



Water for life and livelihoods

River Basin Management Plan Dee River Basin District



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The Environment Agency website holds the river basin management plans for England and Wales, and a range of other information about the environment, river basin management planning and the Water Framework Directive. www.environment-agency.gov.uk/wfd

You can search maps for information related to this plan by using 'What's In Your Backyard'. <http://www.environment-agency.gov.uk/maps>.

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This plan at a glance

This plan is about the pressures facing the water environment in the Dee River Basin District, and the actions that will address them. It has been prepared under the Water Framework Directive, and is the first of a series of six-year planning cycles.

By 2015, 25 per cent of surface waters (rivers, lakes, estuaries and coastal waters) in this river basin district are going to improve for at least one biological, chemical or physical element, measured as part of an assessment of good status according to the Water Framework Directive. This includes an improvement of **265 km** of the river network in relation to fish, phosphate, specific pollutants and other elements.

38 per cent of surface waters will be at good or better ecological status/potential and 67 per cent of groundwater bodies will be at good status by 2015. In combination 38 per cent of all water bodies will be at good status by 2015. The Environment Agency wants to go further and achieve an additional two per cent improvement to surface waters across England and Wales by 2015.

The biological parts of how the water environment is assessed – the plant and animal communities – are key indicators. **At least 48 per cent of assessed surface waters will be at good or better biological status by 2015.**

In the past there has been considerable progress in protecting the natural assets of the Dee river basin district and cleaning up many of the problems for the water environment. From the mountains and lakes of the Snowdonia National Park in the upper part of the basin, to the open plains of Cheshire and the mudflats of the Dee Estuary in the lower basin, their wildlife is supported by water, which is vital for the livelihoods of those who live and work here. However, a range of challenges remain, which will need to be addressed to secure the predicted improvements. They include:

- diffuse pollution from agricultural and other rural activities;
- point source pollution from sewage treatment works;
- the physical modification of water bodies;
- point source pollution from domestic (non-water industry) activities
- diffuse pollution from housing.

At present, because of these pressures and the higher environmental standards required by the Water Framework Directive only 28 per cent of surface waters are currently classified as good or better ecological status/potential. 51 per cent of assessed surface water bodies are at good or better biological status now, although we expect this to change to 48 per cent when we have assessed all water bodies.

In order to meet these targets, it is important for everyone to play their part now and in the future. River basin management is an opportunity for this generation – for people and organisations to work together to improve the quality of every aspect of the water environment – to create an environment we are all proud of and can enjoy.

1 About this plan

This plan focuses on the protection, improvement and sustainable use of the water environment. Many organisations and individuals help to protect and improve the water environment for the benefit of people and wildlife. River basin management is the approach the Environment Agency is using to ensure our combined efforts achieve the improvement needed in the Dee River Basin District.

River basin management is a continuous process of planning and delivery. The Water Framework Directive introduces a formal series of 6 year cycles. The first cycle will end in 2015 when, following further planning and consultation, this plan will be updated and reissued.

The Dee River Basin District Liaison Panel has been central to helping us manage this process. The panel includes representatives of businesses, planning authorities, environmental organisations, consumers, navigation, fishing and recreation bodies and central, regional and local government, all with key roles to play in implementing this plan. The Environment Agency has also worked extensively with local stakeholders to identify the actions needed to address the main pressures on the water environment.

This plan has been prepared under the Water Framework Directive, which requires all countries throughout the European Union to manage the water environment to consistent standards. Each country has to:

- prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- aim to achieve at least good status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027;
- meet the requirements of Water Framework Directive Protected Areas;
- promote sustainable use of water as a natural resource;
- conserve habitats and species that depend directly on water;
- progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;
- contribute to mitigating the effects of floods and droughts.

The plan describes the river basin district, and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions will be taken to address the pressures. It sets out what improvements are possible by 2015 and how the actions will make a difference to the local environment – the catchments, the estuaries and coasts, and the groundwater.

Looking towards implementation, the plan highlights the programme of investigations to be undertaken. This will identify more actions, particularly those associated with diffuse pollution, for delivery during the first cycle. New national measures, made available by government, will also lead to additional improvements. At local level, the Environment Agency will be working closely with a wide variety of organisations and individuals, not only to deliver the commitments contained in the plan, but wherever possible to expand upon them for the benefit of the water environment.

Strategic Environmental Assessment

A Strategic Environmental Assessment of the draft plan was completed to review the effects of the proposals on the wider environment. The assessment enabled us to make sure that this plan represents the most sustainable way of managing the water environment.

The Post Adoption Statement and accompanying Statement of Environmental Particulars is available at www.environment-agency.gov.uk/wfd.

Habitats Regulations Assessment

A Habitats Regulations Assessment of this plan has been carried out to consider whether it is likely to have a significant effect on any Natura 2000 sites. The assessment was undertaken by the Environment Agency, in consultation with Natural England and the Countryside Council for Wales.

The assessment concluded that the River Basin Management Plan is unlikely to have any significant negative effects on any Natura 2000 sites. The Plan itself does not require further assessment under the Habitats Regulations. This conclusion is reliant on the fact that before any measures in the plan are implemented they must be subject to the requirements of the Habitats Regulations. Any plans, project or permissions required to implement the measures must undergo an appropriate assessment if they are likely to have a significant effect.

A copy of the Habitats Regulations Assessment of this plan is available at www.environment-agency.gov.uk/wfd.

Impact Assessment

An impact assessment of this plan has been completed. It looks at the costs of a reference case, which includes existing actions and new actions required by existing obligations, and the incremental costs and benefits of implementing the additional new actions required by this plan. The impact assessment also provides a forward look to the costs and benefits of potential action in future cycles (2015 to 2021 and 2021 to 2027).

A copy of the impact assessment is available at www.environment-agency.gov.uk/wfd.

2 About the Dee River Basin District

The Dee River Basin District is home to over 500,000 people and covers an area of 2,251 square kilometres of North East Wales, Cheshire, Shropshire and the Wirral. The district consists of a single river basin; the River Dee, its tributaries and estuary. The district is characterised by a varied landscape. It ranges from the mountains and lakes of the Snowdonia National Park in the upper part of the basin, through the Vale of Llangollen in the middle reaches, to the open plains of Cheshire and the mudflats of the Dee Estuary in the lower basin (Figure 1). The Dee and its tributaries are renowned for their excellent fishing and there is an important cockle fishery in the estuary. The River Dee and Llyn Tegid are designated as a Special Area of Conservation (SAC) under the Habitats Directive. The Dee estuary is a Special Protection Area (SPA) and SAC.

Chester and Wrexham are the two major urban centres, but the dominant land uses are agriculture and forestry, particularly in the upper part of the basin. Key economic sectors in the region include business services, retailing, health, banking and insurance.

Llyn Tegid, Celyn and Brenig reservoirs in the upper catchment are used for water storage to regulate river flows in the Dee downstream all year round. In the drier months, typically between April and September, this is to sustain abstractions for public supply, and industry. Nearly three million people get their drinking water from the Dee, including many in North West England. Outside of this period, the reservoirs are used to modify flood response and reduce the flooding frequency in the Dee between Bala and Chester.

The Environment Agency is responsible for managing the Dee Regulation System under the Dee and Clwyd River Authority Act 1973. The Environment Agency is assisted in the drawing up of operational management rules by the statutory Dee Consultative Committee which comprises three members of the Environment Agency, plus one member from British Waterways, and representatives from relevant water companies.

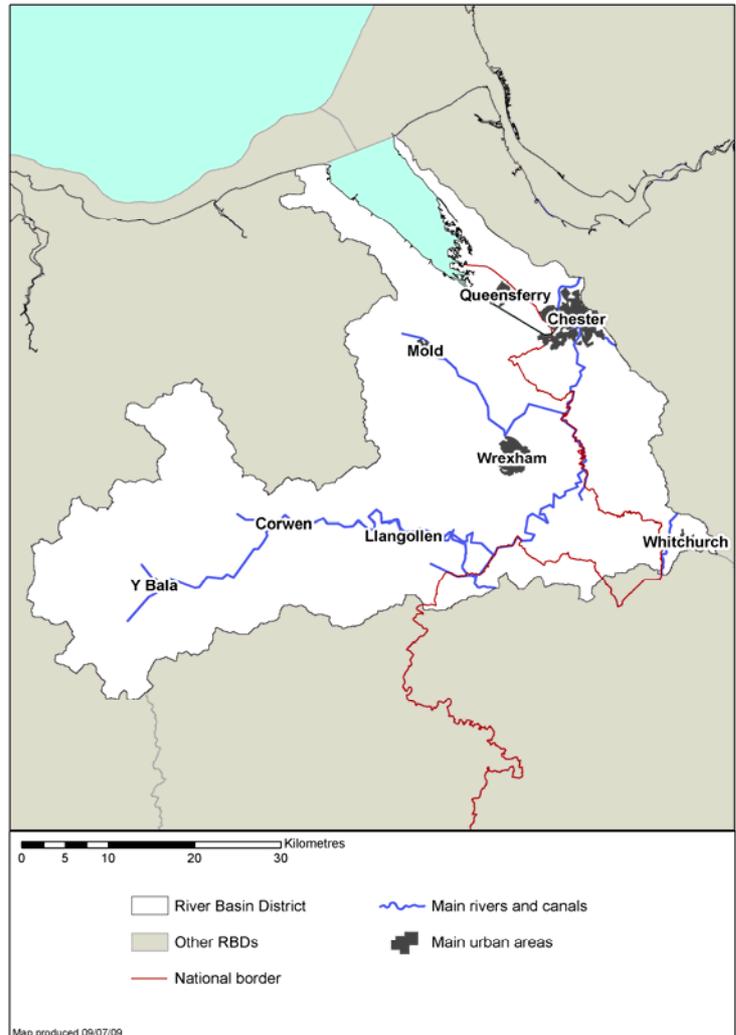


Figure 1 Map of the Dee river basin district

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Operational Management rules are established for operation of the scheme under "normal" and "drought" conditions. Within these rules and within the powers given by the Dee and Clwyd River Authority Act, the Environment Agency can specify the level of residual flow to be maintained over Chester Weir, and detail specific measures to be taken to reduce demands on the system in times of drought. Regard must also be given to mitigating flooding, supplying a specific volume of water to British Waterways for the Shropshire Union Canal, safeguarding the fisheries and other purposes including the safeguarding of specific features and habitats designated under the Habitats Directive that may be affected by management of flows in the River Dee.

The strategic importance of the Dee as a potable water source and the risk posed to it from pollution have led to the Dee becoming one of the most protected rivers in Europe. In 1999, the lower part of the Dee was designated as the UK's first, and to date only, Water Protection Zone.

Pressures on the water environment

A great deal is already being done to protect and improve the water environment. However, it will take more time, effort and resources to deal with the pressures that have significantly altered and damaged the environment over the last few hundred years.

There are a number of major challenges.

High population densities and transport networks put pressure on the water environment.

Discharges from sewage works can impact on water quality or the enjoyment of it, and water companies will implement a major programme of work to address this issue.

The way land is managed has given rise to complex pollution issues. **Diffuse pollution is a major pressure** on the water environment, and can come from urban areas as well as rural areas. Further improvements are needed to farming practices to protect water quality and allow wildlife to thrive.

Rivers and estuaries have been significantly modified physically, to facilitate development, flood and coastal risk management or navigation. **Physical modification** needs to be addressed in order to achieve more natural functioning of wetland ecosystems, and protect fish and their habitats into the future.

The River Dee is an important source of drinking water supply in the district and North West England. Work is required to **ensure that the water resources in the Dee are maintained** as the impact of climate change become evident.

Groundwater in the Dee River Basin District is an important source of drinking water. 20 million litres of groundwater per day are licensed by the Environment Agency to be abstracted for public water supply by the major water companies. In addition, there are over 1500 known private water supplies in the Dee River Basin District, dependent on groundwater as the primary source of drinking water. It is therefore essential to safeguard supplies and the environment by protecting groundwater from pollution, and managing the water resource.

All these challenges relate to a range of specific pressures (significant water management issues) that need to be dealt with in this river basin district. These are:

- **Nitrate** – an essential plant nutrient composed of nitrogen and oxygen that is found in fertilisers used in agriculture, and in sewage effluent. It can cause environmental problems when in excessive concentrations.

- **Pesticides** –chemical and biological products used to control pests.
- **Phosphate** – a nutrient in sewage and fertiliser that can cause too much algae to grow in rivers when in excess concentrations.
- **Invasive non-native species** - plants and animals that have deliberately or accidentally been introduced outside their natural range, and by spreading quickly threaten native wildlife and can cause economic damage.
- **Commercial fisheries (estuaries and coastal waters)** – problems related to the direct capture and removal of fish or shellfish, or habitat damage caused by some types of fishing.
- **Metals** – metals, in large quantities, can be toxic to freshwater fish, invertebrates and marine organisms.
- **Sediment** – Undissolved particles floating on top of or suspended within water, for example those caused by increased rates of soil erosion from land activities. Sedimentation can smother river life and spread pollutants from the land into the water environment.
- **Urban and transport pollution** – a range of pollutants related to urban areas and the transport network.

3 Water bodies and how they are classified

In the context of the Water Framework Directive, the water environment includes rivers, lakes, estuaries, groundwater and coastal waters out to one nautical mile. For the purposes of river basin management, these waters are divided into units called water bodies, as summarised in Table 1. In addition, this plan aims to protect wetlands that depend on groundwater.

Table 1 **Water body numbers in the Dee River Basin District**

	Water body types					Total
	Rivers, canals and surface water transfers (SWTs)*	Lakes and reservoirs	Estuaries (transitional)	Coastal	Groundwater	
Natural water bodies	56	4	0	0	6	66
Artificial water bodies	1	0	0	0		1
Heavily modified water bodies	30	17	1	0		48
Total	87	21	1	0	6	115

* The total length of river covered by the Directive in this river basin district is 753 kilometres.

The Water Framework Directive sets a target of aiming to achieve at least 'good status' in all water bodies by 2015. However, provided that certain conditions are satisfied, in some cases the achievement of good status may be delayed until 2021 or 2027.

Surface waters

For surface waters, good status is a statement of 'overall status', and has an ecological and a chemical component. Good ecological status is measured on the scale high, good, moderate, poor and bad. Chemical status is measured as good or fail.

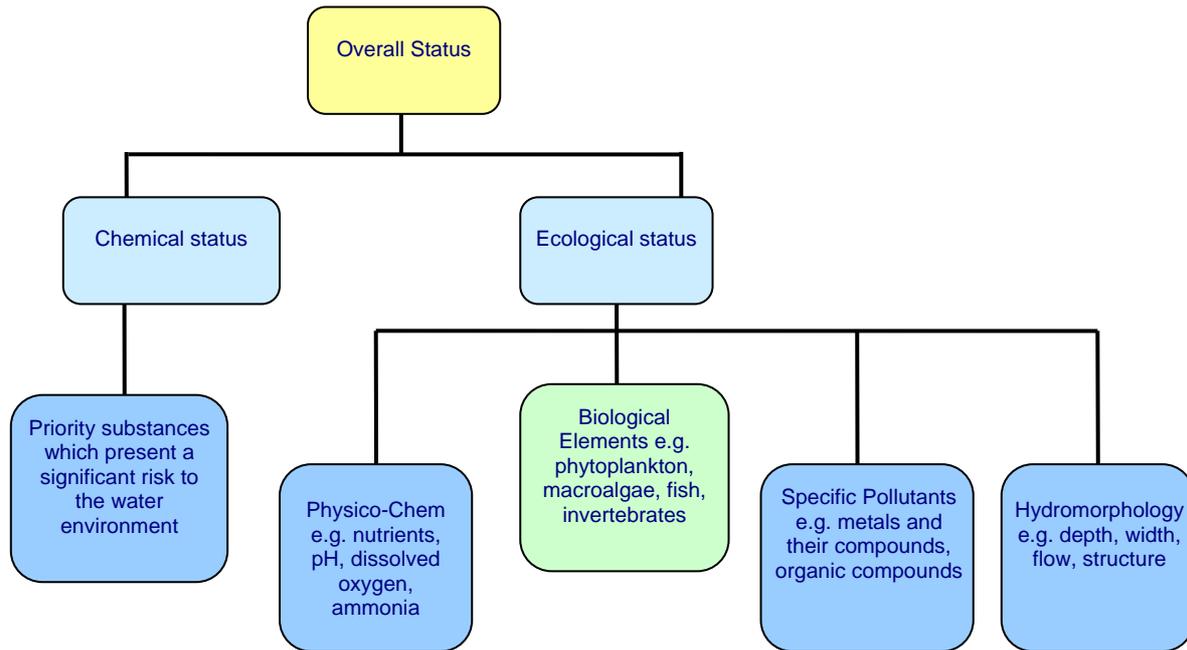
Good ecological status applies to natural water bodies, and is defined as a slight variation from undisturbed natural conditions. Figure 2 shows how status is determined for surface waters. Each component has several different elements. These are measured against specific standards and targets developed by the Water Framework Directive UK Technical Advisory Group (UKTAG) and the European Union.

