Cyfoeth Naturiol Cymru
Natural Resources Wales

Llywodraeth Cymru
Welsh Government

River Basin Management Plan Overview Annex

Updated December 2015

Contents

1. Introduction to this document

The European Water Framework Directive (WFD) provides the main framework for managing the water environment throughout Europe. At its heart is an ecosystem and catchment based approach that requires measures to be taken to encourage the sustainable use of water and to protect and improve the water environment, with the aim of achieving good status. It recognises that interested groups need to work together to design and implement improvements, taking a holistic and integrated approach to managing the water environment.

Under the WFD, a management plan must be developed for each River Basin District (RBD). Environment Agency Wales (now Natural Resources Wales), as competent authority for implementing the WFD in Wales, first published these in December 2009. The River Basin Management Plans (RBMPs) outlined the actions that would need to be taken to get more waters to good status by 2015 and look at what could justifiably be achieved by 2027.

The plans and the objectives and measures contained within them must be reviewed and updated every six years; therefore an updated plan for Western Wales, Dee and Severn RBDs have been published. Natural Resources Wales leads on the Western Wales and Dee RBMPs, whereas the Environment Agency leads on the Severn plan.

This document sets out the detail behind the decision making which has shaped this update to the RBMPs for political Wales. It explains each step of the process, linking to more detailed information where appropriate.

Supporting information

Much of the data which supports this plan is available for every water body in Wales on **Water Watch Wales** http://waterwatchwales.naturalresourceswales.gov.uk/en/ including:

- Classification results
- Reasons for not achieving good status
- Water body objectives
- Reasons for alternative status objectives
- Monitoring networks
- Measures required to improve water bodies to good status

1.1 What this document covers

Managing the water environment (the next section) describes why water is such an important resource and summarises the policies, both European and domestic, which shape how the water environment in Wales is managed.

The Water Framework Directive (section 3) describes the aims and objectives of the WFD including the application of exemptions. The river basin management planning process used in Wales is described, including how Natural Resources Wales is working with others. This section also describes how the second cycle plans were developed following the consultation.

Defining and describing the water environment (section 4) describes how the water environment is divided up and characterised for the purposes of implementing the WFD. It sets out how the environment is monitored and the results of that monitoring used to assess and report on the status of the water environment. The latter part of the section

describes the main challenges affecting management of the water environment in Wales, how future risks have been assessed and current causes of problems identified.

Identifying measures and objectives (section 5) describes the role of economic appraisal and sets out the overall process used for determining environmental objectives, including water body status objectives and developing measures.

Summary of engagement (section 6) looks at the engagement work we have done including public access to information, consultations and a forward look.

Annex VII Requirements (section 7) sets out the requirements under Annex VII of the Directive and where the information can be found.

Mechanisms for protecting the water environment (section 8) provides further information on the mechanisms that underpin the measures to improve the water environment

Glossary (section 9) a comprehensive list of all acronyms used throughout the document

2. Managing the water environment

Summary of this section
This section provides an introduction to the management of the water environment, describes why water is such an important resource and the policies (European and domestic) that shape how the water environment is managed in Wales.

Topics covered:
Importance of water management; policy context; Natural Resources Wales's role.

2.1 Water – a vital resource

Water and water environments are essential for life and livelihoods. Water is a vital resource for businesses and agriculture and is critical to ensure the economy will grow and prosper.

The average person in Wales uses about 140 litres of water every day in their home. If you include all the water used in growing and manufacturing the things people use or consume, the figure is much greater.

Rivers, lakes, estuaries, coastal areas, wetlands and groundwater provide many different benefits to society, from supplying drinking water and supporting fisheries to providing an essential resource for business and agriculture, transport routes and opportunities for leisure that promote wellbeing such as physical and mental health.

Healthy water environments also help protect the nation from floods and droughts and regulate the quality of the air and the climate.

It is essential that these activities are managed in a sustainable way. This will ensure that the natural environment, business and economic growth will be protected and the long-term benefits to health and wellbeing improved.

2.2 Managing the water environment in Wales

Much of the policy relating to water management is driven by European Directives that have been introduced over the last 40 years. Some relate to the water quality required for different uses of water such as drinking water, bathing waters and shellfisheries. Some set the requirements to protect wildlife such as the Directives on habitats and birds. Others concern the control of pollution from particular chemicals such as nitrates and hazardous substances.

There is also EU legislation that sets standards for the performance of sewerage systems and wastewater treatment and emissions from industrial processes. These have been important in driving investment by water companies and others. They have led to major improvements in the water environment.

Over recent years there has been a move to introduce a more strategic approach to water management policy. The WFD (see section 3) provides a major overarching framework for river basin management. The Floods Directive (see section 2.2.2) sets out a strategic approach to flood risk management planning. As competent authority for implementing these Directives Natural Resources Wales has an important role in coordinating their implementation in Wales (see section 2.3). The European Commission has recently carried out a major review of water-related policy and legislation through its 'Water

Blueprint' initiative. It concluded that reforming the allocation of water resources and measures to improve water efficiency are important priority areas for future action.

Welsh Government is responsible for policy on water management in Wales. There are a number of current policy initiatives that are important in shaping the future of water management in Wales, namely: the Environment (Wales) Bill, Planning (Wales) Act 2015, National Flood and Erosion Risk Strategy, Marine and Fisheries Strategic Action Plan, Rural Development Programme, Well-being of Future Generations (Wales) Act 2015 and Wales National Marine Plan. There are a number of other plans and strategies that affect the water environment (see **RBMP summary documents**). For other policy and legislation that may also be relevant see Section 8 below.

The Environment (Wales) Bill, together with the Wales National Marine Plan when published, will set out a new statutory framework and integrated natural resource management for the sustainable management of natural resources.

This new framework for managing natural resources, will build on the UN ecosystem approach, defined as 'an integrated strategy for the management of natural resources'. Therefore the Environment (Wales) Bill will legislate for a more joined-up management process, focused on delivering a healthier, more resilient Wales through economic, social and environmental benefits.

The vision of the Water Strategy for Wales is to ensure that Wales continues to have a thriving water environment which is sustainably managed to support healthy communities, flourishing businesses and the environment.

The strategy is set within the context of the long-term policy direction to improve natural resource management and covers a broad range of matters relating to the management of our water systems, including all inland waters, estuaries and coastal waters. The aim is that policies will contribute to wider Welsh Government priorities and well-being goals, including promoting green growth, resource efficiency, and tackling poverty.

2.2.1 Government guidance on river basin planning

To support the first cycle of RBMPs, the Government issued two volumes of statutory guidance on the implementation of the WFD: Volume 1 (2006) and Volume 2 (2008). The guidance set out the expectations of Government in relation to the important steps and principles of the river basin management planning process and the content of the documents.

