall environmental benefit could be achieved for any given cost if, for example, it were possible to increase effluent standards at a treatment works with capacity but to offset that with greater flexibility with a works elsewhere on a river with less capacity.

The potential benefits of flexible consents are that river quality will be protected, the amount of carbon used to treat water will be reduced, and the arrangement will be more cost-effective, freeing up resources to make environmental improvements elsewhere. In our view, these ideas should be promoted further.

5.4 New approaches to treating sewage

The traditional view of sewage is that it is a waste product that needs to be treated so that it can be safely returned to the environment. The long-term approach we are taking is to see it as raw material that can be used for other purposes. Instead of just being a cost, sewage can also be an income stream.

There are a number of practical examples where better use is made of sewage:

- **Energy generation.** Through a process known as anaerobic digestion, sewage sludge can produce gas, which in turn can be converted into electricity. Severn Trent Water already has a total of 35 anaerobic digesters producing around 200GW/h of electricity, which is about 25 per cent of our total needs. We hope to expand this process in the future.
- **Fertiliser production.** Sewage is rich in phosphorous and nitrogen and, when treated, can be used as commercial fertiliser.
- **Phosphorous production.** Phosphorous is a scarce resource and is used in many other products as well as a fertiliser – from steel production to the manufacture of some detergents.

The environmental benefits of this new approach are threefold. First, there is less waste to be returned to the environment. Second, by generating an income stream, the overall cost of the process will be reduced – which will make implementing the WFD more affordable over time. Third, making use of sewage waste will reduce the demand for other resources.

6

Overcoming the challenges

- **The successful implementation of the WFD requires a clear understanding of the challenges that need to be overcome.**
- **This chapter identifies and discusses six key challenges:**
  - **Keeping bills affordable**
  - **Developing an appropriate way to measure progress**
  - **Dealing with a problem with multiple causes**
  - **Minimising carbon usage**
  - **Providing space for innovation**
  - **Ensuring appropriate criteria**

6.1 Keeping bills affordable

The fundamental challenge faced by policy makers is how to ensure that the WFD is implemented in an affordable way.

The UK Water Industry Research has estimated that the cost of implementing the WFD could be £27 billion in the UK alone between 2010 and 2030.

Funding investment of this size would always be challenging. Funding it in the current economic climate is especially difficult. As Figure 5 shows, people have less money now than they did seven years ago. Not only do they have less disposable income to pay for higher water bills, public funds are also extremely limited.

Figure 5. Average incomes

Source: Office of National Statistics

In a recent speech, Ofwat's chairman Jonson Cox noted: "Customers, particularly vulnerable customers, are having a tough time... [water] bills have increased by over 12.5 per cent cumulatively since 2010 while over the same period there have been reductions in some household incomes of as much as 5 per cent."[9]

The WFD needs to be implemented in an affordable way.

6.2 Developing an appropriate way to measure progress

The one out, all out method for measuring success at achieving a good standard is outlined in section 3.3 above. To achieve a good status, a river or water body must pass up to 61 tests. A score of 60 out of 61 is treated no differently from a score of only 10 out of 61 – both are failures.

The problem is that although this is a good way of measuring ultimate success, it is a poor way by which to track progress.

A hypothetical but realistic scenario illustrates the point. A decision maker is responsible for two rivers, River A and River B. River A is considered to be generally in a healthy condition and already meets 58 of the WFD's 61 tests for "good" status. It is estimated that to meet the remaining three criteria an investment of £1 million would be required.

River B is in a much poorer condition and only meets 20 of the WFD's 61 tests for good status. It is estimated that an investment of £1 million would dramatically improve the health of the river and help it to meet 50 of the 61 WFD criteria for good status – but it would not fulfil all 61 criteria necessary to be defined as "good".

If the decision maker's performance is measured only on how many of the rivers achieve good status, the rational thing to do would be to spend the £1 million on River A. If the decision maker wanted to achieve the maximum environmental benefits for the investment sum available, then it is very likely that investing the money in River B would be the best option. There is therefore currently a mismatch between what is good for the environment and what is good for the reporting process.

A second challenge with the current system of measurement is that it makes it very difficult to show those who are paying for the improvements that significant progress is being made. If the progress that is being made cannot be demonstrated, the legitimacy to make further investments is undermined.

The House of Lords 2012 report into EU Freshwater Policy concluded: "We view the 'one out all out' basis for assessing status categories as a blunt and rigid method..."[10].

9. Observations on the regulation of the water sector, March 2013.
10. EU Committee – Thirty-third report, *'An Indispensible Resource: EU Freshwater Policy'*, Chapter 2, House of Lords, April 2012.

Similar challenges to measuring success occur in many other areas of public policy and effective solutions have been found. For example, the UN has developed a Human Development Index to measure the progress of countries towards achieving good socio-economic development. This helps donor countries, aid agencies and others plan and justify investment that will deliver the greatest results.

A similar index could work for measuring the success of implementing the WFD. The end goal – "good" status – would be the same and the criteria need not change. But instead of countries being assessed on whether they pass or fail the goal, they would be measured on the progress they are making towards achieving the goal.

For example, if a river fulfilled 30 of the 61 criteria, it would be just under 50 per cent towards achieving good status. If improvements were made and the river then met 40 of the 61 criteria, it would be two-thirds of the way to achieving good status. Good status would not be achieved, but progress towards it could be demonstrated and decision making would not be distorted.