To understand the underlying reasons for water body status it is helpful to break down the results. Ecological status could be driven by the presence of a single chemical substance slightly exceeding the required standard. As well as ecological status this plan highlights the results of biological assessments (referred to as biological status) as these are the main indicators of the health of the environment for surface waters.

Monitoring and components of overall status

The monitoring programme for river basin management is based on a far wider range of assessments than were carried out in the past. A range of elements are measured in each water body, and a classification is produced based on a 'one out, all out' principle. This uses the poorest individual element result to set the overall classification.

Figure 2 The components of overall status for surface water bodies



The classification of water bodies will improve as new monitoring data are collected and better methods of assessment are developed. Future monitoring will help show where environmental objectives are already being met and where more needs to be done to improve the water environment. Monitoring will also give us some information on the spread of invasive non-native species.

The Water Framework Directive recognises the key role that water resources and habitats play in supporting healthy aquatic ecosystems. It requires that water bodies are managed to protect or improve hydromorphological conditions. Hydromorphology is a term that covers the flow of water in a water body and its physical form. The term encompasses both hydrological and geomorphological characteristics that help support a healthy ecology in rivers, lakes, estuaries and coastal waters.

Artificial and heavily modified waters

Some water bodies are designated as ‘artificial’ or ‘heavily modified’. This is because they may have been created or modified for a particular use such as water supply, flood protection, navigation or urban infrastructure.

By definition, artificial and heavily modified water bodies are not able to achieve natural conditions. Instead the classification and objectives for these water bodies, and the biology they represent, are measured against ‘ecological potential’ rather than status.

For an artificial or heavily modified water body to achieve good ecological potential, its chemistry must be good. In addition, any modifications to the structural or physical nature of the water body that harm biology must only be those essential for its valid use. All other such modifications must have been altered or managed to reduce or remove their adverse impact, so that there is the potential for biology to be as close as possible to that of a similar natural water body. Often though, the biology will still be impacted and biological status of the water body may be less than good.

Groundwater

For groundwater, good status has a quantitative and a chemical component. Together these provide a single final classification: good or poor status.

A ground water body will be classified as having poor quantitative status in the following circumstances; where low ground water levels are responsible for an adverse impact on rivers and wetlands normally reliant on ground water; where abstraction of ground water has lead to saline intrusion; where it is possible that the amount of groundwater abstracted will not be replaced each year by rainfall.

Poor chemical status occurs if there is widespread diffuse pollution within the groundwater body, the quality of the groundwater is having an adverse impact on wetlands or surface waters, there is saline intrusion due to over abstraction, or the quality of water used for potable supply is deteriorating significantly. There are other objectives for groundwater quality in addition to meeting good status. These are the requirements to prevent or limit the input of pollutants to groundwater and to implement measures to reverse significant and sustained rising trends in pollutants in groundwater.

Protected areas

Some areas require special protection under European legislation.

The Water Framework Directive brings together the planning processes of a range of other European Directives. These Directives, listed in Table 2, establish protected areas to manage water, nutrients, chemicals, economically significant species, and wildlife – and have been brought in line with the planning timescales of the Water Framework Directive. Meeting their requirements will also help achieve Water Framework Directive objectives.

Table 2 **Other Directives and their Water Framework Directive protected areas**

Directive	Protected area	Number of protected areas
Bathing Waters	Recreational waters	1
Birds	Natura 2000 sites (water dependent special protection areas)	3
Drinking Water	Drinking water protected areas	25
Freshwater Fish	Waters for the protection of economically significant aquatic species	83
Shellfish Waters	Waters for the protection of economically significant aquatic species	2
Habitats	Natura 2000 sites (water dependent special areas of conservation)	7
Nitrates	Nitrate Vulnerable Zones	23 per cent land coverage
Urban Waste Water Treatment	Sensitive areas	0

Achieving the objectives of these protected areas is a priority for action in this plan. Annex D sets out their objectives and the actions required for Natura 2000 sites and the new Drinking Water Protected Areas required under the Directive. Annex C describes the actions required for all protected areas. In addition, there are two new daughter Directives (Groundwater and Environmental Quality Standards) that will be used to implement specific parts of the Water Framework Directive.

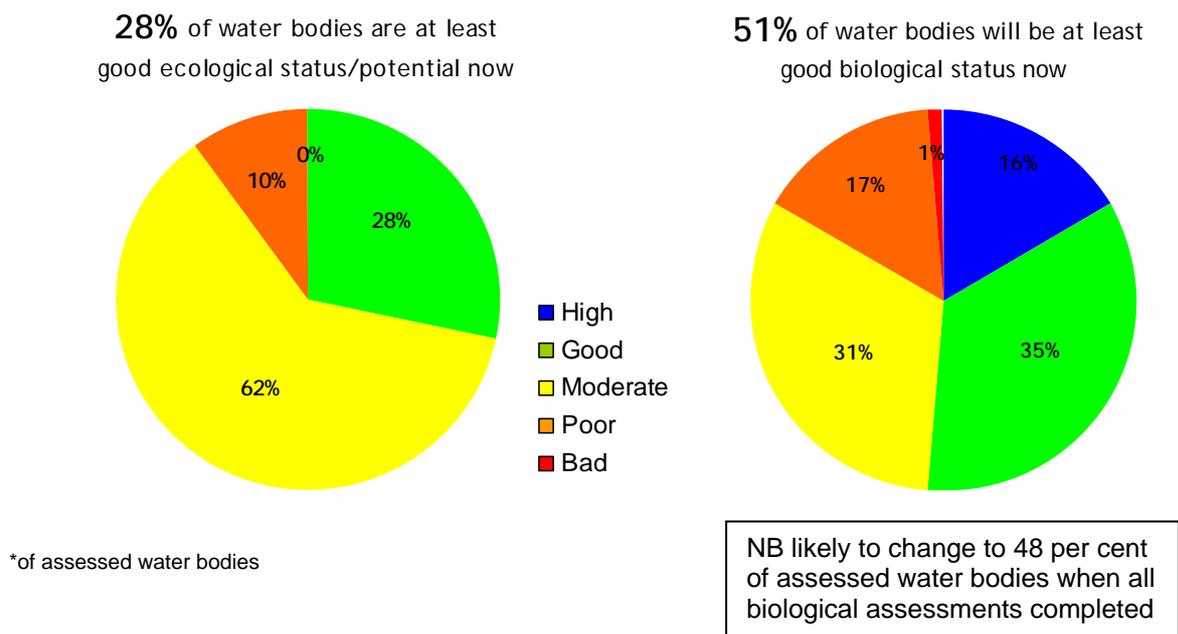
4 The state of the water environment now

The current status classification is the baseline from which improvements and the 'no deterioration in status' objective of the Water Framework Directive is measured. The current status classification has been updated since the draft plan. It is different to that presented in the draft plan because:

- the quality of assessments has been improved by refining classification methods;
- the accuracy of individual assessment tools has improved, especially for fish;
- a number of water bodies that were identified as potentially being heavily modified have not been designated as such in this plan because monitoring shows that they currently achieve good status;
- improvements from the water companies' Periodic Review 2004 have now been factored in;
- an additional 10 lakes have been classified that were previously unassessed.

28 per cent of surface waters are at good or better ecological/potential status now. 51 per cent of assessed surface waters are at good or better biological status now. 108 surface water bodies have been assessed for ecology and 72 have been assessed for biology. This is shown in Figure 3.

Figure 3 **Ecological status/potential and biological status* of surface water bodies now**



Statistics for both good ecological status/potential and biological status are influenced by the relative number of artificial and heavily modified waters and their classification. In the Dee River Basin District, 22 per cent of 49 artificial and heavily modified water bodies are currently classified as at good or better ecological potential, compared to 33 per cent of 60 natural surface water bodies having good or better ecological status. As discussed in the previous section the higher percentage of poor and bad water bodies assessed for biological status compared to ecological status/potential reflects the fact that even where all mitigation measures are in place to allow an artificial or heavily modified water body to be classified as good, the use of the water body may mean that biology is still impacted.

As biological monitoring continues it is likely that the percentage of water bodies at good or better biological status will change from 51 per cent to 48 per cent. This is explained further in the section on Biological status and monitoring.

For groundwater bodies, currently 83 per cent are at good quantitative status and 83 per cent are at good chemical status.

Reasons for not achieving good status or potential

This section takes a closer look at rivers. The majority of management actions in the first river basin management cycle will be applied to rivers. Reasons for not achieving good status or potential in other surface waters are being developed. The first course of action for lakes, coasts and estuaries is to develop a better understanding of the issues.

To identify what needs to be done to improve the environment, the reasons for not achieving good status need to be understood. The main reasons most frequently identified by Environment Agency staff using monitoring data and their knowledge and who have on the ground experience of individual water bodies are shown in Table 3. Each relates to one or more pressures, which in turn impact on elements of the classification.

The reasons for failure include diffuse source pollution from agriculture, point source discharges from water industry sewage works and a range of reasons due to physical modifications. The actions in this plan will increase the number of waters achieving good status or potential, for example through significant investment in improving discharges from sewage works and changes to land management practices. Even if good status is not completely achieved, they will also lead to improvements to the key elements impacted.

Table 3 Main reasons (where known) for not achieving good ecological status or potential

Reason for failure	Key elements impacted
Diffuse source agricultural	phosphate, macrophytes, invertebrates, phytobenthos
Point source water industry sewage works	phosphate, macrophytes, invertebrates, phytobenthos
Physical modification flood protection	mitigation measures required
Physical modification barriers to fish migration	fish
Point source domestic (non water industry)	phosphate, dissolved oxygen
Physical modification water storage and supply (including for power generation)	mitigation measures required
Diffuse source housing	fish, macrophytes, phytobenthos
Point source water industry storm discharge (incl. Combined Storm Overflows)	phosphate, phtobenthos, macrophytes
Disused mines point and/or diffuse source	zinc
Diffuse source mixed urban run-off	invertebrates

It is important to note that because classification involves a wider range of elements than previous monitoring schemes, and many of the key pressures are complex and occur in combination, we often do not know the reason for a failure. For many water bodies either the reasons for failure are unknown or it is uncertain whether there is a failure or whether pressures really are causing an impact. In these cases we will need to investigate, as discussed in “Investigations – improving outcomes for 2015” in Section 6.

For groundwater quality, the reason for poor status is due to the impact of minewaters from historic coal and metal mining activities. The main reason for poor quantitative status is due to the associated surface water impact, with the amount of groundwater baseflow (affected

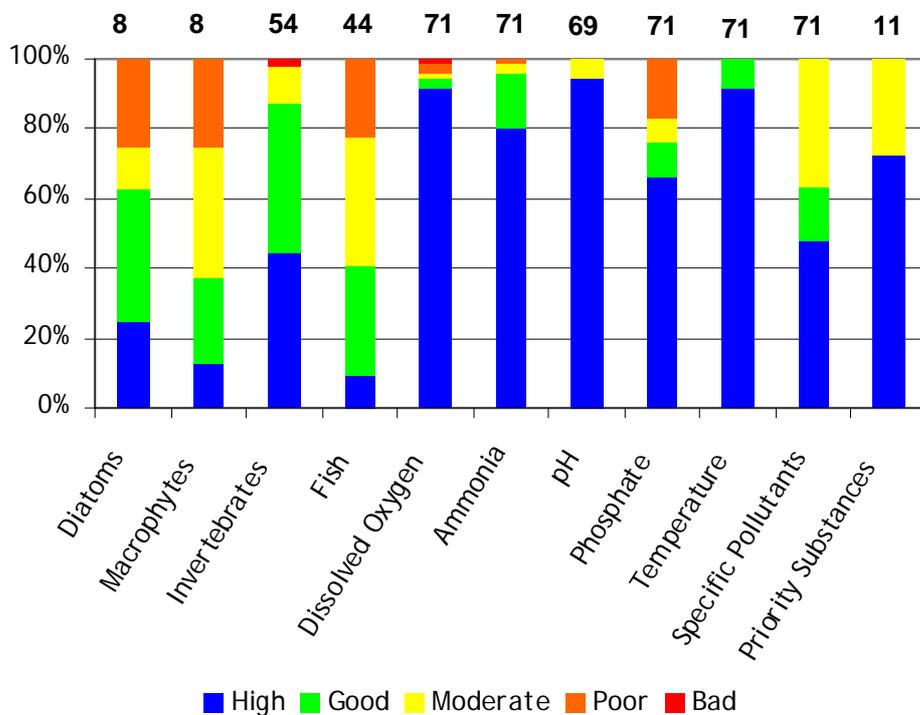
by local abstractions) being considered to be a contributing factor to the poor status of these surface waters.

Classification of individual elements

For rivers, which comprise the majority of water bodies in the river basin district, the main elements indicating that the standards for good ecological status/potential are not being achieved are fish, invertebrates, specific pollutants and phosphate. This is shown in Figure 4.

The results for macrophytes (aquatic plants) and diatoms (microscopic algae) are from relatively fewer water body assessments based on a new (2007) risk based monitoring programme. However, as would be expected, the results for these elements confirm the presence of pressures on biology in many of the assessed water bodies.

Figure 4 **Proportion of assessed river water bodies in each status class, by element** (numbers above bars indicate total number of water bodies assessed for each element)



Excessive sediment is a possible cause for biology not being good in a number of water bodies. At present however, standards are not available to identify clearly where sedimentation is excessive. The Environment Agency will be developing techniques to assess the impact of sedimentation as one of the actions in this plan.

Biological status and monitoring

New monitoring programmes for the Water Framework Directive since 2007 focus on locations where the Environment Agency suspects there may be a problem caused by pressures on the water environment. The Environment Agency does not yet have biological assessments for all relevant water bodies. In this river basin district 66 per cent of surface water bodies have an assessment for at least one biological element. The number of water bodies covered by biological monitoring is set to increase over the next three years. As new information becomes available it is likely that some water bodies currently labelled as good biological status will be shown to have a lower quality.

For instance, from the chemical monitoring the Environment Agency is now clear that there is a link between high levels of phosphate in surface waters and biological failures in the main river type (lowland alkaline rivers). The assessment of reasons for failure that the Environment Agency has started to undertake shows that across England and Wales 22 per cent of river water bodies are failing to achieve good status/potential because of excessive levels of phosphate. In this river basin district phosphate results show that it is likely that the percentage of water bodies at good or better biological status may change from 51 per cent to 48 per cent when additional water bodies are assessed for diatoms and/or macrophytes. This same analysis points to discharges from sewage treatment works and releases from agriculture being responsible for the majority of this. Rather than wait for the results of more biological assessments, we need to ensure corrective action is started in the first plan cycle.