The guidance was reviewed and reissued in July 2014 and replaces the previous volumes 1 and 2.

Changes include an emphasis on catchment planning and working with partners, use of economic appraisal within the planning process, new environmental standards and revised water body classifications and integrating requirements relating to Protected Areas.

Supporting information
River basin planning guidance (July 2014) - statutory guidance on how the WFD is being implemented in England and Wales is available here;
https://www.gov.uk/government/publications/river-basin-planning-guidance

2.2.2 Managing flooding in Wales

The Flood and Water Management Act 2010 sets out the roles and responsibilities for managing flood and coastal erosion risk in Wales. The Act gives Natural Resources Wales responsibility for managing flooding from main rivers, the sea and large raised reservoirs. The Act gives Lead Local Flood Authorities (LLFAs) (Unitary Authorities in Wales) responsibility for managing local flooding from surface water, ground water and ordinary watercourses. It also sets out the requirement for the Welsh Government to develop a National Strategy for Flood and Coastal Erosion Risk Management that provides the national policy framework for managing flood and coastal erosion risk in Wales.

i. Implementing the European Floods Directive

The European Floods Directive aims to provide a consistent approach to managing flood risk across Europe. The Directive is implemented through the Flood Risk Regulations 2009 which require some LLFAs and Natural Resources Wales to publish flood risk management plans (FRMPs). These plans are important because they will set out how flood risk management authorities and communities will work together to reduce the potential adverse consequences of flooding. The FRMPs will set out the main objectives and measures for the six-year planning cycle to 2021.

Natural Resources Wales publish FRMPs for flooding from main rivers, the sea and reservoirs for Wales. LLFAs must publish FRMPs covering local sources of flooding for the Flood Risk Areas that were identified during the preliminary flood risk assessment stage in accordance with Government guidance.

The major milestones already met in developing the FRMPs are the publication of:

- Preliminary Flood Risk Assessments
  - LLFAs prepared Preliminary Flood Risk Assessments (PFRA) that were published in December 2011. These identified Flood Risk Areas where local flood risk was considered sufficiently significant to warrant maps and plans being prepared to complete the first cycle of planning.
  - Natural Resources Wales were exempt from preparing these assessments on the grounds that we would prepare flood hazard and risk maps, and flood risk management plans covering flooding from main rivers, the sea and reservoirs for the whole of Wales.
  - The PFRA were reported to the European Commission in March 2012.
- Flood hazard and risk maps
  - Flood hazard and flood risk maps covering flooding from main rivers and the sea were published for each RBD in Wales in December 2013. Flood hazard and flood risk maps were also published in December 2013. Maps showing the extent of and hazard from flooding from reservoirs were published in December 2013 and April 2014 respectively.
  - The flood hazard and flood risk maps were reported to the European Commission in March 2014.

ii. The approach to developing flood risk management plans

In August 2012 Environment Agency Wales (now Natural Resources Wales) consulted on the approach to developing flood risk management plans.

In June 2013, Natural Resources Wales consulted on the ‘challenges and choices’ as part of river basin management planning for updating the RBMPs. Both consultations asked how best to coordinate consultation on the RBMPs and the flood risk management plans. Feedback from the consultation steered Natural Resources Wales towards developing the first FRMP separately from the second cycle RBMPs but aligning the consultation to

enable a read across the plans and ensure objectives and measures were aligned as far as possible.

Guidance on what flood risk management plans are, who is responsible for them and how to prepare them has been developed in collaboration with Welsh Government, Defra, Natural Resources Wales and Environment Agency; and was published in May 2014. The guidance sets out the need to coordinate with the second cycle RBMPs.

In June 2014 Natural Resources Wales published scoping reports for each RBD flood risk management plan. These set out where LLFAs would prepare FRMPs for local sources of flooding separately from the plans prepared by Natural Resources Wales. The scoping reports also set out the timescales for consultation.

Both the RBMPs and flood risk management plans are subject to strategic environmental assessment (SEA), with reporting requirements at a common RBD scale. Although separate SEA reports will be produced for each plan common approaches to SEA are being used where appropriate and the environmental effects of the plans are being reported in a consistent way, for example:

- Using a common ecosystem services method of environmental assessment across both plans.
- Using the same evidence base for the current environmental context for the RBD.
- Reviewing other organisations' plans for how they relate to both plans.
- Identifying how the proposals of the FRMP would be required to meet requirements of the second cycle RBMPs.

Consequently the SEA process has allowed identification of potential synergies and conflicts between the plans that can be addressed at a plan and project scale to ensure we achieve integrated natural resource management.

Supporting information

Preliminary Flood Risk Assessments are available here https://www.gov.uk/government/publications/preliminary-flood-risk-assessments-and-flood-risk-areas

Flood Risk Maps and information on flood risk management plans are available here; http://naturalresources.wales/flooding/?lang=en

2.2.3 Estuarine and coastal waters and other Marine Policy

Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD) came into force on 15th July 2008. The Directive establishes an integrated policy for the protection of the marine environment, in a similar manner to the WFD, by focusing on progress towards achievement of 'good environmental status' in marine waters. The scope of the MSFD is broader than that of the WFD, covering a greater range of biodiversity components and indicators. However, there are some significant areas of overlap with good ecological and chemical status for the WFD, particularly in relation to chemical quality, eutrophication and aspects of ecological and hydromorphological quality. Where both directives apply in coastal waters, the MSFD

covers those aspects of good environmental status not covered by the WFD, for example noise, litter and aspects of biodiversity.

Given the strong links between the MSFD and the WFD it is important for stakeholders interested in implementation of the MSFD to engage in river basin management planning. The WFD will monitor and contribute to certain aspects of the MSFD in coastal waters including the monitoring of contaminants, eutrophication and aspects of biodiversity. The Marine Strategy Framework Directive does not apply to estuarine waters.

The requirements of the MSFD are transposed into UK law by the Marine Strategy Regulations 2010 and Welsh Ministers are the competent authority for the Welsh inshore region. Natural Resources Wales is continuing to work with Welsh Government, Defra and others to ensure that implementation of both Directives is complementary where they overlap.

The UK targets and indicators for the objective of good environmental status under the MSFD have been aligned, as far as possible, with existing WFD assessment tools. The UK's overall approach to implementing the Marine Strategy Directive is set out in the UK Marine Strategy Part One: UK Initial Assessment and Good Environmental Status. A Programme of Measures that builds on actions taken as part of the River Basin Management Planning process will be established by 2016. Progress towards achieving Good Environmental Status will next be evaluated in 2020.

The WFD Reporting Guidance 2016 now includes a number of fields which ask how the MSFD has been taken into consideration in the implementation of the Directive through the RBMPs. The answers to these questions will be available on the EIONET website in due course.