An index measure could also allow the criteria underpinning it to be independently weighted, as in practice all of the 61 criteria may not be of equal importance.

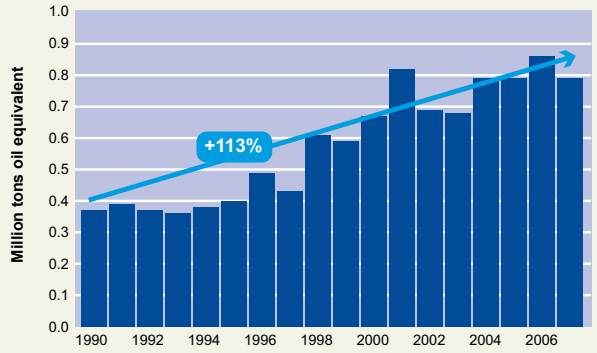
Annex 1 sets out in detail how we believe a simple good status index (GSI) could be used to support the implementation of the WFD.

6.3 Dealing with a problem with multiple causes

The WFD (rightly) measures the overall health of rivers and other water courses. It does not seek to measure the factors that affect the overall health of rivers and other water bodies such as diffuse pollution described in section 1.1 above.

The challenge is that decision makers need to understand the factors affecting the health of any particular stretch of water so they can select the best option for dealing with the problem. If a river is suffering from relative poor health because fertiliser is being washed off nearby farmland, its status is unlikely to be improved in a cost-effective way by demanding even higher standards of discharge from the local sewage treatment works.

Figure 6. Water industry energy use since privatisation



Source: Fuel Use by 93 Economic Sectors, 1990 to 2007, Department of Energy and Climate Change

6.4 Minimising carbon usage

The goal of the WFD is to enhance the quality of rivers and water courses. A problem is that achieving this goal can often undermine other environmental ambitions such as reducing carbon emissions. This is because traditional water treatment processes are often energy intensive and a lot of embedded carbon is included in the associated construction processes.

The challenge for decision makers is to look at the overall environmental impact of a proposed improvement scheme. A scheme that moderately improves water quality but results in significantly higher carbon emissions might not make overall environmental sense. The limited resources available would be better invested in areas that do achieve wider environmental benefits.

The water industry has already more than doubled the energy it uses since privatisation, as Figure 6 shows.

6.5 Overcoming barriers that discourage innovation

Tackling pollution and increasing the health of rivers is not a precise science undertaken in laboratory conditions. It is undertaken in the natural environment with innumerable factors affecting outcomes. It is therefore very difficult to guarantee precise results.

When precise results are demanded, the consequences can be damaging. First, it acts as a disincentive to water companies, and other stakeholders, to trying to be more innovative. It also deters them from exploring new, cost-effective ways of tackling the problem such as the better catchment management schemes outlined in chapter three.

Second, it often leads to the use of expensive solutions in terms of cost and carbon emissions when simpler solutions would have been a more appropriate first step, freeing up resources for greater overall environmental improvements to have been made.

The practical challenge for policy makers is how to provide space for innovation whilst at the same time requiring progress to be made. The legal concept of 'best endeavours' could provide a solution to balancing this equation.

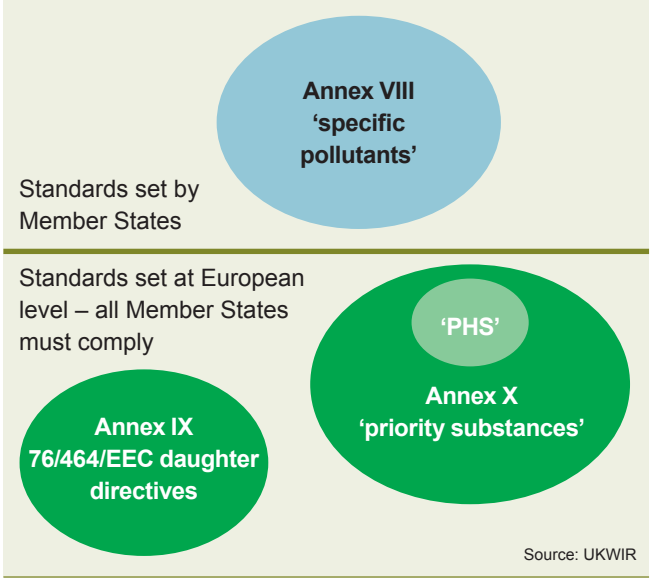
Best endeavours is a legal term for enforcing commercial contracts. It is a term stronger than reasonable endeavours, but more flexible than an absolute requirement. It means that all reasonable actions to meet compliance should be taken, but failure to achieve a particular result is acceptable if there are sufficient reasons to justify such an outcome.

The task of complying with the WFD is huge. Policy makers should be encouraging innovation by giving companies space to innovate.

6.6 Ensuring appropriate criteria

Member States have discretion about some of the criteria they set, as the figure below illustrates. The 61 criteria by which water courses are assessed are naturally the subject of much scientific debate about their appropriateness and proportionality. The important thing is that Member States do have discretion about how to set some of these criteria.

Figure 7. Illustration of Member States (WFD chemicals)



In the UK, the UKTAG is responsible for advising on how to set and implement the standards and propose what the UK standards should be.

We believe that there are three broad challenges that UKTAG should seek to overcome.

First, it should resist the temptation to take an over-cautious approach to controlling substances, the effects of which are not fully understood. Public health and good environmental standards must be safeguarded. But the environmental and social cost of taking an overly cautious approach also needs to be factored into the decision making process.