Through The Water Services Regulation Authority's (Ofwat's) determination of the water industry periodic review of investment, the water industry will continue their investment programme targeted at addressing their contribution to phosphate pollution. It is important that agriculture also makes a contribution in the first cycle improvements.

The Environment Agency is now working with the main farming groups to understand better the main ways in which phosphate from land enters and is transported in water bodies. Farming groups have agreed to use this information to encourage individual farmers to take action to reduce their contribution to water pollution. We will trial this new approach in the Anglian River Basin District and through the Campaign for Farmed Environment. We will also look at what advice and incentives are available through agri-environment schemes and the other initiatives such as England Catchment Sensitive Farming and Glastir in Wales.

In parallel with this approach, the Environment Agency will continue to develop work on regulatory measures, such as piloting, in England, Water Protection Zones (WPZs) so that if voluntary approaches are shown not to work in a particular area, or where higher environmental standards are needed in for example protected areas, we are ready and able to ensure progress is made before 2015. The work to identify the ways in which phosphate enters water bodies and the means of reducing this will inform the measures that might be applied in WPZs. WPZs will only be effective if the means of control have been clearly identified.

5 Actions to improve the water environment by 2015

The following gives an overview of the key contributions from sectors and organisations that the Environment Agency will work with to implement this plan.

[All sectors](#)

[Agriculture and rural land management](#)

[Angling, fisheries and conservation](#)

[Central government](#)

[Environment Agency](#)

[Industry manufacturing and other business](#)

[Local and regional government](#)

[Mining and quarrying](#)

[Navigation](#)

[Urban and transport](#)

[Water industry](#)

[Individuals and communities](#)

These actions are summarised versions of the full programme of actions that can be found in annex C.

The lead organisation for each action is given in brackets. Note that many actions will involve more than one sector and need to be implemented in partnership. Actions in annex C are therefore duplicated across the relevant sectors. Sectors are encouraged to put further actions forward during the implementation of this plan.

After the action tables there are sections on:

[Actions to protect drinking water](#)

[The costs of action in this plan](#)

[Taking action in a changing climate](#)

[Working with other plans and programmes](#)

All sectors

All sectors must comply with the range of existing regulations, codes of practice and controls on the use of certain substances.

Investigations will be carried out by the Environment Agency and partner organisations where appropriate, to establish the extent and source of pressures and to identify any further actions that are technically feasible and not disproportionately costly. These actions will be carried out during this or future management cycles.

Investigations and actions will also be carried out in drinking water protected areas (where necessary focused in safeguard zones) to reduce the risk of deterioration in raw water quality and therefore reduce the need for additional treatment to meet drinking water standards.

A small number of candidate Water Protection Zones (WPZ) will be promoted across England early in the first plan cycle, where there is clear evidence that voluntary mechanisms such as the England Catchment Sensitive Farming Delivery Initiative, Environment Agency Wales Catchment Initiatives and pollution prevention campaigns are not sufficient by themselves to achieve the required environmental objectives. The candidate WPZs will be used to establish the usefulness of the concept, but as we have said earlier in describing the

results of the biological monitoring, this in turn relies on a clear understanding of the practices causing problems and the techniques to avoid them.

Agriculture and rural land management

This sector has a big role in looking after and improving the quality of the rural environment. In north east Wales, agriculture accounts for approximately 75 per cent of land use and employs over 8,000 people.

A combination of incentive, advisory and regulatory measures have been in place for a number of years to help farmers and other land managers protect the environment. For instance the Code of Good Agricultural Practice and agri-environment schemes, such as Entry Level Stewardship and Higher Level Stewardship and Tir Gofal in Wales. Wise stewardship of resources such as soil, nutrients, water and energy helps to cut costs while maintaining or improving the productivity of land and livestock.

Nevertheless, the way in which land is managed is still having a negative impact on natural resources and further action is needed to address diffuse pollution and other key pressures in rural areas. Government will consider the introduction of further restrictions of activities and restrictions on chemicals where there is evidence that voluntary actions failed to deliver.

Example actions
<p>Cross-Compliance – to help farmers comply with a range of Directives to reduce pollution from agriculture at farms receiving subsidies (all land managers).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Education, Training and awareness on diffuse pollution issues associated with forestry and woodland management (all land managers).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Pesticides statutory code of practice – advice for operators on control of plant protection products to prevent and limit pollution of waters (all operators)</p> <ul style="list-style-type: none"> ◆ Across the river basin district
<p>Establish and enforce Nitrate Vulnerable Zones in catchments at high risk from nitrate pollution () to reduce the amount of nitrate and other pollutants entering water from farmland (Welsh Assembly Government, Environment Agency).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Run pollution prevention advice and local campaigns to provide targeted advice and enforcement on farm and land management, domestic oil storage, septic tanks (Environment Agency).</p> <ul style="list-style-type: none"> • Across the river basin district, but focused in high risk areas
<p>Water efficiency campaigns (e.g. National Farmers' Union and National Farmers' Union Cymru "Water Matters")</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Investigate sheep dip pesticide impact on rivers in upper and middle Dee areas using invertebrate and moss sampling in high risk catchments (Environment Agency Wales).</p> <ul style="list-style-type: none"> • Dee river basin district in particular Upper and Middle Dee

Angling and conservation

The Dee River Basin District has a rich and diverse range of wildlife, and retains internationally and nationally important wildlife sites, habitats and species. The district is home to several sites designated under European and national legislation for their nature conservation value. These include the River Dee and Llyn Tegid, Special Area of Conservation (SAC), designated for its Atlantic salmon and water plantain populations; Berwyn and South Clwyd Mountains cSAC and Special Protection Area (SPA), designated for its upland breeding birds and blanket bogs; Dee Estuary, a SPA and Ramsar site designated for its important breeding and migratory bird populations.

The Dee and its tributaries are renowned for their excellent fishing. Game fish, including salmon and trout, are found throughout the catchment, including the lakes and reservoirs in the upper reaches. Coarse fish, including grayling, for which the River Dee is well-known, are present in the middle and lower reaches, and in the Llangollen arm of the Shropshire Union Canal located in part in the south-east of the basin. Some salmon net-fishing takes place in the estuary under licence.

The estuary is also home to important cockle beds, which provide a local industry. The cockles provide an important source of food for the wildfowl and wading birds during the winter months. Cockle fishing disturbs birds and damages the habitat through trampling, discards, raking, illegal fishing and the removal of undersize cockles.

The angling and conservation sector has a large role to play in delivering local 'on the ground' improvements to the water environment as well as working to establish new improvement actions. It engages communities and individuals, building on their skills, experience and local knowledge and actively involves them in making these improvements. Angling is a popular past time that can provide local intelligence on environmental quality.

Many environmental organisations can influence environmental quality through the land they own or manage. Riparian owners have specific responsibility for the management of their watercourses so their support, involvement and investment in implementing the actions is crucial.

Example actions
<p>Education campaigns to the general public through press releases, newsletters and magazines to raise awareness on sustainable water use (efficiency, conservation and re-use) (Environment Agency Wales).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Encourage catch and release of salmon and sea trout through incentives and education (Environment Agency).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Enforcement of rod byelaws, including illegal fishing, to protect vulnerable fish stocks from over-exploitation (Environment Agency).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Promote the 'River Fly Partnership' monitoring programme to assess the status of river health (Fisheries/Angling clubs).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Establish a database of invasive non-native species on nature reserves and in areas where the Environment Agency works for all Wildlife Trusts in the Dee river basin district. The database can then be shared with the Association of Rivers Trusts, Wildlife Trusts and other organisations (Environment Agency Wales).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Produce plan of priority actions for easing eel passage taking account of availability of upstream habitat (Environment Agency Wales).</p> <ul style="list-style-type: none"> • Across the river basin district

Central government

Government will continue to influence the development of European legislation to help bring forward initiatives that protect and improve the water environment, and that are technically feasible and not disproportionately costly. Defra and Welsh Assembly Government are considering further policy options to help improve ambition in achieving objectives in this first plan cycle. These include controls on phosphate in detergents, tackling mis-connections, general binding rules, code of practice on septic tanks and options to increase the use of sustainable drainage systems to reduce risks of flooding and pollution of surface waters during periods of high rainfall.

The Environment Agency, Forestry Commission, Natural England and Countryside Council for Wales are the key government agencies for this plan. The agencies will work together on relevant actions.

Example actions
<p>Promote Code for Sustainable Homes (now mandatory Level 3 for all residential developments greater than 4 dwellings) and Building Research Establishment Environmental Assessment Method (BREEAM) standards in national planning policy in Wales (Welsh Assembly Government).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Promote the wide scale use of sustainable drainage systems and provide guidance for integrating development and water planning (Welsh Assembly Government)</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Where necessary carry out targeted local investigations into the origins, causes of and solutions to pollution to protect private drinking water supplies (Environment Agency Wales)</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Implement the water related actions of the Invasive Non-native Species Framework Action Plan for Great Britain (Defra, Welsh Assembly Government, Environment Agency) .</p> <ul style="list-style-type: none"> • England and Wales
<p>Improve information on distribution of invasive non-native plant species by using information gathered from herbicide applications to create a invasive non-native species database and linking to data gathered from other organisations (Welsh Assembly Government)</p> <ul style="list-style-type: none"> • Across the river basin district

Environment Agency

The Environment Agency is the Government's lead agency for implementing the Water Framework Directive. We will continue to monitor, provide advice and manage improvements to the water environment. We regulate discharges to and abstraction from the water environment by issuing and enforcing environmental permits and licenses. Where necessary we take enforcement action against those who act illegally and damage or put at risk the water environment. We also have responsibility to make sure there is enough water to meet the needs of industry, agriculture and wider society in the future.

Specific requirements for Environment Agency in the Dee River Basin District are to continue to regulate the Dee Water Protection Zone and manage the flow regime in the River Dee in accordance with the Dee and Clwyd Authority Act 1973.

We will work closely with all sectors to learn from them, build on existing knowledge and to develop a shared commitment to implementing environmental improvements.

Example actions
<p>The Environment Agency Wales will manage the Dee Regulation System (river flows in the Dee) under the Dee and Clwyd River Authority Act 1973 (Environment Agency Wales).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>The Environment Agency Wales will enforce the Water Protection Zone Regulations 1999, ensuring all controlled activities are carried out in accordance with the requirements of a protection zone consent (Environment Agency Wales)</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Continue to refine a monitoring programme, to maintain our understanding of the state of the water environment (Environment Agency).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Run local pollution prevention campaigns to raise awareness of the need for responsible handling and disposal of chemicals, oil and other pollutants (Environment Agency).</p> <ul style="list-style-type: none"> • Specified water bodies identified at risk

Example actions
Develop and implement Water Framework Directive mitigation measures manual for flood and coastal erosion risk management and land drainage activities . This manual will set out best practice options for measures to mitigate against the impacts of such activities upon ecology. This will be used to ensure that new and existing schemes and management activities will take into consideration Water Framework Directive requirements and will results in minimal ecological damage (Environment Agency Wales). <ul style="list-style-type: none"> • Across the river basin district
Reduce physical modification by reviewing redundant flood defence structures and identifying where modification, mitigation or removal may be appropriate (Environment Agency Wales) <ul style="list-style-type: none"> • Across the river basin district
Provide advice to small and medium sized businesses on obligations in relation to priority substances, priority hazardous substances and specific pollutants through NetRegs website (Environment Agency Wales) <ul style="list-style-type: none"> • Across the river basin district
Conduct investigations at sites identified under the Restoring Sustainable Abstraction programme (Environment Agency). <ul style="list-style-type: none"> • Across the river basin district

Industry, manufacturing and other business

Chester and Wrexham are the two major urban centres in the river basin district. Key sectors in the District include retailing, business services, health, banking and insurance. Commercial and industrial development is mainly centred in the urban areas adjacent to the estuary and around Wrexham. Major industries include chemical and pharmaceutical plants, food manufacture, paper production and aircraft construction. Manufacturing is an important contributor to the economy of the Dee River Basin District.

All businesses have some environmental footprint, by emitting pollution, producing waste or simply using power. The Economic Strategy covering the English part of the District is a key document to manage the impact of future economic growth, by aiming to demonstrate that this growth can be secured within environmental limits to bring prosperity to the region.

Most relevant actions in this plan are already underway or are part of the existing regulatory system. However, some actions are new, and will help reduce nutrients such as phosphate and will help meet tighter standards on ammonia and 40 other priority substances and pollutants in the river basin district. Where appropriate, industry will participate in pollution prevention campaigns and in investigations to establish the extent and source of pressures to define any further actions required for this and future plan cycles.

Example actions
Comply with regulations such as Environmental Permitting, Environmental Damage and Groundwater, to limit environmental damage and help prevent land contamination, pollution and deterioration of waters (Industry). <ul style="list-style-type: none"> • Across the river basin district
Voluntary pollution prevention and remediation of existing land contamination, to bring land back into beneficial use and remove potential sources of groundwater contamination (Industry). <ul style="list-style-type: none"> • Sites contributing to potential environmental quality standard failure
Run pollution prevention advice and campaigns to provide targeted advice and enforcement to reduce contaminants being released to groundwater from industrial estates, petrol stations and other sources (Environment Agency). <ul style="list-style-type: none"> • High risk areas
Implementation of sustainable drainage systems Code of Practice . Comply with published advice for operators on sustainable drainage systems (Industry) <ul style="list-style-type: none"> • Across the river basin district

Investigate the need to screen intakes and discharges to prevent loss or damage to fish populations. Ensure screening on priority sites (Environment Agency). <ul style="list-style-type: none"> • Across the river basin district
Promote water recycling and rainwater harvesting where cost-effective, appropriate and used together with other demand management measures (Water companies). <ul style="list-style-type: none"> • Across the river basin district
Reducing disposal of fat, oil and grease to sewers – Awareness campaign to influence behaviour with leaflets, information packs (Environment Agency Wales) <ul style="list-style-type: none"> • Across the river basin district
Re-engineer existing discharges to avoid direct discharges of pollutants to groundwater (Environment Agency Wales). <ul style="list-style-type: none"> • Across the river basin district

Local and regional government

Local and regional government have a major role in implementing this plan. The sector has a far reaching influence on businesses, local communities and leisure and tourism sectors. The eight local authorities (Gwynedd, Conwy, Denbighshire, Shropshire, Wrexham, Cheshire West and Chester, Flintshire and Wirral) and Snowdonia National Park Authority also have duties and powers in relation to planning, waste and minerals, regeneration, land contamination, highways, transportation, emergency planning, countryside management, bathing waters, potable drinking water for private water supplies and other activities. Town and Parish councils exist at the local level across part of the river basin district.

Many of the actions identified in the plan form part of this sector's normal work. The Environment Agency and others will work with Local Authorities to ensure that all relevant actions are identified, prioritised, resourced and implemented.