Marine Spatial Plans

It is also important that the RBMP takes into account relevant policies set out in any marine plan adopted and published under Part 3 of the Marine and Coastal Access Act 2009 or, in the absence of a marine plan, the UK Marine Policy Statement. Welsh Government is now developing the first Welsh National Marine Plan, which will align with the policies set out in the relevant RBMP.

Supporting information

Further information on the Marine Strategy Framework Directive including consultation processes, timescales and links with the WFD can be found on the Gov.UK and Welsh Government websites

Further information on the development of marine plans in Wales can be accessed at http://gov.wales/topics/environmentcountryside/marineandfisheries/marine/marine-planning/?lang=en

2.2.4 Eel management plans

The European eel *(Anguilla anguilla*) population has declined by as much as 95% across Europe since the 1980s. In 2007, the European Union adopted a new regulation establishing measures for the recovery of the eel stock. In 2009 the UK and other member states produced an eel management plan for each of their RBDs.

These plans aim to achieve an increase in escapement of adult silver eel to the sea to spawn. The objective is to achieve at least 40% of pristine escapement levels in the long term. These plans address the causes of the decline by implementing management actions which are achievable. The UK must continue to implement the actions described in the eel management plans and in any addendum to those plans. There is a statutory obligation to report on progress in implementing eel management plan actions to the European Commission every three years.

Supporting information
You can find the 15 UK eel management plans here;
https://www.gov.uk/government/publications/2010-to-2015-government-policy-freshwater-fisheries/2010-to-2015-government-policy-freshwater-fisheries

2.2.5 Biodiversity conservation

Improving the water environment through WFD actions will be a core contribution to achieving Welsh Government's nature conservation and biodiversity obligations and outcomes. Part of this contribution comes from the fact that the WFD includes specific requirements to meet conservation objectives for water dependent Natura 2000 Protected Areas.

The second cycle RBMPs will have a key role in supporting the delivery of UK, European and global Welsh Government biodiversity commitments by contributing to habitat quality, habitat creation and restoration outcomes for water dependent habitats.

Although the WFD's statutory requirements only apply to Protected Areas and water bodies, delivering other WFD actions for water quality and resources or invasive species for example will also be key contributions to improving biodiversity and many other important nature conservation areas too. It is the Welsh Governments' policy that the environment should be managed in an integrated way and the river basin management planning process will help with this by taking into account and also contributing to the objectives of relevant Natura 2000 core management plans.

RBMPs also provide an opportunity to integrate other biodiversity improvement drivers. These include national legislation and policy requirements to meet water dependent Sites of Special Scientific Interest (SSSI) objectives and requirements as outlined under the Welsh Government's Nature Recovery Plan Consultation.

Habitat improvement or creation activity needs to focus towards implementing larger-scale schemes in the most appropriate places, more cheaply. Measures will need to be prioritised to contribute to this objective where they are cost beneficial. In the case of wetlands for example, targeting restoration activities toward sites with the greatest potential to become wetland habitat as part of a natural resource management approach will deliver wider ecosystem benefits as well as supporting the Governments' biodiversity outcomes. Restoring functioning floodplains will provide multiple benefits including better flood storage, mitigating diffuse pollution, establishing more natural hydrological regimes, storing carbon, and protecting groundwater and wetlands as well as benefiting biodiversity more generally.

Supporting information
More information on Welsh Government's Nature Recovery Plan Consultation and other associated work to deliver the Government's biodiversity obligations can be found here: http://www.biodiversitywales.org.uk/

Ramsar sites

Ramsar sites are wetland sites of international importance. Natural Resources Wales applies the same considerations to environmental water objectives for Ramsar sites as to WFD Protected Areas (designated under Article 6 and annex IV of the WFD). All Ramsar sites in Wales are also Natura 2000 protected area sites and it is likely that only a few additional measures in the majority of these sites will be required to meet their objectives. This is because meeting the conservation requirements for water dependent Natura 2000 protected area interest features will also meet the conservation requirements for any overlapping water dependent Ramsar features.

For sites that are Ramsar only, criteria are generally broader than for Natura 2000 Protected Areas. Natural Resources Wales designated site database should be used as the principal reference for determining the required measures under the WFD, for any Ramsar site areas and additional habitats and species 'features' which do not also have Natura 2000 designation, supplemented by reference to published Conservation Objectives for Natura 2000 and Ramsar sites.

Supporting information
Further information on Natura 2000 and Ramsar Protected Areas is available here: http://jncc.defra.gov.uk/page-4
Further information on all protected conservation sites in Wales (including Natura 2000, Ramsar and SSSI) is available here: http://naturalresources.wales/conservation-biodiversity-and-wildlife/find-protected-areas-of-land-and-seas/?lang=en

Other non-Natura 2000 and non-Ramsar Sites of Special Scientific Interest

SSSI that are not Natura 2000 or Ramsar sites are not normally treated as WFD 'Protected Areas'. Whilst designation of SSSI are under UK national legislation it should be recognised that many water dependent SSSI (except for some wetlands) are also WFD water bodies. The attainment of good ecological status for these water bodies, whilst not necessarily equivalent to a SSSI achieving 'favourable condition' (as targets for SSSI may in some cases be more stringent), is likely to be an important step toward those sites meeting their conservation objectives and contributing to the Welsh Government's objectives for SSSI under 'The Environment Strategy for Wales'.

Natural Resources Wales will take a coordinated approach to ensure that the setting of ecological status objectives on these water bodies also supports the requirements detailed in the Special Sites Actions Database for meeting SSSI conservation objectives and does not risk their achievement.

2.2.6 Taking account of climate change

To be sustainable, any action in the river basin should:

- Recognise, and ideally contribute to, the UK's greenhouse gas (GHG) emissions reduction targets.
- Be adapted, or easily adaptable, to the changes in climate that are now inevitable given past global emissions.

Actions to address climate change should be considered right at the outset of any work, and not bolted on as an afterthought.

The Governance Framework

The UK Climate Change Act 2008 provides the main context in this area. It legally binds the UK to reducing emissions by at least 80% by 2050, compared to 1990 levels, and sets interim carbon budgets along the way. It also provides the legal framework for adaptation policy in the UK. It requires the UK Government to undertake a Climate Change Risk Assessment (CCRA) every five years, and to prepare a National Adaptation Programme (NAP) to address the most pressing climate change risks. The NAP covers all policy areas in England, but only the non-devolved ones in Wales. The first CCRA was published in January 2012 and the first NAP in July 2013.