Second, it should avoid a one-size-fits-all policy and instead set standards that reflect actual river and water course conditions in specific locations. The Fresh Water Fish Directive already follows this approach with ammonia consents. Other countries have standards that vary as pH levels vary as this affects a substance's toxicity.

Third, it should resist the temptation to add criteria that are not standard throughout the EU unless there is overwhelming evidence to do so. The UK is, for example, an exception in that it classifies iron as a pollutant. This not only increases the number of hurdles the UK needs to get over to be compliant with the WFD, but it also causes problems with trying to tackle the recognised pollutant of phosphorous. This is because iron is widely used to remove phosphorous from sewage effluent.

Annex 2 of this report includes our submission to the House of Common's Science & Technology Committee inquiry into the subject.[11]

11. House of Commons Science and Technology Committee, Inquiry into 'Water quality: priority substances', First report of Session 2013-14, Additional written evidence, printed June 2013.

7

Conclusions and recommendations

The WFD is a piece of legislation that has the potential to greatly enhance our water environment. Whether or not it is ultimately successful will depend on how it is implemented.

We propose a three point action plan for the successful implementation of the WFD:

First, Ministers should set clear priorities for future investment.

Clear priorities are an essential requirement for effective action. The following priorities are proposed:

- Ministers should insist on a greater focus on improving rivers that are in poorer health than on trying to make already largely healthy rivers even healthier. To support this, an improved mechanism for measuring progress towards achieving good status should be adopted. A good status index, similar in methodology to the UN's Human Development Index, is proposed. Further details are set out in Annex 1.

- Rivers that have the potential to achieve the WFD's "good" status should be prioritised by the Environment Agency and Natural Resources Wales over rivers that have been heavily modified (by building extensive concrete banks, for example) and cannot achieve good status as a result.

- Ministers should ensure that only appropriate and balanced technical standards are set. The UKTAG should be asked to:
  – ensure that it appropriately balances the risks between taking a precautionary approach and the resulting costs to consumers;
  – avoid a one-size-fits-all approach where appropriate – what is right for one river might not be appropriate for another with very different conditions;
  – refrain from adding criteria that are not standard throughout the EU unless there is overwhelming evidence to do so.

Second, Ministers should take steps to ensure the affordability of further improvements to water customers.

The following practical measures are proposed:

- Ministers should emphasise that only investments that are affordable to customers and demonstrate long-term value for money should be approved.

- Ministers should set out the appropriate pace and scale for investment. The quicker the investment, the quicker the improvements – but the greater the impact on customers' bills in the short term.

- Ministers should make it clear that the views of water customers should be the critical factor in determining what constitutes a disproportionate financial cost. The WFD emphasises that work should not be undertaken if it is disproportionately costly, either in financial or environmental terms.

- Ministers should reiterate the principle that investment to improve the health of water courses should be taken at the most cost-effective level, be it by water companies, landowners or others. This will help keep costs down overall.

Third, water companies should take responsibility for driving environmental innovation, fully supported and incentivised by regulators.

Innovation is essential to reduce costs and enhance effectiveness. Innovation could be encouraged if the following principles were put in place.

- In cases where there is uncertainty about which solutions will work, the lowest cost reasonable option should be tried first.

- The legal concept of 'best endeavours' should be used to encourage appropriate experimentation in achieving WFD objectives.

- Environmental regulators should publish evidence of the most effective environmental solutions; best practice should be shared.

The Environment Agency and Natural Resources Wales should also encourage flexible consenting regimes. This would allow water companies to adjust to actual environmental conditions, and reduce the energy they use (with the associated carbon cost) from building assets bigger than they need to be just to ensure compliance with rigid targets.

A1

Annex 1: The proposed good status index

This annex sets out an approach that could be used to develop a good status index (GSI) for measuring progress towards implementing the WFD. It is intended to provide a readily presentable way of communicating how far the overall water environment may be from the objective of good status. The current 'one out, all out' approach to assessing good status means that failure to achieve improved status on one component results in no change in the overall classification. Therefore significant improvements can be achieved without any change being seen in the river's status.

An index that reflects partial improvements will help policy makers understand the effectiveness of the policies and actions that are put in place. Further, because the progress will be clear when it is achieved this would help establish legitimacy and credibility in the eyes of customers. The index also ultimately allows all stakeholders to understand the costs and benefits of each percentage movement towards the end goal of good status.