Example actions
Ensure that planning policies and spatial planning documents take into account the objectives of the Dee River Basin Management Plan, including Local Development Documents and Sustainable Community Strategies (Local Authorities). <ul style="list-style-type: none"> • Across the river basin district
Develop and provide sustainable water management planning guidance to ensure that the impacts of development on the water environment are fully understood (Environment Agency). <ul style="list-style-type: none"> • Across the river basin district
Action to reduce the physical impacts of urban development in artificial or heavily modified waters, to help waters reach good ecological potential (Local Authorities). <ul style="list-style-type: none"> • Across the river basin district
Coordination of a variety of spatial plans, including land-use (Regional planning authorities) <ul style="list-style-type: none"> • Across the river basin district
Promote the use of sustainable drainage systems in new urban and rural development where appropriate, and retrofit in priority areas including highways where possible (Environment Agency, Local Authorities). <ul style="list-style-type: none"> • Across the river basin district
General guidance to improve Pesticide use through the Amenity Forum (Amenity Forum) <ul style="list-style-type: none"> • Across the river basin district

Mining and quarrying

Current mining and quarrying activity is well regulated. However, the historic metal and coal mining in the Wrexham area has left a legacy of minewater issues, in particular around the former Minera metal mine. Such minewater may include metals such as cadmium, lead, nickel, copper, iron, manganese and arsenic which can have significant ecological impacts on the receiving water environment. In some areas the habitat has adapted to this historic higher level of metal contamination and have subsequently become important habitats in their own right. The metals continue to be discharged from these sites and enter the

receiving water bodies and eventually the Dee estuary. Investigations into the impacts of these sites, in particular Minera, is being progressed as part of the Metal Mine Strategy for Wales.

Example actions
Coal Authority minewater preventative and remediation programme (Coal Authority). <ul style="list-style-type: none"> • Across the river basin district
Investigate emissions from working sites and appraise options of best practice controls at mines and quarries to ensure environmental quality standards are met (Operators). <ul style="list-style-type: none"> • Sites contributing to potential environmental quality standard failure
Comply with Local Authority contaminated land remediation notices - Make use of site specific notice to remove pollution risk to groundwater (Industry). <ul style="list-style-type: none"> • Across the river basin district
Implementation of best practice controls and remediation at abandoned metal mines (Environment Agency Wales). <ul style="list-style-type: none"> • Across the river basin district
Continue to investigate minewater impacts and develop remediation plans in accordance with the Metal Mines Strategy for Wales (Environment Agency Wales). <ul style="list-style-type: none"> • Across the river basin district
Investigate discharges from abandoned metal, and other non-coal mines in accordance with the Metal Mine Strategy for Wales. Prioritise for inclusion in national agreement with relevant mines partner organisations (Environment Agency Wales). <ul style="list-style-type: none"> • Across the river basin district

Navigation

Ports, harbours and marinas are essential for economic prosperity. Many navigation and port authorities have already done a great deal to help improve ecology and water quality and some harbours are home to internationally important wildlife. Careful planning will be needed to ensure that waters remain navigable whilst at the same time water quality is protected and improved.

Proposals to build new ports or expand existing ones need to take sustainable water management goals into account. Physical changes are permitted to waters for navigation but only if certain conditions are met.

The North Wales coast is also popular with tourists and recreational boaters. The Environment Agency wants to encourage recreation in the river basin district, whilst taking action to minimise any environmental impacts.

Example actions
Ban Tributyltin (TBT) use on ship hulls unless there is a coating to prevent leaching of underlying TBT anti-foulants, to prevent or limit pollution in marine waters (Marine and Fisheries Agency, Welsh Assembly Government and others). <ul style="list-style-type: none"> • England and Wales
Create guidance notes for boat users and recreational activities on water bodies to reduce disturbance to habitat and species. The guidance will form an aspect of a wider code of practice to boat users (Countryside Council for Wales). <ul style="list-style-type: none"> • England and Wales
Develop a dredging and disposal framework which will provide guidance to all those undertaking or permitting navigation dredging and dredged material disposal activities to assist in achieving the statutory objectives of the Water Framework Directive and related Environmental Quality Standards Directive (2008/105/EEC) (Ports sector). <ul style="list-style-type: none"> • England and Wales
Review existing controls for disposal of dredgings inside and outside harbour limits as appropriate (Welsh Assembly Government, Defra). <ul style="list-style-type: none"> • England and Wales

Investigate the reason for failure: to assess the contribution from dredging or disposal activities on EQS compliance as appropriate (Environment Agency)

- England and Wales

Urban and transport

Development and regeneration is a major opportunity to improve the water environment. However, when poorly planned or designed, urban and transport infrastructure can adversely impact on water quality or water resources. The Environment Agency and others want to work with the urban and transport sector to achieve an urban water environment rich in wildlife that local communities can benefit from and enjoy.

A good quality water environment has the potential to help economic regeneration and to enhance the economic and social amenity value of developments, and improve the quality of life in cities, towns and villages.

Spatial planning and design for urban development and infrastructure should aim to reduce surface water run off; protect and restore habitats; improve the quality of rivers, coastal waters, and groundwater, and thus protect drinking water supplies and bathing areas. The release of toxic pollutants that harm the water environment also need to be reduced.

Example actions
Environment Agency and Highways Agency Memorandum of Understanding (MoU) and associated initiatives in England (Highways Agency and Environment Agency). <ul style="list-style-type: none"> • England
Action to reduce the physical impacts of urban development in artificial or heavily modified water bodies, to help waters reach good ecological potential (Local Authorities). <ul style="list-style-type: none"> • Across the river basin district
Run pollution prevention advice and local campaigns to provide targeted advice and enforcement on farm and land management, domestic oil storage, septic tanks (Environment Agency). <ul style="list-style-type: none"> • Across the river basin district
General guidance to improve Pesticide use through the Amenity Forum (Amenity Forum). <ul style="list-style-type: none"> • England and Wales
Countryside Council for Wales is promoting sustainable drainage systems in developments around SSSI's/areas with significant newt populations (Countryside Council for Wales). <ul style="list-style-type: none"> • Across the river basin district
Promote good practice to avoid pollution from construction sites (Environment Agency). <ul style="list-style-type: none"> • Across the river basin district
Reducing disposal of fat, oil and grease to sewers – Awareness campaign to influence behaviour with leaflets, information packs (Environment Agency Wales) <ul style="list-style-type: none"> • Across the river basin district
Targeted programme of site visits to review activities operating in the Dee Protection Zone (Environment Agency Wales). <ul style="list-style-type: none"> • Across the river basin district

Water industry

Water companies are major partners in the management and protection of the water environment. The Environment Agency works with companies, consumers and government to ensure that the sector's environmental work is planned and implemented in a way that is affordable for the public.

Improvement of continuous and intermittent sewage effluent discharges and of water resources management will be carried out as part of the ongoing water industry asset management programme.

The companies' programme of work under the periodic review of water industry investment in 2009 will make a large contribution to meeting the objectives in this plan. This includes carrying out investigations, and specific improvement schemes to address water quality or water resources.

In addition, specific actions will be carried out in drinking water protected areas to help safeguard drinking water supplies.

Example actions
<p>Reduce leakage through active leakage control and customer supply pipe repair policies to help ensure sufficient water for people and wildlife (Water companies).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Complete the current round of water company asset investment to deliver water quality improvements and reduce the impact of abstraction (Water companies).</p> <ul style="list-style-type: none"> • Rivers, coasts, estuaries and groundwater bodies across the river basin district
<p>Improvements to water company assets under the next round of company investment (Asset Management Programme – AMP5), to deliver water quality improvements and continue to reduce the impact of abstraction under a range of environmental Directives (Water companies).</p> <ul style="list-style-type: none"> • Rivers, coasts, estuaries and groundwater bodies across the river basin district
<p>Advice to capital delivery partners working on Dwr Cymru Welsh Water capital programme to ensure awareness of Invasive Non-native Species and to ensure the appropriate disposal of contaminated soils (Water companies).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Coordinated education and awareness on water efficiency including sustainable drainage systems and re-use to promote value of water (Environment Agency Wales).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Provision of first time rural sewerage schemes (Water companies).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Sharing of information on extent of Dwr Cymru Welsh Water wastewater assets already in place, updates likely to continue (Water companies).</p> <ul style="list-style-type: none"> • Across the river basin district
<p>Research and development on fate and transport of phosphate in groundwater to determine impact on surface water (Environment Agency Wales, Water companies).</p> <ul style="list-style-type: none"> • Across the river basin district

Individuals and communities

Everyone can help protect and improve the water environment. Actions people can take include the following.

To save water

in houses or offices

- Turn off the tap when brushing teeth, and take short showers rather than baths.
- Wash fruit and vegetables in a bowl rather than under the running tap - and use the remainder on plants.
- Install a 'hippo' or 'save-a-flush' in toilet cisterns.
- Run dishwashers or washing machines with a full load on an economy setting, and boil the minimum amount of water needed in kettles or saucepans.
- Purchase low energy and low water use appliances.
- Hand wash cars.
- Ask water companies to fit a meter. This can reduce household water consumption.
- Install a low-flush toilet, put flow regulators on taps and showers, and install waterless urinals at work.
- Consider installing grey-water recycling systems in homes or workplaces. This can save one third of domestic mains water usage.

- Ensure that any off-road parking or patio around the house use permeable materials so rain can soak into the soil.

in gardens

- Choose plants that tolerate dry conditions. To help lawns through dry periods, don't cut them too short.
- To save water in gardens, collect rain in a water-butt, water at the beginning or end of the day, mulch plants, and use watering cans where possible instead of sprinklers or hosepipes.
- Fix dripping taps, and lag pipes to avoid them bursting in freezing weather.

To prevent pollution

- Use kitchen, bathroom and car cleaning products that don't harm the environment, such as phosphate-free laundry detergents, and use as little as possible. This helps prevent pollution.
- Take waste oil and chemicals such as white spirit to a municipal recycling facility: don't pour them down the sink or outside drains.
- Check that household appliances are connected to the foul sewer, not the surface water drain.
- Ensure septic tanks or private sewage treatment plants are well maintained and working effectively.
- Ensure household oil storage is in good condition, with an up-to-date inspection record.
- Ensure extensions or conservatories have their roof water draining into a soakaway or sustainable drainage system and not connected to the combined sewer.
- Report pollution or fly-tipping to the Environment Agency on 0800 807060.

To protect water dependent wildlife

- Put cotton buds and other litter in the bin, not down the toilet. It may end up in the sea where it can harm wildlife.
- Eat fish from sustainable sources, caught using fishing methods that don't cause damage to marine wildlife and habitats.
- Seek expert advice to eliminate invasive non-native species from gardens, disposing of them responsibly. Do not buy, plant or release invasive non-native species.
- Adopt-a-beach to help keep beaches clean of litter than can harm wildlife and cause pollution.
- Join a river group to spot pollution, invasive non-native species, and take part in practical tasks.

Actions to protect drinking water

Drinking water supplied to households by water companies is of high quality and complies with strict standards enforced by the Drinking Water Inspectorate. Where water is abstracted from a water body for human consumption, the water body is designated as a Drinking Water Protected Area (DrWPA) – additional objectives apply and where necessary, additional action is put in place to protect the quality of the raw water abstracted.

Where we are reasonably confident that the DrWPA objective is at high risk of not being complied with, a Safeguard Zone has been identified. In the Safeguard Zone additional actions will take place. These may include voluntary agreements, pollution prevention campaigns and targeted enforcement action of existing legislation. Additional monitoring is taking place to assess whether those DrWPAs currently not assessed at high risk, need a Safeguard Zone and additional action taken.

In parallel with this approach, the Environment Agency will continue to develop work on regulatory measures, such as piloting Water Protection Zones in England. If voluntary approaches are shown not to work in a Safeguard Zone, we are ready and able to ensure progress is made before 2015.

The costs of action in this plan

Overall the Environment Agency estimate that the cost for implementing the actions in the Dee River Basin Management Plan will be £13 million annually. A significant proportion of this cost relates to existing measures. The existing measures are mainly required to fulfil the requirements of earlier EC Directives and are defined as the Reference Case in the Impact Assessment.

There are new measures in the plan which we estimate to cost £4 million with a benefit of £6 million. In addition investigations will be carried out that will help to identify the additional measures necessary in future planning cycles. The new measures are defined as the Policy Option in the Impact Assessment.

Further information on the approach used to assess the costs and benefits is contained in the Impact Assessment.

Taking action in a changing climate

The UK's Climate Projections (UKCP09) show that this region is likely to experience hotter drier summers, warmer wetter winters and rising sea levels. This is likely to have a significant effect on environmental conditions and will increase the impact of human activity on the water environment. Table 4 shows the likely effects of climate change on known pressures and the risk they pose on the water environment in the river basin district.

It is essential that the actions in this plan take account of the likely effects of climate change. What is done now must not make it harder to deal with problems in the future.

Most actions in this plan will remain valid as the climate changes. Others can be adapted to accommodate climate change.

Table 4 Qualitative assessment of increased risk from climate change by 2050 and beyond

Pressure	Increased risk
Abstraction and other artificial flow regulation	Very high
Nutrients (nitrate and phosphate)	High
Sediment	High
Physical modification	Medium
Biological (invasive non-native species)	Medium
Microbiology (including faecal indicator organisms)	Medium
Organic pollution (sanitary determinands)	Medium
Salinity	Medium
Biological (fisheries management)	Low/Medium
Acidification	Low for freshwater Medium/high for marine
Priority hazardous substances, priority substances and specific pollutants, such as pesticides	Low
Temperature of point source discharges	Low

It is important to assess the carbon implications of the plans to avoid adding unnecessary carbon dioxide burdens that could increase the problem of climate change.

The carbon costs associated with actions in the water industry Periodic Review 2009 (PR09) have been quantified. This is where the most significant carbon impacts will occur as the actions will require additional water treatment, construction of new works or upgrades to existing sites.

The approximate operational carbon implications (this does not include scheme construction carbon implications) of PR09 measures in England and Wales is approximately 4,722,000 tonnes per year at the start of the PR09 cycle (2009-10) and 4,564,200 tonnes per year at the end of the PR09 cycle (2014-2015). These figures are from the water company plans and result from schemes to satisfy a number of existing drivers such as Urban Waste Water Directive and Bathing Waters Directive as well as the Water Framework Directive.

In this river basin district, the operational carbon component driven by the additional requirement to meet good status under the Water Framework Directive is estimated, at this time, to be three tonnes per year. In the majority of cases this will be balanced by reductions elsewhere as part of the CRC Energy Efficiency Scheme (formerly known as the Carbon Reduction Commitment).

The CRC Energy Efficiency Scheme is a legally binding scheme, which covers large business and public sector organisations, and is intended to promote energy efficiency and help reduce carbon emissions. See www.decc.gov.uk for further information.

The majority of other actions are likely to have low impact as they are investigations, partnerships or encouraging best practice management. The potential impact of these can be assessed as the work is progressed.

No organisation has sole responsibility for ensuring that society adapts successfully to the effects of climate change on the water environment. Most will be achieved by working together and in partnership. This river basin management process provides an excellent framework to help focus and co-ordinate activities. In particular it will allow action to be taken on existing pressures at sites that are at risk and where appropriate restore the natural characteristics of catchments to protect water quality, maintain water resources and reduce the risks of floods and droughts thus building resilience to the further impacts of climate change.

Working with other plans and programmes

A wide range of planning processes help ensure more sustainable management of the water environment. They are briefly described here.

Development planning

Development planning plays a key role in sustainable development and the Environment Agency will continue to work closely with planning authorities. We aim to ensure that planners understand the objectives of the Water Framework Directive and are able to translate them into planning policy.

There are many planning processes and provisions involved. They include:

- National legislation;
- Welsh Assembly Government Planning Policy and associated guidance;
- Regional Spatial Strategies, including Wales Spatial Plan;
- Local Development documents;

- Local guidance (e.g. Supplementary Planning Documents);
- Delivering the planning application process.

In the Dee River Basin District, there are already spatial plans which set out proposed levels of growth and development. These will be superseded by the new Local Development Plan. The proposed Strategic Development Areas (England) and Development hubs (Wales) include major mixed-use schemes at Northern Gateway on Deeside (Flintshire UDP).

Cheshire West and Chester was awarded Growth Point status in July 2008 by the Government. This comes with an expectation of delivering a much **higher level of housing growth than has been achieved in the past**. This will require a holistic Water Cycle Study for the Growth point area to include determining whether growth can be accommodated without breaching water quality limits, whether any infrastructure or capacity upgrades are necessary and also to ensure the cumulative impacts of growth do not push the Water Resource zones into deficit. Managed well, this growth and regeneration will be an opportunity to make improvements to the water environment in a way that enhances people's quality of life.