The Welsh Government laid out its climate change policies in its Climate Change Strategy for Wales (October 2010). This set a target for reducing GHG emissions by 3% year-on-year from 2011 in areas of devolved competence, against a baseline of average emissions over the period from 2006-10. The Government also committed to preparing five Sectoral Adaptation Plans (SAP's) covering: Health; Natural Environment; Infrastructure; Communities; and Business and Tourism. Together, these five SAP's can be seen as the Welsh equivalent of the NAP in England.

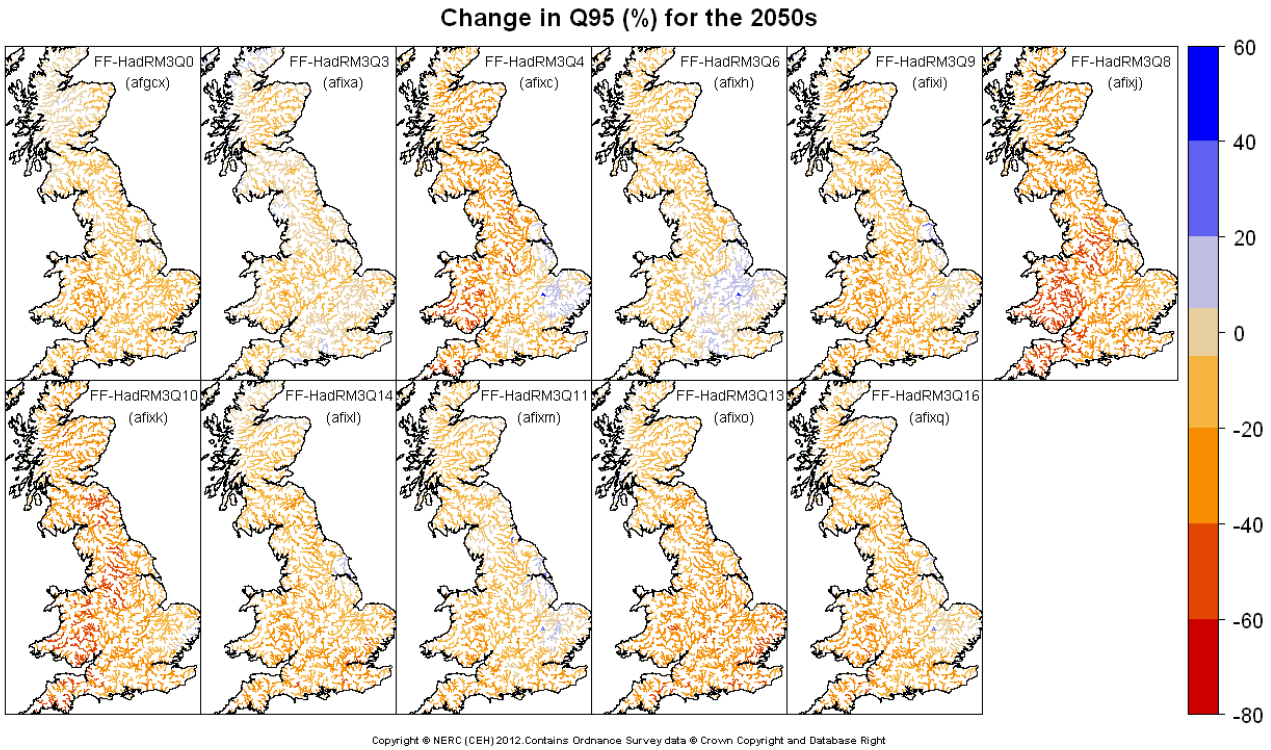
Future Climate and Climate-related Risks and Opportunities

The most recent climate change projections for the UK are the UKCP09 projections (June 2009). In Wales we can expect:

- More intense rainfall events.
- More flooding of low-lying coastal areas.
- Hotter, drier summers.
- More extremely warm days.
- Milder, wetter winters.
- Less snowfall and frost.
- Lower groundwater levels. While the direction of travel is clear, the rate of change is still uncertain.

The UKCP09 projections allow for this by covering three scenarios (High, Medium and Low future global emissions) and by adopting a probability-based approach. The weather will also continue to vary from year to year. The Met Office report "Too hot, too cold, too wet, too dry" (March 2014) confirmed the underlying UKCP09 trends but also stated "new analysis suggests that we should also plan to be resilient to wet summers and to cold winters throughout this century". The Future Flows and Groundwater Levels project provides an assessment of the impact of climate change on river flows across 282 catchments in the UK. The model takes into account different assumptions of possible climate behaviours and feedback to provide an indication of the uncertainty associated with climate projections. The figure below shows that annual low flows (Q95) are expected to decrease under all scenarios and in almost all locations by 2050.

Figure 1: Annual Low Flows (Q95) for 2050



Further information and flow projections from the Future Flows and Groundwater Levels project can be found here:
http://192.171.153.213/sci_programmes/Water/FutureFlowsandGroundWaterLevels.html

The first CCRA identified the following top risks in Wales:

- Increases in hot-weather related death and illness.
- Changes in soil conditions, biodiversity and landscape due to warmer, drier summers.
- Reductions in river flows and water availability during the summer, affecting water supplies and the natural environment.
- Increases in flooding on the coast and inland, affecting people, property and infrastructure.
- Changes in coastal evolution including erosion and coastal squeeze, affecting beaches, intertidal areas and other coastal features.
- Changes in species including a decline in native species, changes in migration patterns and increases in alien and invasive species.
- Increases in the risk of pests and diseases affecting agriculture and forestry. The risk to livestock was a particular concern.

It also identified the following opportunities:

- Increases in grass yields, allowing a potential increase in livestock production.
- Increases in tourist numbers and a longer tourist season.
- Reductions in cold-weather related illness and death.

Implications for the Water Framework Directive

As far as GHG emissions reductions are concerned, land use and agriculture are the most important sectors in relation to the WFD. Depending upon its use and the associated management regime, land can either be a net source of emissions or a net sink. In particular, if peat lands are kept wet (or re-wetted) they absorb carbon; if they are allowed

to dry out they release carbon. Trees also play a significant role in sequestering carbon. The Forestry Commission publication Forests and Climate Change: UK Forestry Standard Guidelines (2011) provides guidance on how to protect and expand forests and woodlands in the face of climate change.

Under the Kyoto Protocol Member States assess carbon stocks and fluxes under the heading Land Use, Land Use Change and Forestry (LULUCF). All land in the country is identified as having remained in one of six classes since a previous survey, or as having changed to a different (identified) class in that period. The six land classes are: Forest Land, Cropland, Grassland, Wetlands, Settlements and “Other” land. Fluxes within the LULUCF framework are predominantly of carbon dioxide. In 2012, in Wales, they represented a net carbon sink, equivalent to around 1% of Welsh emissions. The Centre for Ecology and Hydrology provide full details in their report Mapping Carbon Emissions and Removals for the Land Use, Land Use Change & Forestry Sector (2014).