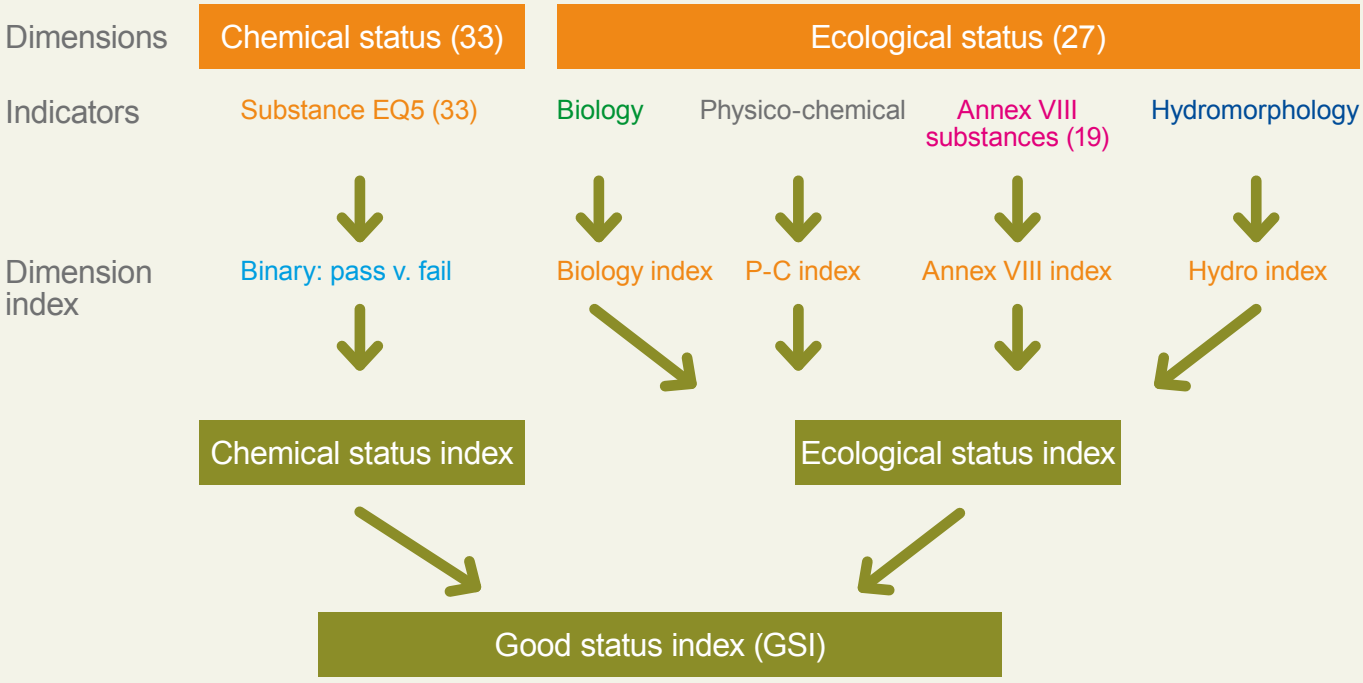
1.1 Calculating the GSI

The GSI would be calculated as a composite index that captures the large number of inputs to the classification of water status (61 in total). It would not replace current status classifications. Rather, it would be derived from the current classification and provide a summary measure of the information provided by those detailed classifications.

All of the available information is already provided as part of the Environment Agency's status classification. All that is required is some agreed rules for converting those classifications into a summary index format.

Figure 8 presents what the structure of the proposed GSI would look like – for ease of exposition we have left out the alien species test.

Figure 8: The good status index



The primary dimensions of water status are already defined: chemical status and ecological status. The required indicators for chemical status are provided by the Environmental Quality Standards for the 33 substances. As indicators they are simple binary metrics: a water body either passes or fails the standard. The Environment Agency's classification methodology captures the details and these can be combined into indices for chemical status and ecological status.

Progress toward the ultimate goal of good status on the 'one out, all out' principle would be measured by how far the GSI is from its minimum value of 0 to its maximum value of 1 or 100.

The example below illustrates the workings of the GSI.

Chemical status
Chemical status is assessed on a pass (= Good) / fail basis. The chemical status score would represent the proportion of chemical status tests passed – if 20% of the chemical parameters passed the test the score would be 20.

Ecological status
For ease of exposition, we illustrate the dimension of ecological status in a more simplified form. We suppose ecological status is represented by the dimensions of biology, physico-chemical & the specific Annex V111 pollutants. At present these indicators are assessed using the categorical classifications as follows:

Dimension	Classification category				
Biology	High	Good	Moderate	Poor	Bad
Physico-chemical	High	Good	Moderate		
Pollutants	High/ good		Moderate		

For the calculation of the GSI we would propose the following values for the categories (these values are for illustration only and alternatives could be proposed).

Ecological status category	Category value
High	100
Good	100
Moderate	66
Poor	33
Bad	0

An example score for each component is illustrated below.

Dimension	Classification (lowest classed element)	Indicator value
Biology	Poor	33
Physico-chemical	Moderate	66
Specific pollutants	Poor	33

This would then need to be aggregated into an overall score. This could be done through a simple average (which would be 44 in the case above). Alternatively, different weights could be applied to the different dimensions to reflect their relative environmental significance. It would also be possible to use a more complex, multiplicative, approach. This would give higher scores to achieving small progress on all indicators than to achieving significant progress on one aspect.

Scaling the GSI
A further advantage of the GSI is that it would be easily scalable. The previous example was constructed in terms of the status of a specific water body. Scaling to catchment, river basin or even national level would simply require aggregating the individual GSI values to a global GSI value. Again, different weights could be given to different types of water bodies: for example, rivers vs. estuaries & lakes vs. transitional waters (according to environmental significance).

The illustration below shows aggregating the results on a simple averaging approach.

Water body	GSI value
WB 1	84
WB2	57
WB3	52
WB4	33
WB5	29
Overall average	51

We conclude our discussion of the proposed GSI with an illustration of this 'tracking progress' point. This illustration projects forward the example already used to illustrate the workings of the GSI.

The detailed classifications present a complex picture of improving environmental water quality. Failures and moderate status are still evident by time period 3 and under the current 'one out, all out' philosophy overall water quality would only be classed as moderate. The 'one out, all out' classification through its sole weight on the worst performing parameter is also insensitive to the changing state of the water body in time periods 2 and 3.

The GSI would encourage policy makers to look at the data differently – the objective is still to be achieved, but notable progress is underway. Overall water bodies are improving as evidenced by the move from the 'weak' 29% to the 'getting stronger' 72%.