In the Dee River Basin District, the Environment Agency is already working with water companies and local government to assess the **implications of new development on sewage treatment works discharges** and consequently on receiving river water quality. To date, it indicates that forecast growth must pay special attention to phosphate.

Good development planning needs to consider a number of issues relevant to the Dee River Basin District, including housing locations, flood risk, sewage treatment options, initiatives to reduce flow to sewage works, water efficiency measures and the reduction of nutrients from diffuse pollution. The Environment Agency and others will continue to work to help clarify the way forward.

Flood risk and coastal erosion planning

There is a separate planning process for flood and coastal erosion risk management introduced by the new European Floods Directive (Directive 2007/60/EC on the assessment and management of flood risks). This requires that the environmental objectives of the Water Framework Directive are taken into account in flood and coastal erosion plans. Implementation of the Floods Directive in England and Wales will be co-ordinated with the Water Framework Directive. The delivery plans and timescales for the two directives will be closely aligned.

Catchment Flood Management Plans (prepared by the Environment Agency) and Shoreline Management Plans (prepared by local coastal authorities and the Environment Agency) set out long term policies for flood risk management. The delivery of the policies from these long term plans will help to achieve the objectives of this and subsequent River Basin Management Plans.

The Environment Agency plans its flood and coastal risk management capital investment through the 'Medium Term Plan', which is a rolling five-year investment plan. Using this, we have identified flood and coastal risk management activities that will deliver one or more restoration or mitigation measures included in this plan. Although these activities will be carried out for flood risk management purposes, they will be carried out in such a way to ensure any impacts are minimised and that the ecology is protected. Activities will not lower water body status unless fully justified under Article 4.7 of the Water Framework Directive.

Marine planning

The Marine Strategy Framework Directive is closely linked with the Water Framework Directive and their application overlaps in estuaries and coasts. The Environment Agency is working with Defra, Welsh Assembly Government and others to ensure that the implementation of both Directives is fully integrated.

Managing new physical modifications

In specific circumstances the Water Framework Directive provides a defence for when, as a result of a new physical modification, good ecological status or potential cannot be achieved or where deterioration in status occurs. This is covered under Article 4.7 of the Directive.

Although protecting the water environment is a priority, some new modifications may provide important benefits to human health, human safety and/or sustainable development.

Such benefits can include:

- public water supply;
- flood defence/alleviation;
- hydropower generation;
- navigation.

It is often impossible to undertake such activities without causing deterioration of status to the water body. The benefits that such developments can bring need to be balanced against the social and economic benefits gained by maintaining the status of the water environment in England and Wales. The Environment Agency has developed a process for applying the tests and justifications required for such new modifications (Article 4.7) and will work with stakeholders to ensure these provisions are met during the first cycle of river basin management.

Other planning processes

The Environment Agency is also working to align planning processes in other areas. These include water resources and water quality, agriculture and rural development and natural heritage.

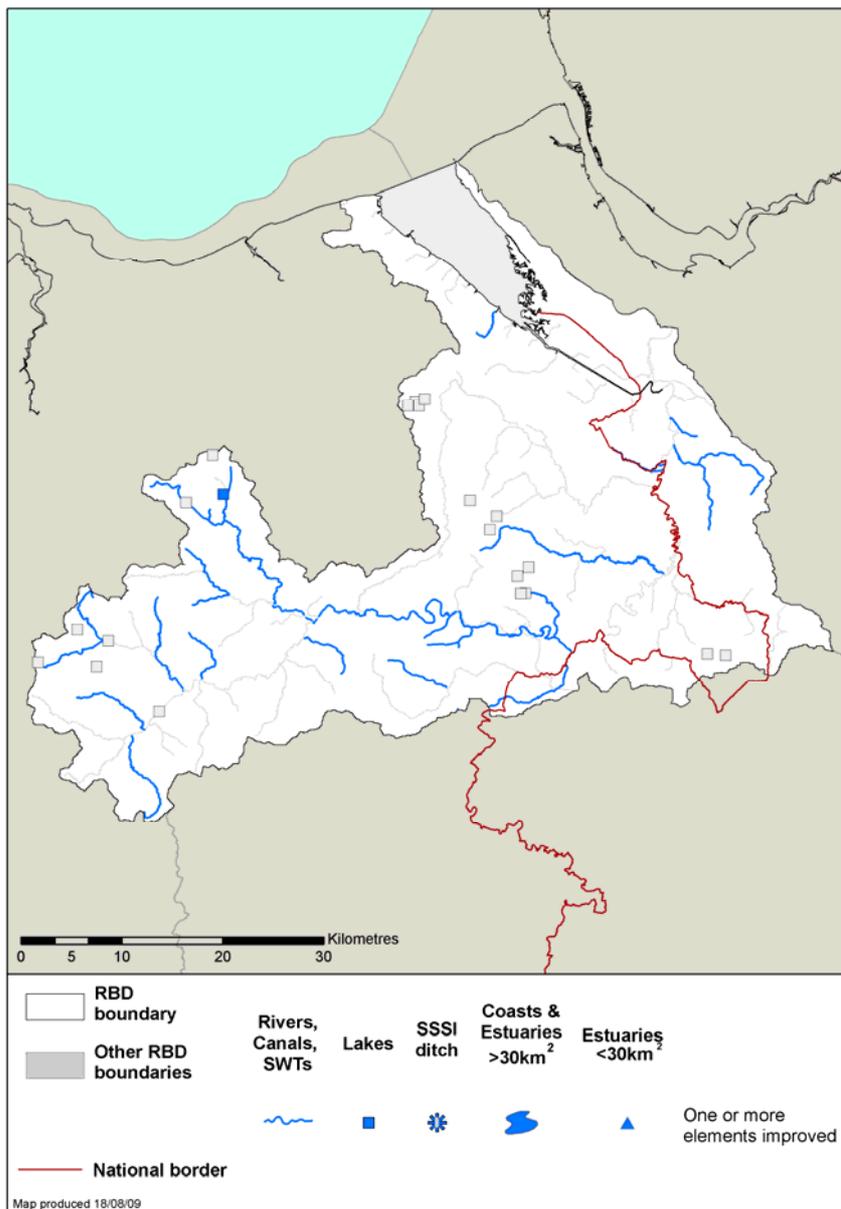
Annex J provides further information about these and other planning processes.

6 The state of the water environment in 2015

One of the objectives of the Water Framework Directive is to aim to achieve good ecological status in water bodies by 2015. However, for 62 per cent of water bodies this target cannot be met by this date. Greater improvement in status is limited by the current understanding of pressures on the water environment, their sources, and the action required to tackle them.

By 2015, 25 per cent of surface waters – 27 surface water bodies – will show an improvement by 2015 for one or more of the elements measured. This translates to 265 kilometres of river and canal improved, and is illustrated in Figure 5.

Figure 5 **Surface water bodies showing an improvement for one or more elements by 2015**



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There will be tangible benefits from meeting these objectives. For example, major investment in the water industry will continue to address problems such as the high levels of nutrients in sewage effluent. By 2015, these actions will have reduced phosphate in some 41 kilometres of river and there will be reduced levels of ammonia in almost 45 kilometres of rivers.

Intermittent discharges will be improved, resulting in over five km of river and three km² of coastal waters potentially improved in Dee river basin district. In addition, continuous discharges from sewage treatment works have improved in recent years, resulting in just over 35 km river potentially improved, of which 19 km was as a result of direct improvements to meet local river quality objectives or Freshwater Fish Directive requirements. There is a large amount of work still to be done on the Dee specifically for the Habitats Directive, which will result in the reduction of phosphate from the catchment.

Figures 6 and 7 show what ecological and biological status will be in 2015 compared to now. By 2015, 38 per cent will be in at least good ecological status/potential and 51 per cent of assessed surface waters will be in at least good biological status. A map showing predicted status for surface water bodies in 2015 is provided in Figure 9. Figures 10 and 11 show the predicted quantitative status and chemical status for groundwater in 2015.

Figure 6 Ecological status/potential of surface water bodies now and in 2015

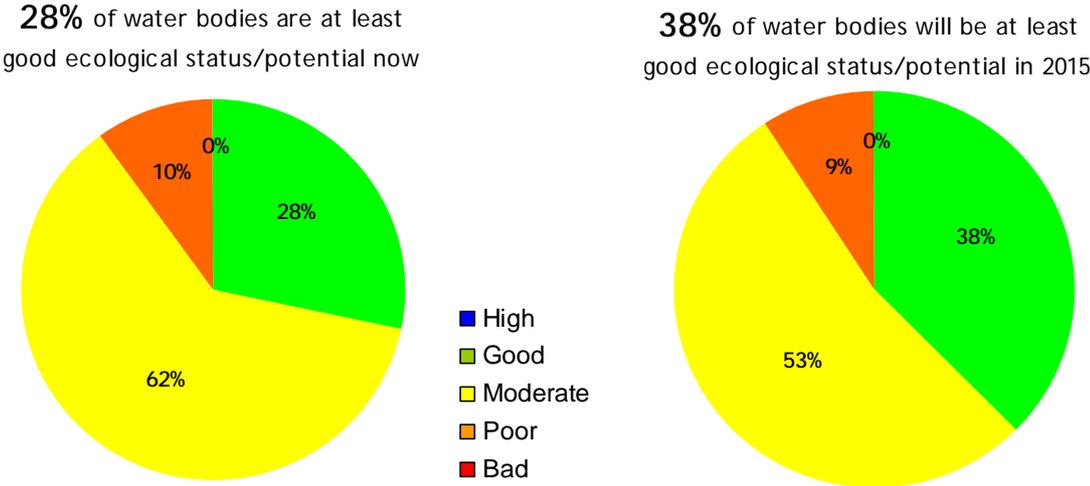
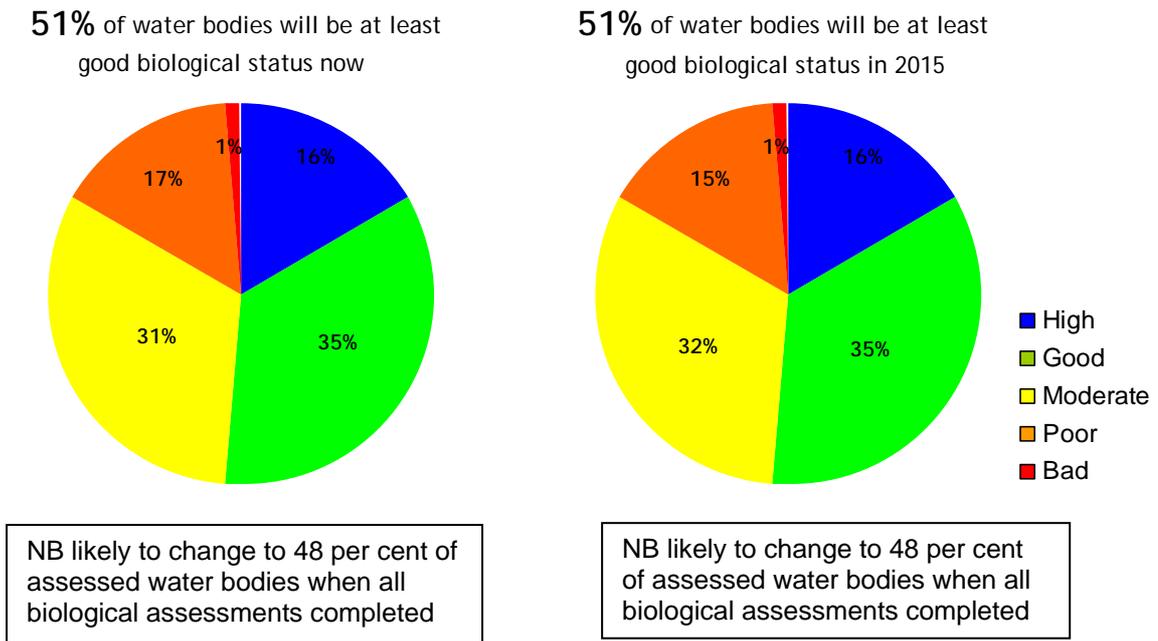
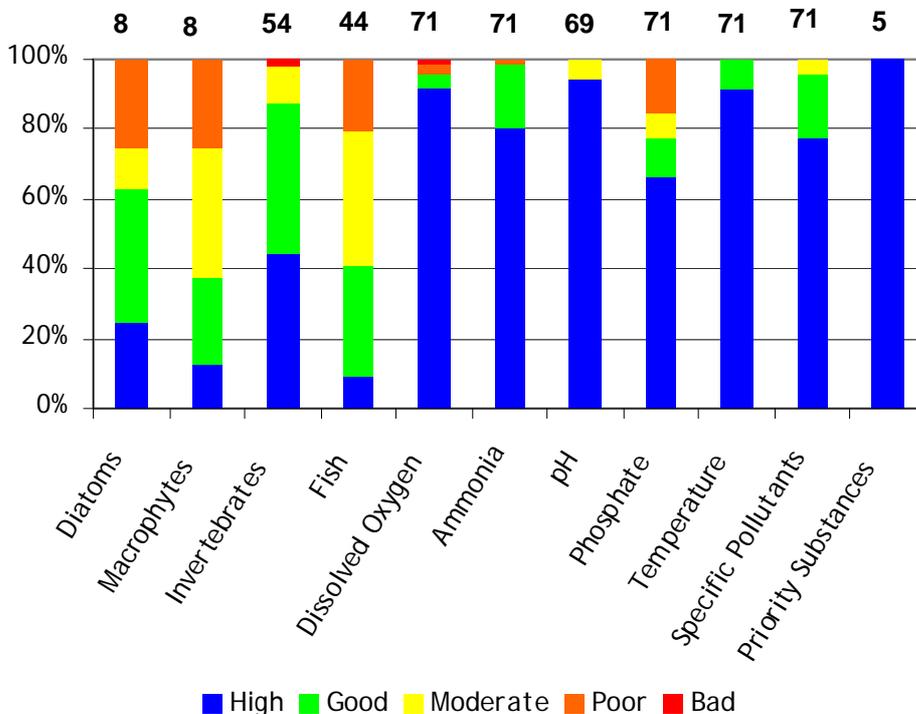


Figure 7 **Biological status of assessed surface water bodies now and in 2015**



For the 49 heavily modified and artificial water bodies (48 heavily modified, one artificial), 16 (33 per cent) per cent will be in at least good ecological potential in 2015, compared to 42 per cent of 60 natural surface water bodies being at good or better ecological status.

Figure 8 **Predicted proportion of river water bodies in each status class, by element, for 2015** (numbers above bars indicate total number of water bodies assessed)



For many estuaries, coasts and lakes it is unlikely that an improvement in the number of water bodies at 'good' status/potential can be achieved by 2015. The biological tools and monitoring data needed to classify these types of water bodies have only recently been developed. There is limited knowledge about the pressures that affect many of these water bodies and how their biology responds to changes in these pressures. It has therefore not been possible to identify many additional cost effective and proportionate measures. In many cases though there will be improvements to some key elements as the result of actions in this plan and there will be investigations to help find technically feasible actions that are not disproportionately costly. The Environment Agency wants these waters to achieve good overall status or potential by 2021 or 2027.

There will be no deterioration in groundwater status by 2015, but improvement will take place over longer timescales. Figures 10 and 11 show the predicted quantitative and chemical status of groundwater in 2015.

Looking at overall status, the combination of ecological status and chemical status, 37 per cent of surface water bodies are expected to meet good overall status by 2015.