Agriculture emits two potent greenhouse gases. Nitrous oxide arises from the application of nitrogenous fertilisers. Methane is emitted directly by livestock, and by the handling of slurries. These agricultural emissions are significant: in 2012 they contributed some 13% of total emissions in Wales – the same figure as for transport.

Turning to adaptation, the first CCRA identified impacts on water as a high risk across each of its five central themes, as shown in the table below.

Table 1. High risk impacts on water

Theme	Main risks
Agriculture and Forestry	Drier soils; reducing crop and timber yields, extra demand for water for irrigation; loss of agricultural land for floodplain.
Business	Flooding; increased competition for water; disruption of transport networks and communication links; indirect risks from changes in agriculture and the natural environment.
Health and Wellbeing	Injury, death and stress/mental health problems due to flooding; increase in water-borne diseases and food poisoning.
Buildings and Infrastructure	Flooding of road, rail, river bridges, water supply and energy infrastructure; performance of buildings in higher temperatures; “Urban Heat Island” effect.
Natural Environment	Lower summer river and estuarine flows may lead to poor water quality; warmer rivers, lakes, estuaries and coastal waters may suit some species but others will not thrive; invasive species may gain advantage; native species may not be able to move to track favoured conditions; more rain falling in intense bursts might increase agricultural runoff.

Evidence suggests that the following measures are particularly useful in mitigating these risks:

- Vegetation planting within catchments (including riparian tree planting to provide river shading) to increase habitat connectivity, keep rivers cool and manage run-off.
- Increase soil carbon and improve soil structure (including peatland restoration) to manage run-off, improve habitat condition and avoid carbon losses to water and the atmosphere.

- Reconnecting rivers with their floodplains and naturalising river channels to increase habitat connectivity and manage increases in rainfall intensity.
- Promotion of water efficiency and high flow storage to avoid deterioration in wetland habitats and help agriculture to remain viable in the face of decreasing water resource availability.
- Adopting Water Sensitive Urban Design, which brings multiple benefits including: reducing flooding; reducing discharges of storm water to watercourses; resilience to drought; and more attractive neighbourhoods with more green space.

This list of adaptation measures is not exhaustive. More general advice, and specific advice on flood risk management and water resources management, can be found in Guidance document No. 24 “River Basin Management in a Changing Climate”, issued under the Common Implementation Strategy for the WFD (2000/60/EC). In particular, this guidance advocates that, where feasible, “no-regret”, or “win-win” measures should be adopted as these yield beneficial outcomes regardless of the eventual outcomes of climate variability and change. Although climate change is not explicitly included in the text of the WFD, the step-wise and cyclical approach of the river basin management planning process makes it well suited to adaptively manage climate change impacts.

Two further publications are relevant to the UK specifically:

- The Living with Environmental Change (LWEC) Water Report Card 2012-13 presents information on a range of potential climate change impacts, and explicitly states the degree of confidence for each projection.
- The Centre for Ecology and Hydrology has published a report on Future Flows and Groundwater Levels, which assesses the impact of climate change across 282 catchments in the UK. This can be used to inform planning at the catchment scale.

2.3 Natural Resources Wales’s role in managing the water environment

Natural Resources Wales is the lead organisation for water management and environmental regulation in Wales. Established in 2013, it has taken over the functions of the Countryside Council for Wales, Forestry Commission Wales, Environment Agency Wales, as well as some functions of Welsh Government.

Our responsibilities include:

- Managing flood risk to protect people and property.
- Strategically planning water resources to ensure adequate water supplies
- Maintaining, improving and developing salmon and freshwater fisheries.
- Maximising the social, economic, environmental and heritage benefits of the waterways for which Natural Resources Wales is the navigation authority.
- Helping to conserve and enhance the diversity of native wildlife and habitats, the landscape and historic environment.
- Promoting the recreational use of inland and coastal waters and associated land
- Protecting, enhancing and restoring the environmental quality of inland and coastal surface water and groundwater.
- Protecting important, recognised sites that make up 30% of Wales' land and waters – including National Nature Reserves, Marine Nature Reserves, Sites of Special Scientific Interest, Ramsar sites, Special Areas of Conservation and Special Protection Areas
- Managing 120,000 hectares of woodlands, that’s 7% of the country’s total land area, producing approximately 850,000 tonnes of timber per year.

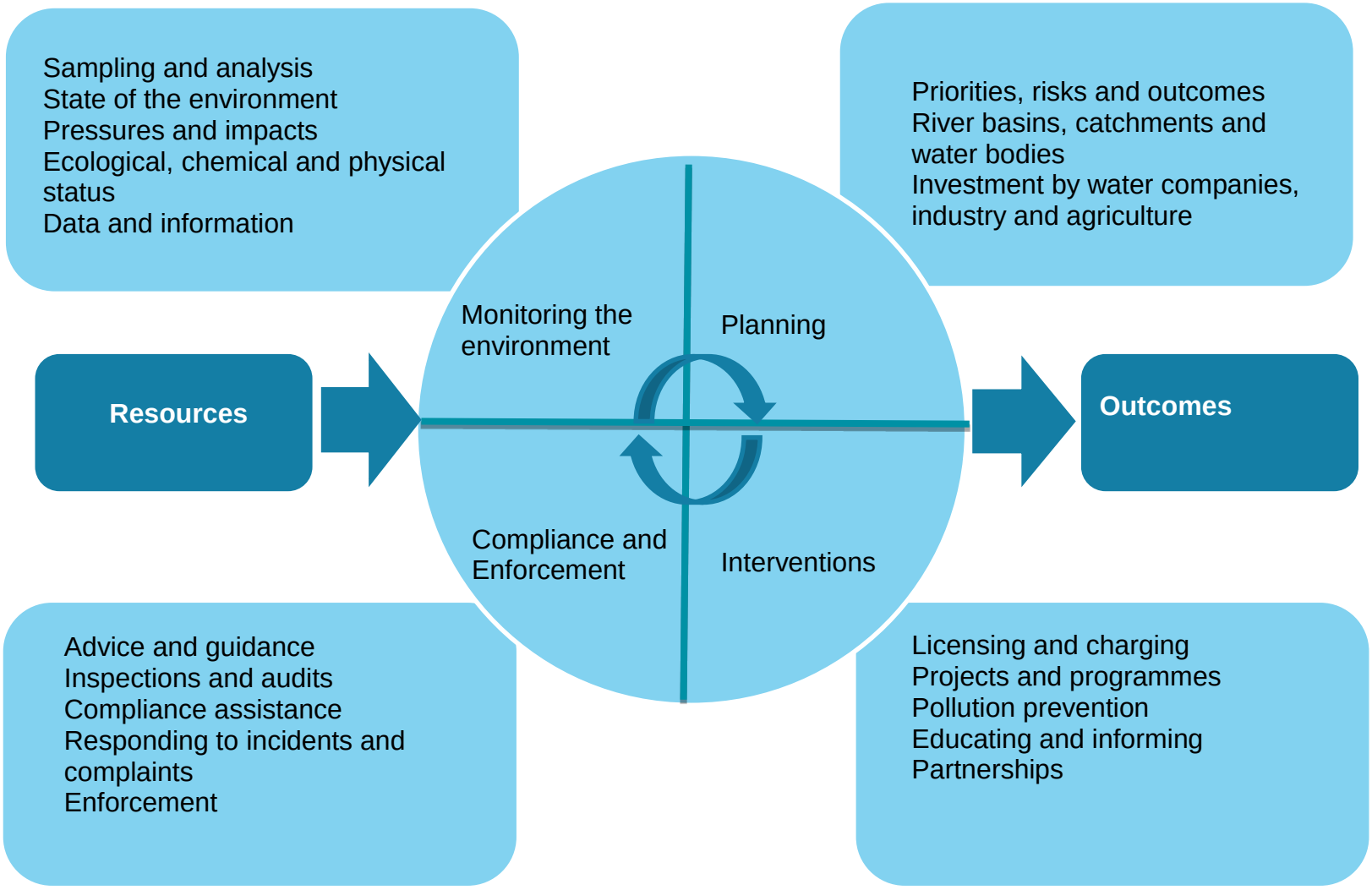
We work within a framework of government policy and legislation (see section 2.1) that defines our powers and duties, and the environmental aims, objectives and standards to which we work. Much of this is based on European requirements.