Status classification and index	Time period – 1	Time period – 2	Time period – 3
Chemical status			
Substance 1	Good	Good	Good
Substance 2	Fail	Fail	Fail
Substance 3	Fail	Good	Good
Substance 4	Fail	Fail	Good
Substance 5	Fail	Fail	Fail
CSI	**0.2**	**0.4**	**0.6**
Ecological status			
Biology	Poor	Moderate	Moderate
Physico-chemical	Moderate	Moderate	Good
Annex V111 specific pollutants	Poor	Moderate	Good
Dimension indices			
Biology	0.33	0.67	0.67
Physico-chemical	0.67	0.67	1
Annex V111 specific pollutants	0.33	0.67	1
ESI	**0.42**	**0.67**	**0.88**
GSI	**29**	**52**	**72**
One out, all out	Poor	Moderate	Moderate

A2

Annex 2: Severn Trent Water's written evidence on priority substances

I am writing to provide evidence in response to the House of Commons Science and Technology Committee's inquiry into Water Quality and the EU Water Framework Directive.

Our general position can be summarised as:

- It is right that public health should be a national priority and that there should be a continued focus on improving water quality standards still further.
- There needs to be a comprehensive cost/benefits analysis undertaken for each substance before customers money is spent on removal. What are the potential health, environmental and financial costs of removing a substance balanced against the same costs of not removing a substance?
- We are proud of the progress we have made with improving water standards in our region, but we are also conscious of the need to keep our customers' bills affordable.
- We would question whether the Commission is taking an over-cautious approach based on theoretical, not practical, harm. Its' assumptions should be tested vigorously against broad criteria. Most of the substances covered by the directive have been present in the environment over the long term – real evidence of existing harm should be the primary driver for remedial action.

Our responses to the specific questions posed by the committee are set out below.

1.0 What chemicals should be controlled in water discharges, what should the acceptable thresholds be and how are these chemicals currently controlled?

1.1 Acceptable thresholds should be set on the basis of demonstrable not theoretical harm, with clear reference to a comprehensive cost benefit assessment of removing or alleviating the source of harm. There needs to be a clear detrimental impact upon river ecology before standards are imposed and these standards should be river catchment specific, not universal. Otherwise, our customers may be paying unnecessarily.

1.2 We are concerned that the EU review both the list of Hazardous Substances and their associated standards every 4 years. This does give rise to the real possibility that expensive treatment assets required to meet a current standard are rendered obsolete if the standards are subsequently tightened or new substances are added to the list.

2.0 What are the roles of the public, industry, regulators and Government in ensuring chemicals that pose a risk are effectively controlled?

2.1 We would suggest that Government should take the lead in determining how these substances should be controlled. There is a clear need to weigh up the alternative options of source control (including outright bans) versus removal from the aquatic environment through enhanced wastewater treatment. Whilst the water industry is able to quantify the cost of 'end of pipe' treatment, it is not well placed to quantify the cost of using alternative chemicals in industrial/commercial processes or quantifying the consequences of outright bans.

2.2 Greater emphasis also needs to be placed on understanding the public's willingness to pay towards meeting the higher water quality standards being proposed. Ultimately, it is the general public who will have to pay, be that through their water bill; via levies raised on the variety of products that contain the proscribed substances or (indirectly) for the cost of developing alternative products.

2.3 We firmly believe that the 'polluter pays' principle needs to be fully implemented in respect of Hazardous Substances. This could be through a combination of amendments to the Mogden Formula (used to determine charges for Trade Effluent discharges to sewers) and/or a levy raised directly upon the producers (or importers) of the proscribed substances. Industrial producers of Hazardous Substances should bear the cost of controlling their effect on the environment. In some respects, this would be consistent with the aims and objectives of the WEEE (Waste Electrical and Electronic Equipment) Directive in that that the manufacturer retains certain responsibilities after point of sale.

2.4 It is important to note that the lists of Hazardous and Priority Hazardous Substances include a number of metals (Cadmium, Mercury, Nickel, Copper, Zinc and Lead). It is not possible to eliminate elemental substances through wastewater treatment processes. All that can be achieved at a sewage works is to transfer these substances from the effluent discharged to watercourses into another waste stream – ie Biosolids (sewage sludge). All of our biosolids are ultimately recycled, following appropriate treatment and conditioning, to agricultural land. Effective control does

need to carefully consider whether or not compliance with WFD requirements has unintended consequences to the wider environment.

2.5 Historically, the role of the water industry in respect of wastewater treatment has been driven by the need to protect public health and safeguard rivers from the effects of pollution from human (organic) waste and our treatment processes are specific to these requirements. Whilst the sewer system has long been used for the disposal of inorganic trade effluents, this has been as much about diluting these wastes as actually treating them. The standard waste water treatment processes are basically physical separation (solid from liquid) and biological treatment. Many of the hazardous substances now being controlled are not readily amenable to separation or treatment through conventional sewage treatment processes. Some removal may be achieved by existing processes (though as much by accident as by design), although not to the levels required by the EU limits. Taking on a lead role in the control of hazardous substances would be a significant extra responsibility for the water industry and procuring the additional treatment technology will come at substantial cost.