Investigations – improving outcomes for 2015

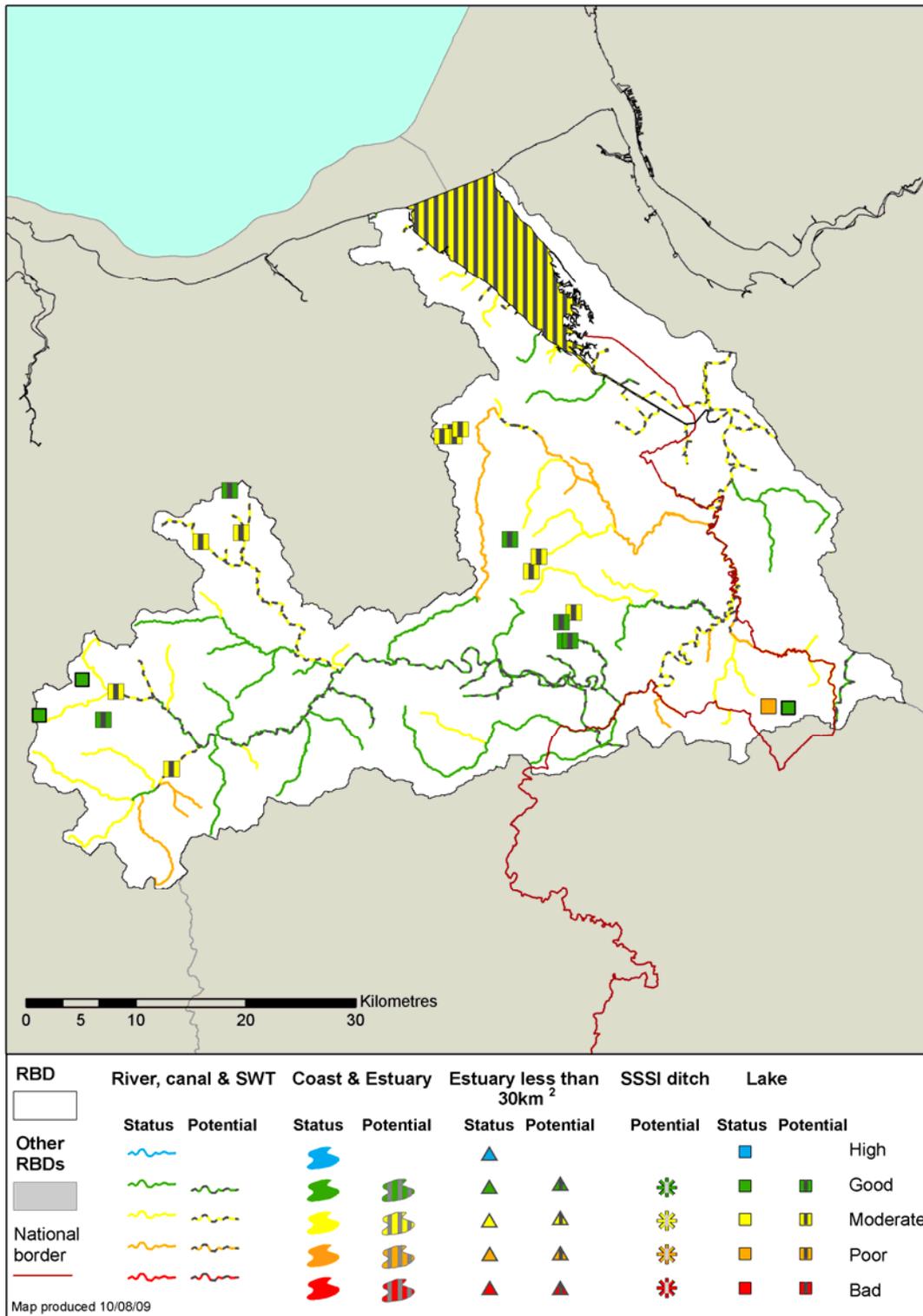
In many cases we, the Environment Agency are not able to identify appropriate actions for water bodies that are currently not achieving good ecological status/potential. Sometimes this is because the cause of the problem and its sources are not yet known. Sometimes this will involve gaining corroborative evidence of biological problems to justify expenditure where there is low confidence of failure of chemical standards. In other cases the most appropriate solution to the problem needs to be researched. Investigations into these types of issues will be an important measure during the first cycle.

Where possible, investigations will take place before 2013 so that the results are known in time for the formal review of this plan by 2015. The Environment Agency has identified 38 surface water bodies that require investigations in this plan. A proportion of these will lead to actions that should be straightforward to put in place before 2015. The outcome of our detailed planning work is that we have confidence that 38 per cent of surface waters will be in good ecological status or potential by 2015. This is our formal target for this plan.

Across England and Wales we have a formal target of achieving 31 per cent of surface waters in good ecological status or potential by 2015. Improvement to the water environment has to be managed as a continuum, not in isolated six year cycles. We are already confident that in this river basin district 25 per cent of surface waters will be improved by for at least one element by 2015.

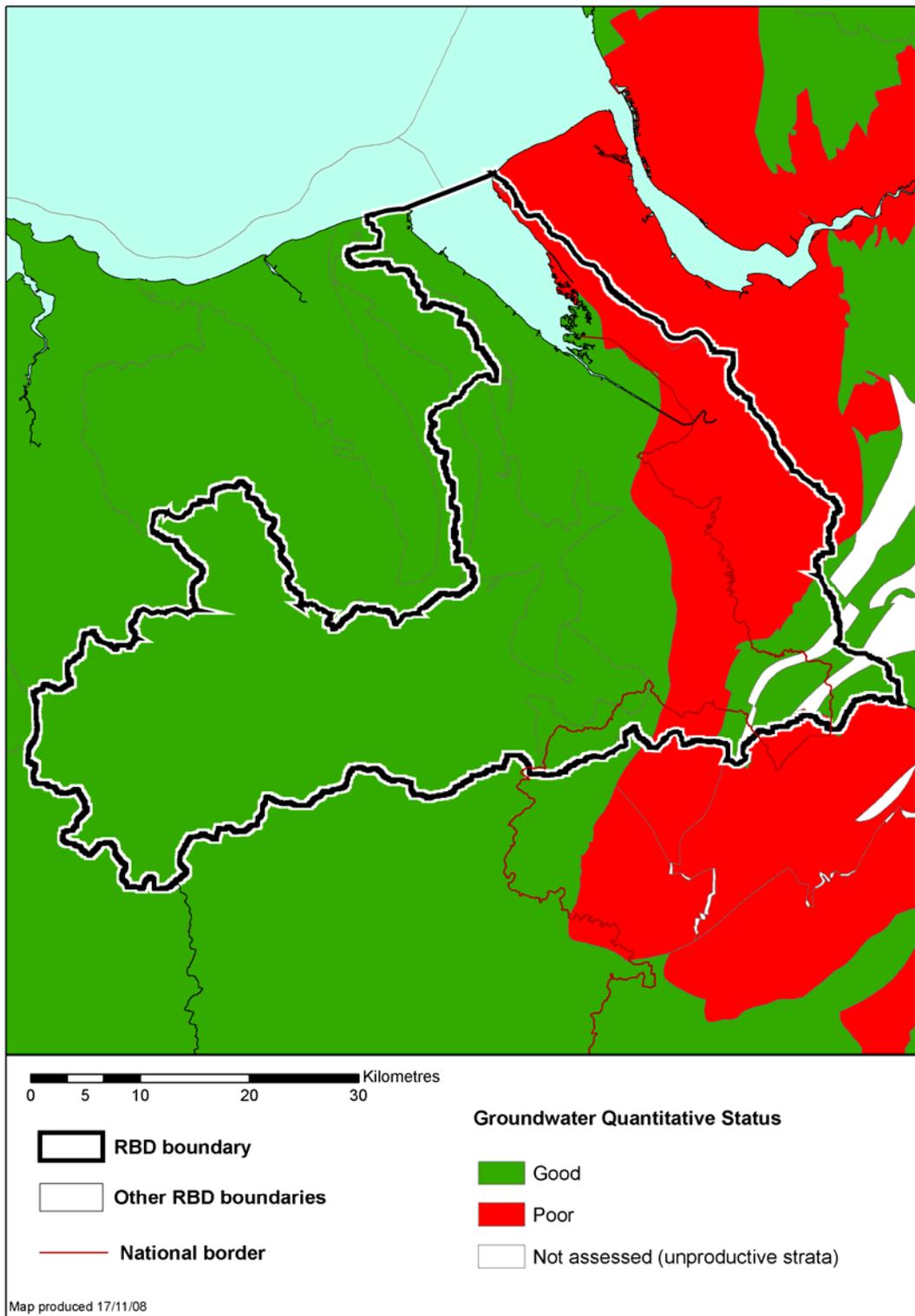
We are also confident that a proportion of investigations will lead to action that we can put in place before 2015. To ensure we capture these additional opportunities, we will be ensuring that the Dee River Basin District makes its contribution to a goal of achieving up to 33 per cent of surface waters across England and Wales at good status or potential by 2015.

Figure 9 Predicted ecological status and potential for surface water bodies in 2015



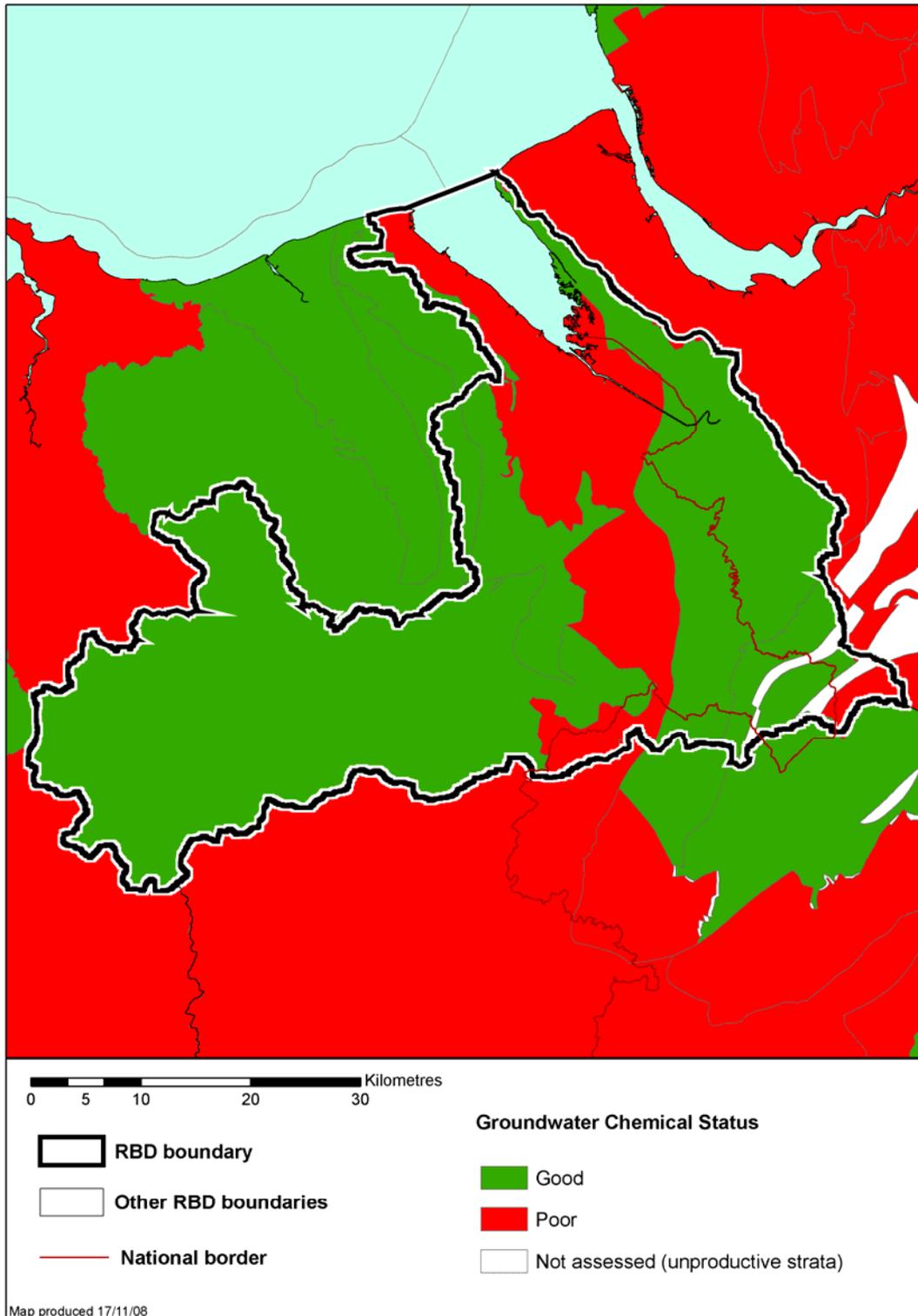
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Figure 10 Predicted quantitative status for groundwater in 2015



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Figure 11 Predicted chemical status for groundwater in 2015



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7 Targets for subsequent cycles

There are three river basin management cycles: 2009-2015, 2015-2021 and 2021-2027. Achieving good status in all water bodies by 2027 is a significant challenge.

The information gained from investigations during the first cycle will help to accelerate improvement to known issues using both traditional and novel techniques in both second and third cycles. New issues will arise though.

This plan sets out where good status cannot be achieved by 2015. This relates to 64 per cent of rivers, 57 per cent of lakes, 100 per cent of the estuary and 33 per cent of groundwater.

In these cases an alternative objective of good status or potential by 2021 or 2027 is set (see Annex E).

Over the period to 2027, the pressures on the water environment will change, particularly because of climate change. It is not known in detail how the water environment will respond to this.

The population in the river basin district will continue to increase, with further urbanisation. Agriculture will respond both here and abroad to the changing climate, market conditions, financial incentives and regulatory pressures. Technology and other solutions to address the pressures will improve, but the rate at which some new solutions can be introduced will depend on the economic climate.

The Environment Agency believes that achieving good status in all water bodies by 2027 will not be possible using only current technologies. Even achieving 75 per cent good status will require marked changes in land use and water infrastructure, such as a major programme to separate foul and surface water sewers across most of the river basin district. By current standards, such changes are extremely unlikely to be economically or socially acceptable.

For some waters therefore, achieving good status by 2027 could be technically unfeasible or disproportionately costly.

The Environment Agency wants to work with others to find and implement additional actions to improve the environment, with the aspiration of achieving good status in at least 60 per cent of waters by 2021 and in as many waters as possible by 2027.

The water environment now and objectives for 2015 are described further in the section '[Dee River Basin District catchments in 2015](#)'. A summary of the key statistics for the Dee River Basin District is provided in Table 10 (Section 10).

8 Dee River Basin District catchments

This section summarises information about the status of waters in the different parts of the Dee River Basin District, their objectives and some of the actions for them.

Rivers and lakes are grouped by catchment. There are three catchments, presented here from west to east. These are shown in Figure 12, below.

- [Upper Dee](#)
- [Middle Dee](#)
- [Tidal Dee](#)

There are also separate sections for [estuary and coastal waters](#), and [groundwater](#).

Figure 12 Dee River Basin District catchments



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Upper Dee



The Upper Dee catchment is largely rural. It includes the main River Dee from its source above Llyn Tegid, in Snowdonia National Park, down through the Vale of Llangollen to the confluence with the Afon Ceiriog. The main areas of population are at Bala, Corwen, Llangollen and Wrexham. The catchment area is covered by five local government areas, Gwynedd, Conwy, Denbighshire, Wrexham and Shropshire, as well as Snowdonia National Park Authority.