Managing the water environment involves targeting effort and resources to reduce risks and to provide the greatest benefits for people and wildlife. We bring together our different water management functions through a number of iterative activities including:

- Monitoring the environment to understand the state it is in and why.
- Planning the action needed to achieve agreed outcomes.
- Taking action and working with others to achieve these outcomes.
- Checking compliance with standards and permit conditions, and carrying out enforcement activities, if necessary, to make sure that the legal requirements are met.

Some of these water management responsibilities are summarised in figure 2 below:

Figure 2. Water management responsibilities of Natural Resources Wales



3 The Water Framework Directive

Summary of this section

This section provides an introduction to the WFD, its aims and objectives before giving an overview of the approach to river basin management planning used in Wales. The important role of all stakeholders, including the work in catchments, is discussed. The section finishes by setting out the timetable for updating the RBMPs and briefly describes the Strategic Environmental Assessment that has been produced to support the second cycle plans.

Topics covered:

WFD and its objectives; river basin management planning; working with others; catchment approach; river basin management planning timetable; assessments to support the development of the second cycle RBMPs.

3.1 The Water Framework Directive

The WFD is focused on establishing an integrated approach for the protection and sustainable use of the water environment from catchment to coast. This requires a holistic approach to managing waters, looking at the water within the wider ecosystem and taking into account the movement of water through the hydrological cycle.

The WFD is implemented through river basin management and planning that involves setting environmental objectives for all groundwaters and surface waters (including estuaries and coastal waters) and devising and implementing programmes of measures (sets of actions) to meet those objectives.

The WFD also requires that other environmental priorities, economic considerations and social issues have to be considered and taken into account when setting water management objectives.

WFD aims (Article 1)

- prevent further deterioration and protect and enhance the status of aquatic ecosystems and associated wetlands;
- promote the sustainable consumption of water;
- reduce pollution of waters from priority substances;
- prevent the deterioration in the status and to progressively reduce pollution of groundwaters;
- contribute to mitigating the effects of floods and droughts.

WFD environmental objectives (Article 4)

- prevention of deterioration in status of surface waters and groundwater;
- achievement of objectives and standards for Protected Areas;
- aim to achieve 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 or set a less stringent objective;
- aim to achieve good ecological potential and good surface water chemical status for heavily modified water bodies and artificial water bodies;
- reversal of any significant and sustained upward trends in pollutant concentrations in groundwater;
- cessation of discharges of priority hazardous substances into surface waters;
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.

WFD additional objectives (Article 7)

- reduce level of purification treatment required for drinking water;
- the water treatment regime will meet the requirements of Directive 80/778/EEC as amended by Directive 98/83/EC.

3.1.1 Preventing Deterioration

The no deterioration baseline for each water body is the status reported in the RBMPs at the time of publication.

Deterioration is formally assessed and reported over the six years of a river basin management planning cycle. The second cycle RBMPs report any water bodies which show deterioration in status compared to the 2009 baseline and set a new baseline based on current status.

The WFD does not allow any deterioration in status of water bodies, except in specified circumstances. The following are the main aspects of Natural Resources Wales's approach to implementing the no deterioration requirements of the WFD:

- Deterioration from one status class to a lower one is not permitted.
- While deterioration within a status class does not contravene the requirements of the WFD, (except for Drinking Water Directive parameters in drinking water Protected Areas, and provided that the objectives and requirements of other domestic or European Community legislation are complied with) action should be taken to limit within status class deterioration as far as practicable. For groundwater quality, measures must also be taken to reverse any environmentally significant deteriorating trend, whether or not it affects status.
- Where the water body is already in the lowest status class (bad ecological status or potential; fail to achieve good chemical status; poor groundwater chemical status; or poor groundwater quantitative status) no significant further deterioration shall be permitted.

- The no deterioration requirements are to be applied independently to each of the elements that come together to form the water body classification as required by Annex V of the WFD and Article 4 of the Groundwater Daughter Directive.
- To manage the risk of the deterioration of the status of the biological elements for surface waters, the no deterioration requirements shall be applied to the environmental standards for the physico-chemical elements, including those for the moderate/poor and poor/bad status boundaries.
- For groundwater the no deterioration requirements will be applied to each of the four component tests for quantitative status and the five component tests for chemical status.

Exemptions under Article 4.7 can be applied to justify deterioration caused by new physical modifications in specific circumstances. As the climate changes there may be fundamental changes to the character of some of our water bodies, for example coastal freshwater water bodies becoming saline due to sea-level rise or streams becoming ephemeral (only flowing in winter). We do not yet know exactly how, when and where these changes will take place, particularly in the shorter term, and so in line with European guidance we do not intend to proactively change the objectives we will seek to achieve. We need to focus on building a baseline understanding of state of the water bodies and monitor and review the performance of measures (for example fish passes, abstraction changes) to ensure they deliver the benefits and resilience required.

3.1.2. Protected Areas

The objectives for Protected Areas are either governed by the European Community legislation under which they are designated, for example the Habitats and Birds Directives for Natura 2000 sites or the objectives as set out in the WFD itself, for example Drinking Water and Shellfish Water Protected Areas.