3.0 Should pharmaceuticals in water discharges be better controlled and if so, how could this be achieved?

3.1 We do not believe that controls over the discharge of pharmaceuticals via sewage works discharges should be implemented, unless there is clear evidence of significant ecological damage. We do not believe that a 'precautionary principle' approach is appropriate as the cost to the country of such an approach is likely to be excessive and disproportionate. Where 'end of pipe' treatment is genuinely required it does need to be clearly explained to customers what the benefits of this treatment will be to the environment. They also need to be made aware that this is a knock-on effect of the availability of modern medicines.

3.2 We also do not think that it would be appropriate to consider controlling the discharge of pharmaceutical products through better source control on a widespread basis – the wider benefits to society of effective medication should take priority over fluvial ecology.

3.3 Whilst it may be possible to develop alternative formulations for certain medications, we are aware that it can take years or even decades to bring new pharmaceutical products to market.

3.4 In respect of some of the more toxic pharmaceuticals (eg. Chemotherapy drugs), that are only administered within a hospital environment, consideration could be given to providing treatment of the wastewater stream prior to discharge into the sewer system where necessary.

4.0 To what extent is innovation in water treatment supported in the UK? How successfully is innovation shared across the UK and the EU?

4.1 The ongoing £25m Chemical Investigation Programme highlights the extent of collaboration and innovation across the water industry within the UK. This programme has carried out extensive work to determine the prevalence of various Hazardous / Priority Hazardous Substances within wastewater effluents and also to establish where they have originated from. Further work has been done to establish the effectiveness of both existing and new technologies for removing these substances from treated sewage effluent.

4.2 Each water and sewerage company has Research and Development (R&D) funding, which will be prioritised according to pressures on local ecology; opportunities for efficiency etc. Collaborative R&D projects are run in the UK under the auspices of UKWIR, however collaboration at the wider EU level is less prevalent.

5.0 Has European Commission taken an evidence-based approach to the designation of chemicals that present a significant risk to/via the aquatic environment under the Water Framework Directive?

5.1 Our impression is that the commission has adopted an excessively precautionary approach to the designation of chemicals and the setting of EQS standards. We would contend that 'on the ground' ecology assessments should drive the need for further chemical controls, not theoretical assessments of the potential for harm to occur. Assessments should be on a catchment by catchment basis, rather than a blanket 'one size fits all' approach.

5.2 We would also question the benefit of adopting the 'one out, all out' approach to assessing compliance with WFD chemical status, especially as compliance is judged on a straight 'Pass/Fail' basis. This ultimately means that there is no compliance benefit of making improvements, unless every chemical that is contributing to failure is addressed.

5.3 We remain concerned that the Commission views the Water Framework Directive in isolation from the wider environment. Full implementation of the proposals will inevitably have wider environmental consequences, not least in terms of carbon emissions. We don't see much evidence that a balance is being struck (or even attempted) between WFD and the wider environment. As a case in point, the phasing out of incandescent light bulbs in favour of mercury containing florescent bulbs would not appear to be consistent with Mercury being on the Priority Hazardous Substance list, with a requirement to phase out emissions by 2020.

6.0 What likely impacts could the Commission's proposals have in the UK? How could any adverse effects be mitigated?

6.1 The new EQS for the Priority Hazardous Substance PBDE (PolyBrominated Diphenyl Ethers – in common use as flame retardants) being proposed by the EU of 0.000000049ug/l is several orders of magnitude below the levels achievable by even the most advanced form of treatment currently available. Initial estimates from the Water Industry led Chemicals Investigation Programme suggest that over 5000 sewage works would become a cause of WFD chemical failure for this substance. Widespread adoption of Reverse Osmosis to treat for this substance would cost of the order of £110bn and would still fail to achieve compliance by at least two orders of magnitude.

6.2 Compliance with many of the proposed new standards will require substantial deployment of energy intensive wastewater treatment processes (unless really significant emphasis is placed upon phasing out these substances at source). This would potentially be incompatible with the country's carbon commitments, unless sufficient investment in non-fossil fuel power generation is made to offset this.

6.3 The £27bn over 20 years being quoted by the Environment Agency for installing the advanced waste water treatment equipment needed just to treat the pharmaceuticals being proposed as new priority substances is marginally higher than the £25bn total capital investment being made by the whole industry in AMP5 to meet all of our existing obligations. This equates to a 25% uplift on the industry's capital investment programme from 2020 to 2040. In addition there would be a significant further upward pressure on customer bills to cover the ongoing running costs.

6.4 Some of the chemicals on the Hazardous / Priority Hazardous Substances lists are of industrial rather than domestic origin (in terms of where they enter the sewerage system). The possibility exists that application of the 'Polluter Pays' principle to the setting of trade effluent discharge consents (for discharges to the sewerage system) could act as a disincentive for certain industrial activities to locate to (or remain within) the country. Some consideration does need to be given (by government) to the possibility that the costs associated with the Commissions' proposals prompt some businesses to relocate production to countries with less stringent regulation.