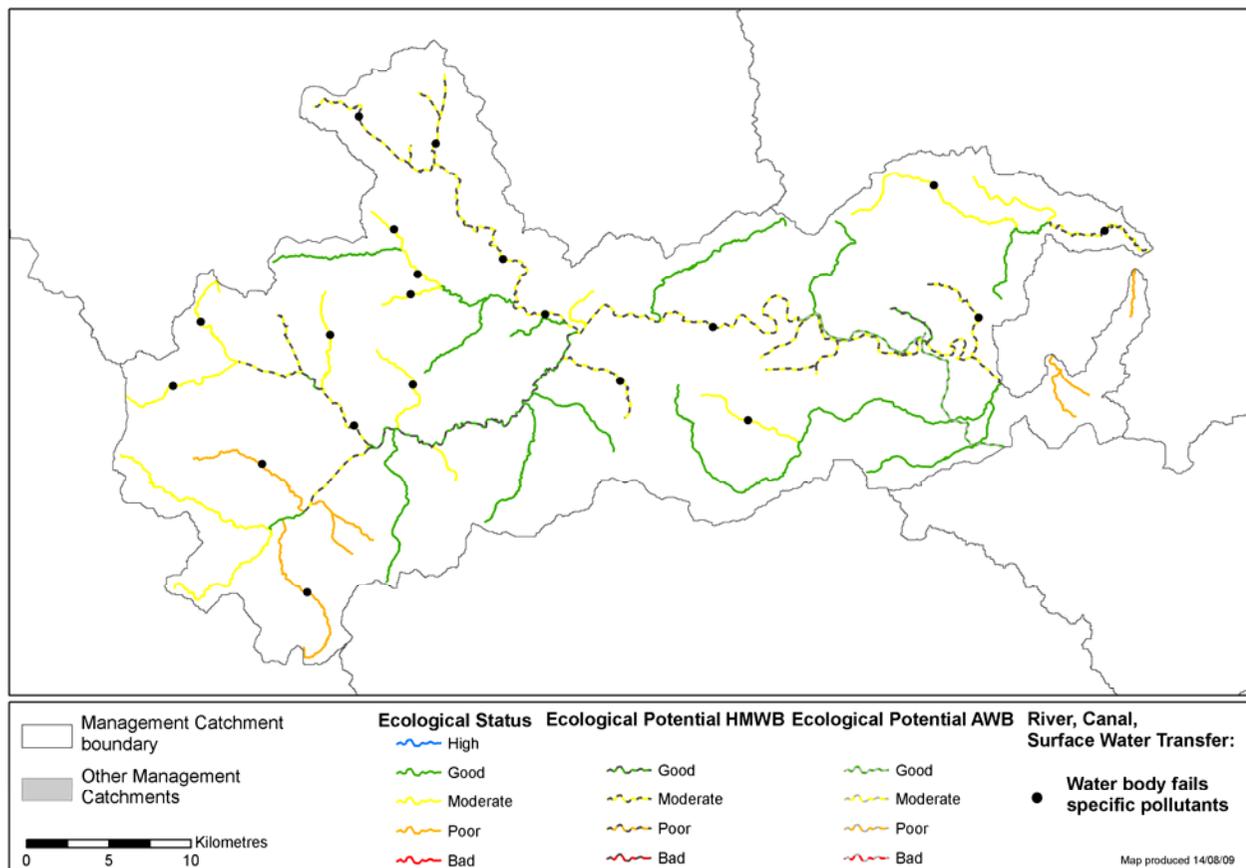
The major tributaries are the Tryweryn, Alwen and Ceiriog. The river Clywedog which drains the Wrexham area is also included in this catchment. Tourism is an important part of the local economy, including water based recreation, particularly around Bala and on the Llangollen canal. Fishing for salmon, trout and grayling is also popular in this part of the Dee.

The key reservoirs for regulating flows along the length of the Dee are in this catchment, Llyn Celyn, Brenig reservoir and Llyn Tegid as well as Alwen reservoir which provides a direct water supply. Agriculture is the main industry, with sheep and beef farming dominant. There are some forestry plantations in the uplands.

Diffuse inputs such as sediments from both agriculture and forestry can affect the biological quality in parts of the catchment and some of the lakes are subject to nutrient pressure. Some tributaries in the upper catchment are impacted by acidification or elevated metals, while others have had ecological impacts from pesticides in recent years but have largely recovered now.

Lower down the catchment there is more urban development with increased population around Wrexham and industrial development, for example at Wrexham industrial estate. Urban pressures are impacting biological quality in the Gwenfro which flows through Wrexham and there are elevated zinc levels in the river Clywedog from Minera mine in the headwaters.

Figure 13 **Map showing the current ecological status/potential of rivers, canals and surface water transfers in the Upper Dee catchment**



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Table 5 **Key statistics for the Upper Dee catchment**

River and lake water bodies	Now	2015
Per cent at good ecological status or potential	40	53
Per cent assessed at good or high biological status (46 water bodies assessed)	58	58
Per cent assessed at good chemical status (5 water bodies assessed)	80	80
Per cent at good status overall (chemical and ecological)	40	52
Per cent rivers improving for one or more element	-	44

There are 50 river water bodies and 12 lakes in the catchment. 26 are artificial or heavily modified. 36 per cent of rivers (162 km or 36 per cent of river length) currently achieve good or better ecological status/potential, including the including the Ceiriog and the Ceirw and Black Brook on the Clywedog. 56 per cent of rivers assessed for biology are at good or high biological status now, with only 10 per cent at poor biological status, and no assessed waters at bad status.

Local actions will address the key pressures in the catchment, and those waters in the worst state will be prioritised. 44 per cent of rivers in the Upper Dee will improve for at least one element by 2015. For example the fish classification in the Llafar will improve. However, these improvements will not be enough to change the ecological status/potential of any water bodies by 2015.

Some key actions for this catchment

Actions to improve the water bodies in this catchment include planned improvements to sewage treatment works, initiatives to provide advice to farmers and The Metal Mine Strategy for Wales will also address minewater impacts in the catchment.

Middle Dee



The Middle Dee includes the remainder of the main River Dee from the Ceiriog down to the canalised section below Chester. Major tributaries are the river Alyn, Worthenbury Brook and Aldford brook. The main centres of population are at Chester, Mold and Whitchurch.

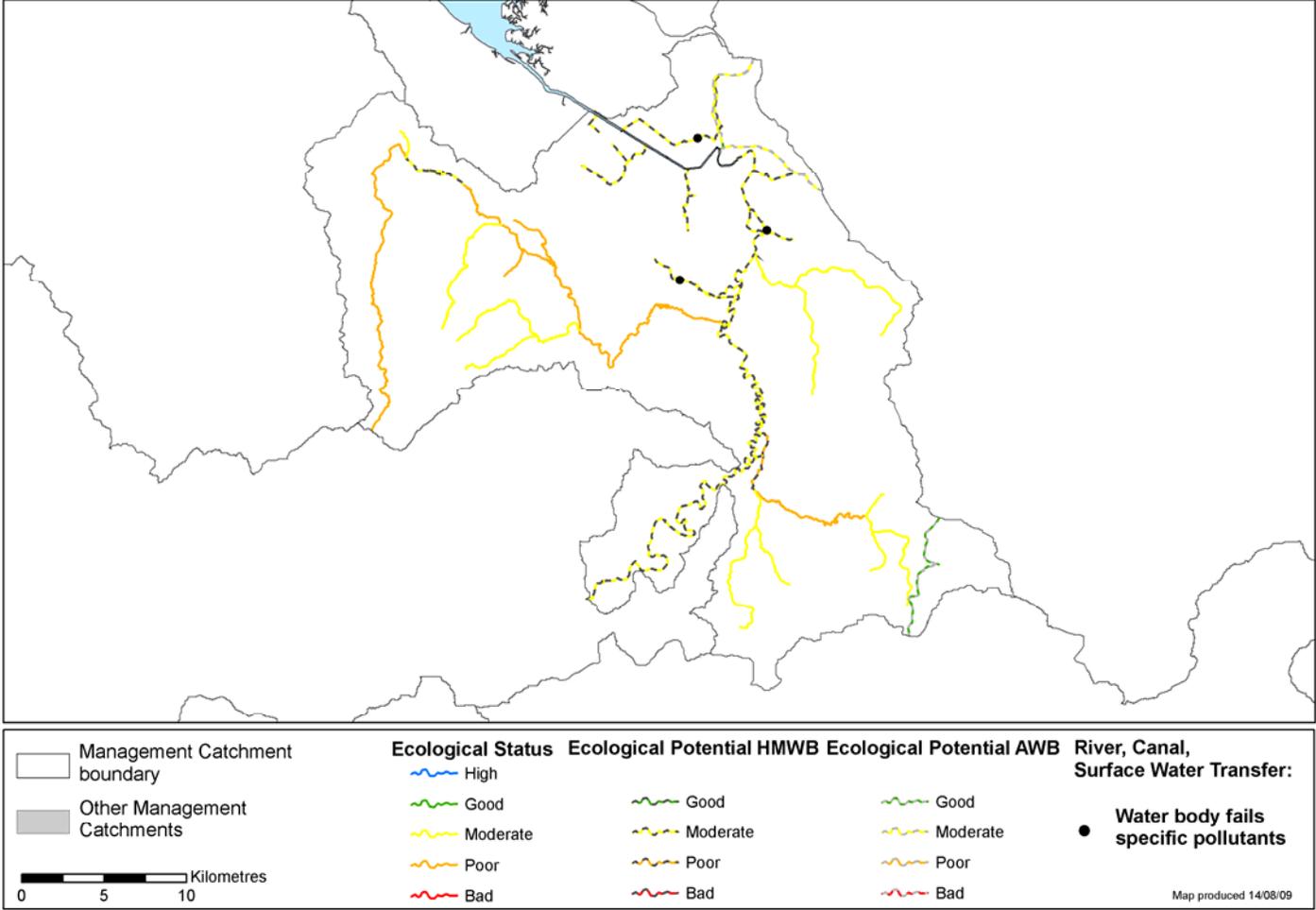
The largest proportion of the Middle Dee lies in Cheshire West and Chester, Wrexham and Flintshire local government areas, though there are also parts in Denbighshire and Shropshire.

Here the Dee meanders through the Cheshire Plains where the landscape is dominated by dairy and arable farming. Mixed sheep and beef remain in the upper parts of the River Alyn on the edge of the Clwydian Hills. Larger manufacturing industries and the retail sector also play a key role in the economy of this area. The major drinking water abstractions are taken from this section of the Dee. Coarse fishing is popular in the main river and some of its tributaries and brown trout fishing is enjoyed on the River Alyn.

The Dee meanders site is designated for its fluvial geomorphological interest which occurs in England and Wales as a Geological Conservation Review site (GCR 2955). It consists of some of the most spectacular and intricately developed river bends or meanders seen anywhere in Britain. There are at present constraints to the natural hydromorphology of this stretch of the river. Management (within an overall river restoration strategy) is required that will reconnect the river to the flood plain to allow natural processes as far as possible to function.

The biological and ecological quality here is under more pressure than the Upper Dee. These pressures include diffuse urban and diffuse rural pollution, as well as nutrient pressure from point sources such as sewage works. Physical modification also affects the rivers, with many of the brooks modified in their lower sections for flood alleviation. There are also some notable man made obstructions to fish migration, particularly on the River Alyn.

Figure 14 **Map showing the current ecological status/potential of rivers, canals and surface water transfers for the Middle Dee catchment**



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Table 6 **Key statistics for the Middle Dee catchment**

River and lake water bodies	Now	2015
Per cent at good ecological status or potential	7	10
Per cent assessed at good or high biological status (14 water bodies assessed)	19	19
Per cent assessed at good chemical status	67	67
Per cent at good status overall (chemical and ecological)	7	10
Per cent rivers improving for one or more element	-	14

There are 21 river water bodies and 9 lakes in the catchment. 15 are artificial or heavily modified. None of the rivers currently achieve good or better ecological status/potential although some rivers like the Terrig and Cegidog, tributaries of the Alyn are only failing on one element, in this case fish. 14 per cent of rivers assessed for biology are at good or high biological status now, with only 44 per cent at poor biological status, and one assessed water body (6 percent) at bad status.

Local actions will address the key pressures in the catchment, and those waters in the worst state will be prioritised. 14 per cent of rivers in the Middle Dee will improve for at least one element by 2015. For example the phosphate classification in the Aldford Brook will improve. However, these improvements will not be enough to change the ecological status/potential of any water bodies by 2015.

Some key actions for this catchment

Actions to tackle the issues in this area include upgrades to major sewage treatment works including removal of phosphate and initiatives to provide advice to farmers. Improvements to diatom and fish and phosphate elements of the classification may take a number of years and it is anticipated it may be after 2015 before some of these improvements are seen.

Case Study: Habitat improvements for fish in the Middle Dee

In-river habitat is being restored along almost a kilometre section of the River Alyn, an important tributary of the River Dee. Stones are being placed in a section of river that had very few features and provided little cover for fish. These stones not only create hiding places where fry can shelter, they also provide resting areas for migratory fish which are travelling up the river and help to establish habitats for invertebrates.



In the Emral Brook, south of the village of Worthenbury, over 2 kilometres of bankside habitat was fenced off recently. These buffer strips allow vegetation to establish and create cover for the resident brown trout and course fish and corridors for wildlife. Also as part of the scheme approximately 50 tonnes of locally sourced boulders were placed in the brook to provide cover for fish and other aquatic wildlife and to create a pool riffle habitat.

Photo showing new swing gate and access point on the Emral brook

Tidal Dee



The Tidal Dee catchment covers the streams and rivers that flow directly to the Dee estuary on both the English and Welsh sides. These include the Afon Y Garth, Swinchiard, Wepre and Shotton brooks. The catchment is covered by three local government areas, Flintshire County Council, Cheshire West and Chester Council, and Wirral Metropolitan Borough Council. The catchment includes a lot of urban development, with major industries including paper processing, aircraft, steel and chemicals manufacturing and power generation found alongside the Dee estuary. The European designated bathing beach at West Kirby is included in this catchment.

Issues in the catchment include elevated zinc concentrations in the Afon-Y-Garth from historic metal mining, nutrient pressures and diffuse urban pollution. Frequently, the water courses are physically modified with culverts and flood embankments in their lower sections and so are designated as heavily modified water bodies.