The WFD requires member states to establish a register of Protected Areas. The types of Protected Areas that must be included in the register are:

- Areas designated for the abstraction of water for human consumption (Drinking Water Protected Areas).
- Areas designated for the protection of economically significant aquatic species (Shellfish Water Protected Areas).
- Bodies of water designated as recreational waters, including Bathing Waters.
- Nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive or areas designated as sensitive under Urban Waste Water Treatment Directive (UWWTD).
- Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection including relevant Natura 2000 sites.

Supporting information
The register of Protected Areas was first published in 2004 and has been updated for this plan. You can find the register on the WFD pages on the Natural Resources Wales website.

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

i Drinking Water Protected Areas

The objectives for Drinking Water Protected Areas (DrWPA) are to ensure that:

- Under the water treatment regime applied, the drinking water produced meets the requirements of the Drinking Water Directive. This will be achieved by meeting the requirements of the Drinking Water Directive (including the standards in the Directive) plus any UK requirements to ensure drinking water is free from contamination.
- The necessary protection to achieve the aim of avoiding deterioration in the water quality in DrWPAs in order to reduce the level of purification treatment required.

Under Article 7, Drinking Water Protected Areas (DrWPAs) have been designated to protect raw waters used for public supply. DrWPAs were designated at a WFD Water body scale.

In Wales the 2011 Risk Assessment, together with subsequent supporting data submitted by the Water Companies operating within Political Wales, has identified 'at risk' DrWPAs where there is evidence of failure, or risk of failure, of the Drinking Water Inspectorate (DWI) targets with upward trend.

These 'at risk ' DrWPAs (and all upstream Waterbodies) have been taken forward as 'candidate' Safeguard Zones (SgZ) for funded AMP Investigations to assess whether they are valid sources of the raw water failure and, if so, whether there are viable catchment solutions to investment in treatment at the Water Treatment Works.

Where catchment solutions are found to be a possible solution, and Natural Resources Wales can secure stakeholder agreement, Safeguard Zones will be formally designated for funded improvement measures. The safeguard zone will describe the extent of the agreed measure, and may be designated to cover a part of a water bodies, a complete water body, group of water bodies or even a whole catchment – depending on the extent at which the improvement measures are applied. While the safeguard zone assessment process is statutory, once designated safeguard zones do not bring any additional statutory powers. Improvements within safeguard zones rely on stakeholder buy-in and Natural Resources Wales extant regulatory powers.

There is currently one groundwater SgZ and no surface water SgZ (covering at risk surface water DrWPA).

ii. Economically Significant Species

In the 2009 RBMPs, Freshwater Fish and Shellfish Waters were designated as Protected Areas under their respective European Directives. Since then both Directives have been repealed and their requirements transferred to the WFD. We continue to retain designated Shellfish Water Protected Areas but there will not be any Freshwater Fish Protected Areas and no further requirements for areas that were designated under the Freshwater Fish Directive. The WFD is designed to give more relevant and up to date standards for protection of freshwater fish.

When waters are designated as Shellfish Waters Protected Areas the aim is to protect and improve water quality to support the growth of healthy shellfish (bivalve and gastropod molluscs) and contribute to good quality edible shellfish. It is anticipated that designations of Shellfish Water Protected Areas will be reviewed within the timeframe of the next RBMP cycle.

iii. Recreational Waters (Bathing Waters)

Until the end of 2014 the objective for bathing waters designated under the current Bathing Waters Directive was to protect the environment and public health whilst bathing. This objective was achieved by meeting the imperative standards and aiming to meet the guideline standards of the then current Bathing Waters Directive.

From the end of 2014 the objective for bathing waters as defined by the revised Bathing Waters Directive is to preserve, protect and improve the quality of the environment and to protect human health by complementing the original Directive (2000/60/EC). This objective is achieved by meeting the 'sufficient' quality standards of the revised Bathing Waters Directive (2006/7/EC); and by taking such realistic and proportionate measures considered appropriate with a view to increasing the number of bathing waters classified as 'excellent' or 'good'.

Supporting information
Further information on the issues at each bathing water can be found on the bathing water data explorer here: http://naturalresources.wales/water/quality/?lang=en

iv. Nutrient Sensitive Areas (Urban Waste Water Treatment Directive)

A sensitive area in the Urban Waste Water Treatment Directive (UWWTD) is a water body identified as affected by eutrophication or having a surface water abstraction affected by elevated nitrate concentrations from waste water treatment works. Designating a sensitive area is a trigger for action to reduce or prevent further pollution caused by nutrients.

The general objective of the UWWTD is to protect the environment from the adverse effects of urban waste water discharges and waste water discharges from certain industrial sectors.

This is to be achieved by ensuring that discharges from relevant urban waste water treatment plants meet the appropriate emission standards set out in the directive. For areas affected by eutrophication this includes phosphorus and/or nitrogen reduction measures.

v. Nutrient Sensitive Areas (Nitrate Vulnerable Zones)

The general objective of the Nitrates Directive is to reduce water pollution caused or induced by nitrates from agricultural sources and prevent further such pollution.

This is to be achieved through designating nitrate vulnerable zones (NVZs) and action programmes to reduce agricultural nitrate losses being implemented within them, or by applying measures throughout the national territory. In addition a code of good agricultural practice must be established for voluntary implementation by all farmers. NVZs that are identified include all land draining to 'polluted waters' as defined by the directive. 'Polluted waters' are fresh surface waters or groundwater which do, or could, exceed 50 mg/l nitrate. They are also defined as waters which are, or may become, eutrophic due to nitrates from agricultural sources.

vi. Natura 2000 Protected Areas

Natura 2000 is a key legal instrument to protect and enhance biodiversity in the European Union. It is an ecological network of Protected Areas, set up to conserve Europe's most vulnerable and threatened species and habitats. It is composed of Special Protection Areas (SPA) designated by member states under the Birds Directive (2009) to protect wild birds and their habitats, and Special Areas of Conservation (SAC) designated by member states under the Habitats Directive (1992) to protect habitats and plant and animal species.

These areas are intended to enable the favourable conservation status of the species and habitats across their bio-geographic range within the EU.

Natural Resources Wales is the statutory nature conservation body for Wales and works towards ensuring that Wales's unique natural environment including its flora and fauna, land and seascapes, geology and soils is protected and improved. This includes in particular the protection, improvement and management of Natura 2000 sites. Natural Resources Wales has a lead role in ensuring the appropriate management of the sites. It must carry out its own regulatory and land management functions so as to meet the requirements of the Habitats and Birds Directives, as well as provide advice to local authorities, Welsh Government and other bodies to enable them to comply with their obligations under the Directives.