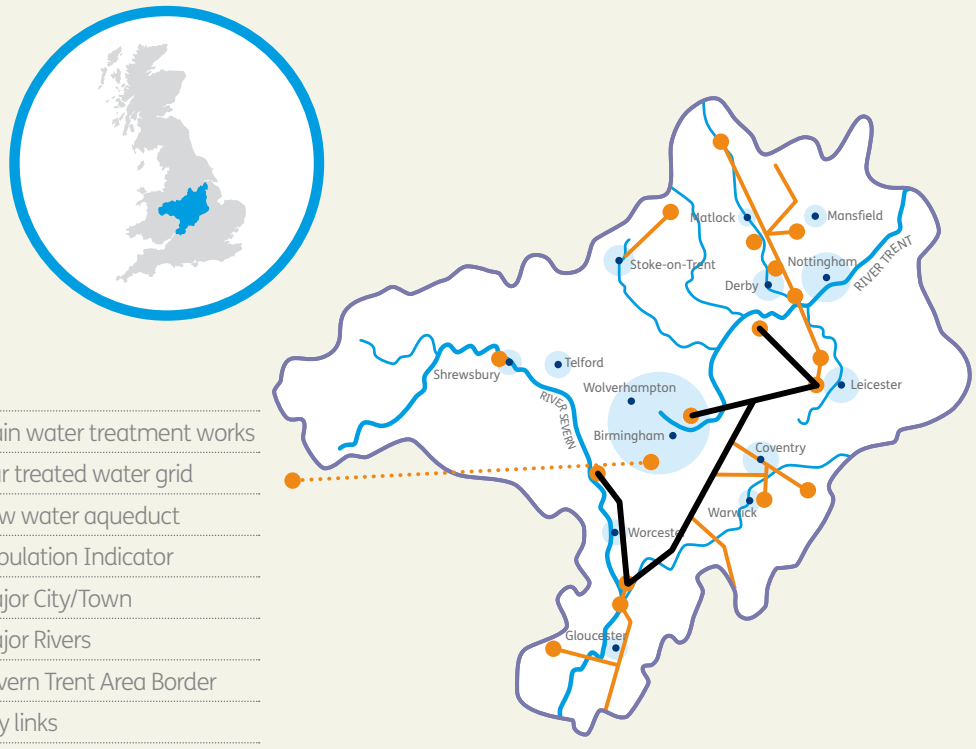
6.5 We understand that it falls to DEFRA to determine what would constitute a 'disproportionate cost' of delivering WFD compliance. We would urge that this assessment be progressed as a matter of some urgency as it will be difficult for the Water Industry to take significant steps in the absence of national guidance on what may constitute 'disproportionate'. The potential levels of investment that could be required (assuming that 'end of pipe' treatment is the country's preferred approach), will be substantial and will take a number of years to procure. Given this, the potential for infraction proceedings on grounds of a perceived lack of progress does exist.

A3

Annex 3: About Severn Trent Water

Severn Trent Water is an operating company of Severn Trent Plc that provides water and waste water services to over 4 million customers in mid-Wales and the English East & West Midlands. Key facts about Severn Trent Water include:

- **We clean 1.8 billion litres of drinking water every day – the equivalent of 720 Olympic-sized swimming pools. We do this at 126 water treatment works.**
- **We deliver it through our 47,000 kilometre network of water pipes – approximately three times the distance between Birmingham and Sydney.**
- **Our customers are among the most water-efficient in the country, using an average of 126 litres a day for each person.**
- **We take away 1.4 billion litres of waste water every day.**
- **We do this through our 91,000 kilometre network of sewers and drains – approximately five times the distance between Birmingham and Sydney.**
- **We clean the water at 1,026 sewage treatment works before putting it back into nearby rivers.**
- **All of this is done for £335 a year per household, which is the lowest average bill in the country.**



A4

Annex 4: EU water and related legislation

EU water and related legislation

The Framework Legislation

- *Water Framework Directive (WFD) (2000/60/EC).*

Water Quality Objective oriented

- *Bathing Water Directive (76/160/EEC; to be repealed and replaced by the new Bathing Directive 2006/7/EC at the latest by 2014).*
- *Drinking Water Directive (98/83/EC).*
- *Directive on Surface for Drinking Water Abstraction (75/440/EEC; integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.07).*
- *Freshwater Fish Directive (78/659/EEC); integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.13).*
- *Shellfish Water Directive (79/923/EEC; integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.13).*

Emission-Control oriented

- *Urban Waste Water Treatment Directive (91/271/EEC) and related Decision 93/481/EEC.*
- *Nitrates Directive (91/676/EEC).*
- *Ground Water Directive (80/68/EEC; integrated into the WFD, to be repealed under the WFD 2000/60/EC as from 22.12.13; after 2013 the protection regime should be continued through the WFD and the new Groundwater Daughter Directive (2006/118/EC) adopted on 12/12/2006).*
- *Dangerous Substances Directive (76/464/EEC; to be repealed under the WFD 2000/60/EC as from 22.12.2013; proposal for a new Directive setting limits for 41 substances was adopted on 17/07/2006 (COM(2006)397 final)).*
- *Daughter Directives of the Dangerous Substances Directive (to be replaced and repealed under the Directive proposed 17/07/2006).*
- *Integrated Pollution Prevention and Control Directive (96/61/EC).*

Diffuse source emission controls

- *Plant Protection Products (91/414/EC).*
- *Marketing and Use of Dangerous Substances and Preparations (76/769/EEC).*
- *Biocides (98/8/EC).*

Monitoring and reporting

- *Directive on the Measurement of Surface (Drinking) Water (79/869/EEC; to be repealed under the WFD 2000/60/EC as from 22.12.07).*
- *Common Procedures for Exchange of Information (Decision 77/795/EEC).*