Table 7 **Key statistics for Tidal Dee catchment**

River water bodies	Now	2015
Per cent at good ecological status or potential	20	27
Per cent assessed at good or high biological status (3 water bodies assessed)	100	100
Per cent assessed at good chemical status (0 water bodies assessed)	-	-
Per cent at good status overall (chemical and ecological)	20	27
Per cent rivers improving for one or more element	-	7

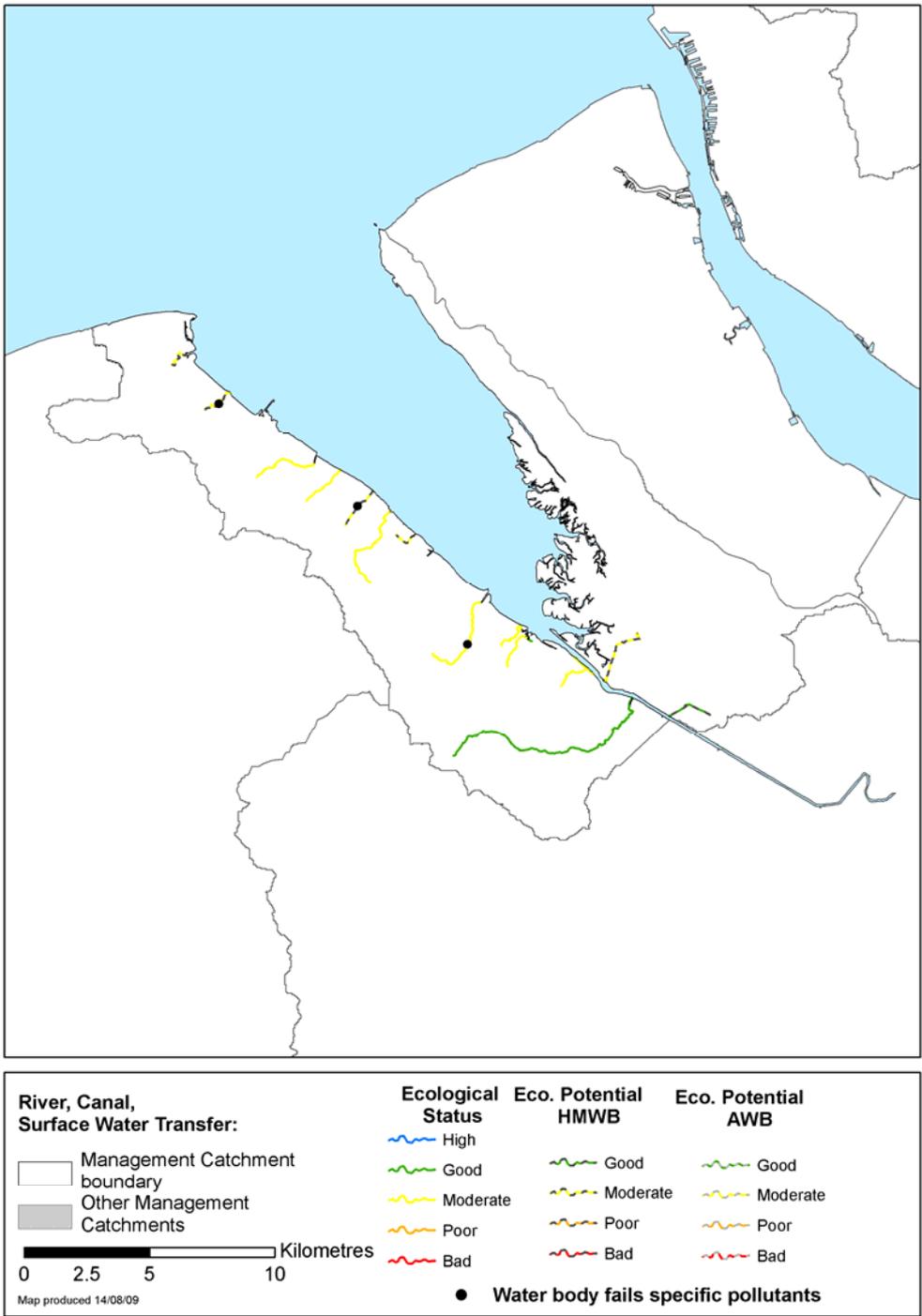
There are 15 river water bodies and no lakes in the catchment. 6 are artificial or heavily modified. 20 per cent of rivers (12km or 31 per cent of river length) currently achieve good or better ecological status/potential, including Wepre Brook. 100 per cent of rivers assessed for biology are at good or high biological status now.

Local actions will address the key pressures in the catchment, and those waters in the worst state will be prioritised. 7 per cent of surface waters in the Tidal Dee will improve for at least one element by 2015.

Some key actions for this catchment

Actions to address these issues include pollution prevention visits to bathing waters to identify and resolve issues that may threaten bathing water compliance, investigating site drainage and misconnections as part of pollution prevention work on industrial estates and improvements to sewage treatment assets.

Figure 15 Map showing the current ecological status/potential of rivers, canals and surface water transfers in the Tidal Dee catchment



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Estuary and coastal water bodies



The Dee River Basin District has one large funnel shaped estuary that totals 14000 hectares and is the sixth largest in the UK. The estuary has numerous European designations: it is a RAMSAR site, Special Protection Area, Special Area of Conservation (SAC) and SSSI site.

It is recognised as one of the most important estuaries in Britain for waders and wildfowl, attracting internationally important populations of oystercatcher, redshank, black-tailed godwit and grey plover. It is also an important staging post for migrating birds during spring and autumn.

The estuary supports commercial fishing including a nationally important cockle fishery. The cockle fishery is regulated by the Environment Agency. Cockle harvesting is licensed, with allocation of licences for cockling determined by rules in the Dee Cockle Regulating Order.

There is an EC bathing beach at West Kirby on the north west mouth of the estuary and two European designated shellfish waters. There is one major port, the Port of Mostyn which is privately owned and operated. The Port of Mostyn is a Statutory Harbour Authority and is also the Pilotage Authority for the Dee Estuary.

The main pressures on the Dee estuary are morphological alterations, nutrients from sewage and potential over-exploitation of fisheries.

The estuary is currently at good biological status now and this will be maintained in 2015.

There are no coastal waterbodies assigned to this river basin district – these are dealt with in the North West River Basin Management Plan and Western Wales River Basin Management Plan respectively.

Table 8 Key statistics for the estuary in the Dee River Basin District

	Estuary	
	Now	2015
Per cent at good or better ecological status or potential	0	0
Per cent assessed at good or high biological status (1 water bodies assessed)	100	100
Per cent assessed** at good chemical status (1 water bodies assessed)	100	100
Per cent at good status overall (chemical and ecological)	0	0
Per cent improving for one or more element	-	-

Some key actions for the estuary

Proposals to address these issues include sustainable management of the cockle fishery through the Dee Cockle Regulating Order and managed realignment schemes to create more saltmarsh habitat.

Groundwater



Bore hole drilling in the Dee River Basin District at Burton

Groundwater is an important resource in the Dee River Basin District and is predominantly from sandstone aquifers. The main pressures on our groundwater are abstraction and contamination with nitrates. Contaminants from historic mining activity also have an influence on compliance.

It takes time for rainwater to make its way into our major aquifers. Because of this, some groundwater resources can take many years to recharge and therefore recover from the effects of abstraction and for pollution to flush out of the system. Similarly concentrations of pollutants can continue to rise for years after the source of any pollution has been brought under control.

Unsustainable abstraction from groundwater can lower groundwater levels and affect dependent river flows or wetlands. They can also induce the intrusion of poorer quality (saline) water from the sea or from adjacent aquifers. Investigations are ongoing to better understand the impact of the major groundwater abstractions in the Dee River Basin District but it is thought that at least one groundwater water body may be at risk of saline intrusion.

Table 9 **Key statistics for groundwaters in Dee River Basin District**

Groundwater	Now	2015
Per cent at good quantitative status	83	83
Per cent at good chemical status (6 water bodies assessed)	83	83
Per cent at good status overall	67	67

Currently 5 out of the 6 (83 per cent) groundwater bodies in the Dee River Basin District are achieving good quantitative and good chemical status. By 2015 we will maintain compliance for quantitative and chemical status.

It is necessary to prevent or limit the input of pollutants into groundwater and implement measures to reverse any significant trends in pollutants. The 'prevent or limit' objective in the Water Framework Directive is the first line of defence for groundwater, and will drive action on point source pollution as well as the widespread pollutants such as nitrate that are causing deteriorating trends.

All groundwater must be protected from deterioration in quantity or quality, and the Environment Agency will ensure the monitoring network is kept under continuous review so that there is the best possible understanding of pressures and trends. As a result of these challenges, it may not be possible to achieve the objective of good status in all groundwater by 2027.

Some key actions for ground water

Proposals to address these issues include pollution prevention work to reduce the risk of groundwater pollution.

9 Next steps – implementing this plan

Diffuse pollution investigation and action

In developing the River Basin Management Plans approximately 8,500 investigations have been identified for England and Wales, including further monitoring. The vast majority of these will be undertaken by the Environment Agency and all of these will be completed by the end of 2012. The investigations will focus on resolving what is causing the problem and what the best method to tackle it is. As a result of the evidence they will provide, we will be able to take further action in the first cycle where practicable.

The remainder of the investigations – including over 100 water company catchment management investigations – will be carried out by co-deliverers across England and Wales during the course of the first delivery cycle. Working with the river basin district liaison panels, the Environment Agency will welcome the input of local data and knowledge from other parties to help drive action at catchment level.

We are confident the investigation programme will lead to actions enabling a further reduction in diffuse pollution and more environmental improvement before 2015. As we have said earlier, the Environment Agency is already committed to delivering, through its own work or through working with others, an additional two per cent improvement towards good status or potential by 2015 across England and Wales.

Additional national measures

In addition to commitments already provided, the UK Government and Welsh Assembly Government will continue to demonstrate their commitment and bring forward significant work starting with;

- banning phosphates in household laundry detergents;
- a new requirement contained within the Flood and Water Management Bill making the right to connect to surface water sewers contingent on Sustainable Drainage Systems (SuDS) being included in new developments. Local authorities will be responsible for adopting and maintaining SuDS that serve multiple properties and the highways authorities will maintain them in all adopted roads;
- general binding rules to tackle diffuse water pollution by targeting abuse of drainage systems, potentially including industrial estates, car washes and construction by 2012;
- transferring the responsibility for misconnections to water companies by 2012;
- the Water Protection Zones Statutory Instrument which will enter into force on 22 December 2009 and will be used to tackle diffuse pollution where voluntary measures are not sufficient;
- more funding for the Catchment Sensitive Farming Delivery Initiative in England from 2010 – a 50% increase in capital grant spend, and evaluation of the initiative to ensure it is achieving maximum effectiveness;
- better targeting of agri-environment schemes for water protection. In Wales, this includes aligning the forthcoming “Glastir” agri-environment scheme to contribute towards meeting Water Framework Directive requirements;
- supporting the farming industry in the Campaign for the Farmed Environment, which has reducing impacts on water quality as one of its priorities;
- encouraging farmers to use buffer strips to reduce diffuse pollution through guidance and advice provided under cross compliance;
- better understanding of the impact of sediment and measures to tackle it as a result of the additional funding announced in June 2009;
- further consideration of the impact of cross compliance and good agricultural and environmental conditions (GAEC) on water quality;

- implementation of the Sustainable Use of Pesticides Directive;
- Environmental Permitting Regulations guidance setting essential standards of location, operation and maintenance for septic tanks.

These and the other actions in the plans will lead towards a greater achievement of good status and improvement within class, with more than a quarter of the length of all rivers improving.

Implementing the plans at catchment level

The Environment Agency has found river basin liaison panels extremely valuable, and will continue to work with them throughout the plan delivery period. The panels will help to encourage river basin district-wide action through their sectors, monitor overall progress and prepare for the second cycle of River Basin Management Planning.

Given that implementation requires activity 'on the ground', it is essential that there is the maximum involvement and action from locally based organisations and people. Innovative ways of working together need to be identified that will deliver more for the environment than has been captured in this plan.

The Environment Agency will adopt a catchment-based approach to implementation that is efficient and cost-effective. This will support the liaison panels, complement existing networks and relationships, and enable better dialogue and more joined up approaches to action.

In some places there will be added value from adopting more detailed catchment plans to help deliver the River Basin Management Plan objectives during the planning cycles. The River Kennet is a case in point where we have set up a pilot group with a range of stakeholders. We will share the knowledge gained with the liaison panels, to help identify other catchments that could benefit from a similar approach.

Working with co-deliverers

This plan sets out in detail the actions required to improve the water environment. All organisations involved must play their part, record their progress and make the information available.

Where the work of a public body affects a river basin district, that body has a general duty to have regard to the River Basin Management Plan. Ministerial guidance states that the Environment Agency should:

- work with other public bodies to develop good links between river basin management planning and other relevant plans and strategies, especially those plans that have a statutory basis such as the Local Development Plans and Wales Spatial Plan;
- encourage public bodies to include Water Framework Directive considerations in their plans, policies, guidance, appraisal systems and casework decisions.

For some, the actions in this plan may be voluntary and for others they will be required under existing legislation. We want to work with you to make these actions happen, and identify new action to create a better place.

Reporting on progress

The Environment Agency will use its environmental monitoring programme and, where appropriate, information from other monitoring programmes, to review whether work on the ground is achieving the environmental objectives. We will update the classification status of water bodies accordingly and review progress annually. At the end of 2012 a formal interim report will be published. This will:

- describe progress in implementing the actions set out in this plan;

- set out any additional actions established since the publication of this plan;
- assess the progress made towards the achievement of the environmental objectives.

Preparations have already begun for the next cycle period 2015 to 2021 and for the subsequent cycle to 2027. If you have proposals for actions that can be included in these future cycles please contact us.

River basin management milestones

The plan builds on a number of other documents and milestones required by the Water Framework Directive. The work to date has ensured a strong evidence base, and a framework for dialogue with interested organisations and individuals. In terms of taking this plan forwards, it helps to understand the major milestones remaining. These future milestones are summarised in the figure below.

Figure 16 River basin management planning milestones to date and to 2015



10 Summary statistics for the Dee River Basin District

Table 10 Summary statistics for the Dee River Basin District

	Rivers, Canals and SWT's	Lakes and SSSI ditches	Estuaries	Surface Waters Combined	Groundwater
% of water bodies with improvement in any status of any element by 2015	30	5	0	25	0
% of water bodies at good ecological status/potential or better now					
For groundwater: % of water bodies at good or better quantitative status now	25	43	0	28	83
% of natural water bodies at good ecological status or better now	30	75	0	33	83
% of artificial and heavily modified water bodies at good ecological potential or better now	16	35	0	22	N/A
% of water bodies at good ecological status/potential or better by 2015.					
For groundwater: % of water bodies at good or better quantitative status 2015	37	43	0	38	83
% of natural water bodies at good ecological status or better by 2015	39	75	0	42	83
% of artificial and heavily modified water bodies at good ecological potential or better by 2015	32	35	0	33	N/A
% of water bodies at good chemical status now	73	0	100	75	83
% of water bodies at good chemical status 2015	73	0	100	75	83
% of water bodies at good biological status or better now	49	63	100	51	N/A
% of water bodies at good biological status or better by 2015	49	63	100	51	N/A
% of water bodies with alternative objectives (good status 2021 or 2027)	64	57	100	63	33
% of waterbodies deteriorated under Article 4.7	0	0	0	0	0
% of all water bodies (surface waters and groundwaters) at good status now	30				
% of all water bodies (surface waters and groundwaters) at good status by 2015	38				

11 Further information – the annexes

- Annex A** **Current state of waters in the Dee River Basin District**
What the waters are like now. Information on our network of monitoring stations, the classification status of water bodies and the reference conditions for each of the water body types in the river basin district.
- Annex B** **Water body status objectives for the Dee River Basin District**
Information on water body status and objectives
- Annex C** **Actions to deliver objectives**
Details of the actions planned (programmes of measures) for each sector to manage the pressures on the water environment and achieve the objectives of this plan.
- Annex D** **Protected area objectives**
Details of the location of protected areas, the monitoring network, environmental objectives and the actions required to meet Natura 2000 sites and Drinking Water Protected Area objectives.
- Annex E** **Actions appraisal and justifying objectives**
Information about how the Environment Agency has set the water body objectives for this plan and how we selected the actions. It also includes justifications for alternative objectives that have been set.
- Annex F** **Mechanisms for action**
More detail about the mechanisms (i.e. policy, legal, financial tools) that are used to drive actions.
- Annex G** **Pressures and risks**
Information about the significant pressures and risks resulting from human activities on the status of surface water and groundwater.
- Annex H** **Adapting to climate change**
Information on how climate change may affect the pressures on the water environment and the ability to meet the objectives.
- Annex I** **Designating artificial and heavily modified water bodies**
Information about the criteria used to designate waters as artificial or heavily modified water bodies.
- Annex J** **Aligning other key processes to river basin management**
Aligning planning processes to deliver multiple benefits and sustainable outcomes
- Annex K** **Economic analysis of water use**
Information about the costs of water services within the river basin district
- Annex L** **Record of consultation and engagement**
Details of how the Environment Agency has worked with interested parties to develop this plan
- Annex M** **Competent authorities**
List of the competent authorities responsible for river basin management planning.
- Annex N** **Glossary**
Explanation of technical terms and abbreviations.

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