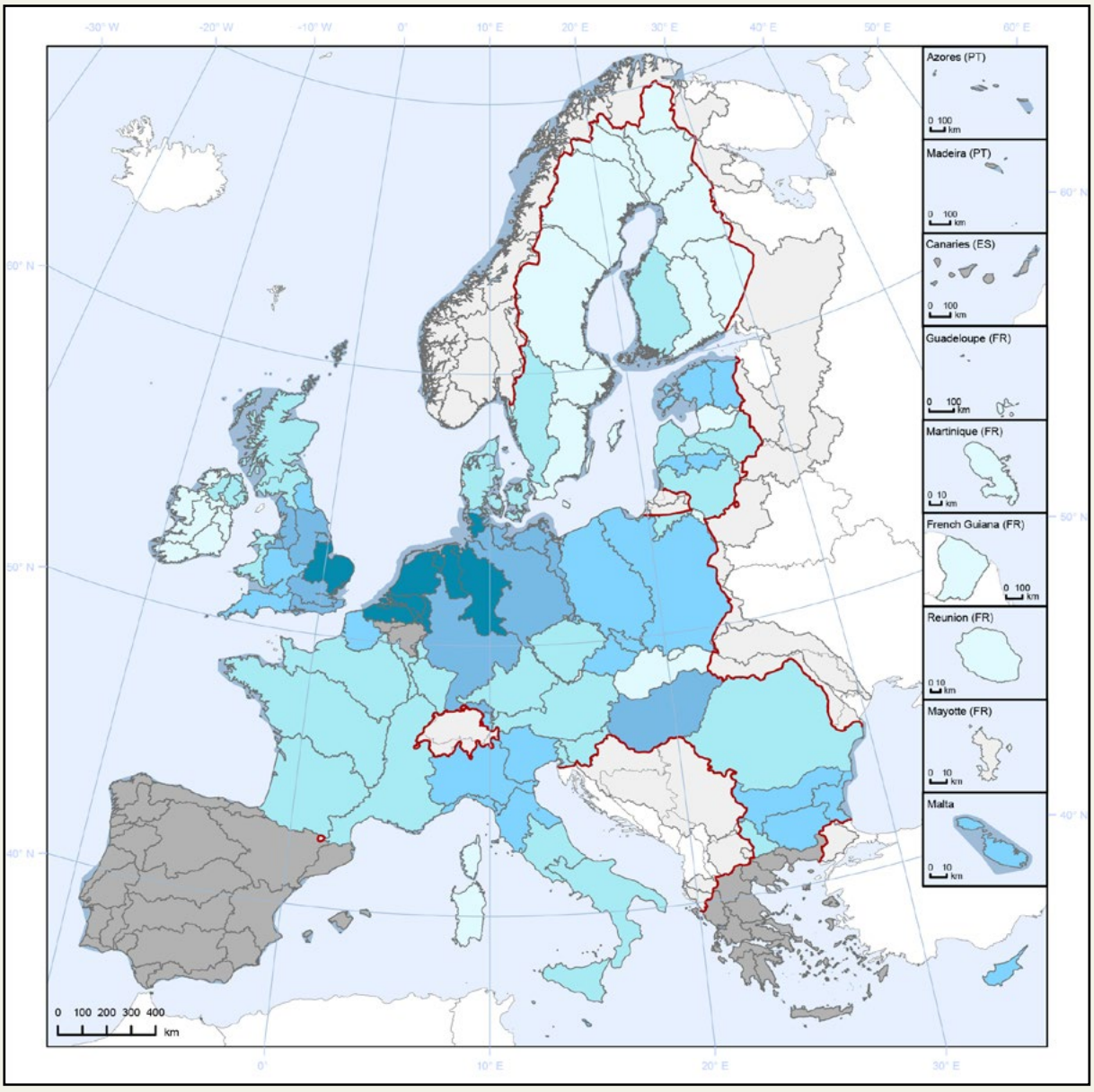
Source: Handbook on the Implementation of EC Environmental Legislation;
Guide on Convergence with EU Environmental Legislation in Eastern Europe, Caucasus and Central Asia.

A5

Annex 5: Heavily modified water bodies and artificial water bodies in River Basin Districts

Map of percentage of heavily modified water bodies and artificial water bodies in River Basin Districts

Version 29 October 2012



Map of percentage of heavily modified water bodies and artificial water bodies in River Basin Districts

- 0 - 5 %
- 5 - 20 %
- 20 - 40 %
- 40 - 60 %
- 60 - 100 %
- EU Member States that have not reported River Basin Management Plans
- National River Basin Districts (outside the EU)
- Coastal waters
- Country borders
- EU extent

Map produced by WRc plc on behalf of the European Commission©, DG Environment, 2012

Footnotes

1) The boundaries of the National River Basin Districts are displayed using version 1.5 of the Water Information System for Europe (WISE) River Basin Districts dataset available from the European Environment Agency: http://www.eea.europa.eu/data-and-maps/data/wise-river-basin-districts-rbds-1. This dataset is based on data reported to WISE by EU Member States, Andorra, Switzerland, Liechtenstein, Monaco and Norway.

2) The boundary of the Mayotte RBD (France) is displayed using the country border dataset.

3) The boundaries of the International River Basin Districts are derived from the WISE River Basin Districts dataset.

4) Country border data was provided by Eurostat and is derived from EGM at a scale of 1:3 million.

5) Coastal waters are defined in the Water Framework Directive as extending 1 nautical mile from the coastline. Some Member States included a larger part of their coastal waters within their River Basin District boundaries.

6) This map displays heavily modified water bodies and artificial water bodies expressed as a percentage of all surface water bodies, based on data reported by Member States to WISE. Member States that have not reported River Basin Management Plans are coloured dark grey.

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SEVERN TRENT WATER

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