In addition to Natura 2000 sites, Wales has a number of wetlands designated under the 1971 Ramsar convention on the protection of internationally important wetlands. As matter of Welsh and UK government policy, these 'Ramsar sites' have the same level of protection and management as Natura 2000 sites. All Ramsar sites are also designated within the Natura 2000 network.

In Wales, there are approximately 700,000 hectares of Natura 2000 and Ramsar Protected Areas (113 out of 122 sites) which have water dependent features.

EU member states must take appropriate conservation measures to maintain or restore the habitats and species on Natura 2000 sites to a favourable conservation status. Monitoring of Natura 2000 sites found that only 17% of the water dependent habitat and species features on Natura 2000 sites were favourable. To achieve favourable condition, and so ensure that the conservation objectives of the Natura 2000 sites are being met, further or ongoing action is needed. Appropriate management of those currently in favourable condition is required to ensure they maintain this status.

Supporting information
Further information on Natura 2000 and Ramsar Protected Areas is available on the Joint Nature Conservation Committee (JNCC) website here:
http://jncc.defra.gov.uk/page-4

Further information on all protected conservation sites in Wales (including Natura 2000, Ramsar and SSSI) is available on Natural Resources Wales website here:
http://naturalresources.wales/conservation-biodiversity-and-wildlife/?lang=en

3.1.3 Artificial and heavily modified water bodies (A/HMWBs)

Some water bodies contain features that provide valuable social and economic benefits or uses, for instance through flood risk management schemes or reservoirs that supply drinking water. In many cases significant physical modifications have been required to support this use, for example the installation of a weir or a dam. To achieve good ecological status in these water bodies we would have to alter the modifications to such an extent that their function was compromised, for example the removal of a weir installed for flood defence purposes. It is vitally important to protect the uses that benefit society and the economy and therefore we are able to designate these water bodies as artificial or heavily modified (under Article 4.3 of the WFD), and determine objectives accordingly. An exception to this would be if there were other options for achieving the same benefits for

society; in these cases designation would not be allowed (European Union CIS guidance document four, 2003).

Once designated, artificial and heavily modified water bodies are required to reach the objective of good ecological potential (GEP). Good ecological potential is similar to good ecological status but takes into account the constraints imposed by the social and/or economic uses and involves using a Mitigation Measures Assessment (MMA). This MMA requires putting into place a series of measures to maximize the ecology, accepting that we cannot achieve GES in these water bodies and is considered alongside the classification of other elements to determine whether the water body will achieve an overall status of good ecological potential.

In some instances is may not be appropriate to implement a specific mitigation measure if doing so is likely to have a significant adverse impact on the designated use/social and economic benefits provided by the water body. Where it is not appropriate to implement a mitigation measure due it having a significant adverse impact on use, that mitigation measure is then excluded from the classification process and would not prevent a water body from achieving good ecological potential.

Artificial and heavily modified water bodies are still required to aim to achieve good chemical status.

Under WFD there is a requirement to review A/HMWB designations six-yearly and report any changes. We conducted a light touch review in 2014 and provided detailed information (as part of the consultation on the draft plan) on **Water Watch Wales** for those waterbodies that we proposed to make changes to. For more information see; http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.1.4. Exemptions to the environmental objectives (alternative objectives)

WFD also allows for alternative objectives (i.e. an extended deadline or less stringent objective) to be set where certain conditions are met. We must provide justifications within the RBMP. These are set out in Paragraphs 4.4 and 4.5 of the Directive.

We can extend a deadline where:

- the scale of improvements required can only be achieved in phases exceeding the timescale, for reasons of technical feasibility
- natural conditions do not allow timely improvement in the status of a water body (can extend beyond 2027)
- completing the improvements within the timescale would be disproportionately expensive

Where appropriate we can set a less stringent objective (i.e. less than good) where measures are:

- technically infeasible, or
- disproportionately expensive

When applying a less stringent objective we must still aim for the highest status possible.

Temporary deterioration in status

In certain circumstances (set out in Article 4.6 of the WFD) a temporary deterioration in status of a water body, caused by exceptional or unforeseen events such as extreme floods, prolonged droughts or accidents, is allowed. The exception does not apply to those effects of extreme floods and prolonged droughts which could reasonably have been

planned for and prevented, nor does it apply in the case of accidents which could reasonably have been foreseen.

This exemption requires responsible authorities to demonstrate that:

- all practicable steps were taken to prevent further deterioration in status
- the measures to be taken under exceptional circumstances are included in the Programme of Measures and will not compromise the recovery of the quality of the body of water once the circumstances are over;
- all practicable measures are taken to restore the body of water to its status prior to the effects of those circumstances as soon as reasonably practicable, and
- a summary of the effects of the circumstances and the measures taken are included in the next update of the RBMP.

Prolonged droughts

In Wales, the main bodies responsible for managing water resources are Natural Resources Wales, water companies and the Welsh Government. All of these bodies have a role in drought management. Natural Resources Wales and water companies prepare for droughts by producing Drought Plans detailing the actions that will be taken if a drought occurs.

Natural Resources Wales is responsible for securing the proper use of water resources in Wales and making sure there is enough water available for all needs including the environment. We achieve this by regulating the abstraction of water, monitoring the environment and working closely with the water industry and other abstractors to manage resources. During droughts we monitor and report on the impacts on the environment, monitor water company actions to confirm they are following their drought plans and determine drought permit applications.

Water companies are responsible for developing and maintaining an efficient and economical system for public water supply in their area, without damaging the environment or affecting the needs of other water users. During a drought they will take actions to maintain public water supplies, as set out in their drought plans, whilst minimising any impacts on the environment.

The Welsh Government is responsible for the policies relating to water resources in Wales. They ensure the legislative framework for water resource management is fit for purpose. They direct water companies on the development and content of their water resource management plans and drought plans. During a drought they will confirm that water companies are taking appropriate actions and determine drought order applications.

Defining and then monitoring indicators (often called drought ‘triggers’) helps Natural Resources Wales and water companies decide when a drought is happening and determine what actions to take. The decision to take action will be based on a range of factors, including present and forecast weather conditions and how effective the action would be. The sequence of actions will not always be the same as all drought events are different and need to be managed on an individual basis.

Prolonged and severe droughts may impact water body status through reduced river flows, damage to or loss of habitat, alterations to bio-chemical composition of the river and detrimental impact to water dependent species. A drought is a natural, unpredictable phenomenon and it is not always possible, even with the implementation of appropriate

mitigation measures, to avoid the impacts of drought or prevent temporary deterioration in water body status throughout a prolonged drought.

Drought plans set out the actions that will be taken to minimise environmental impacts and maximise available supplies during a drought, without causing deterioration where possible. These plans set out how the environment will be monitored and the possible mitigation measures that can be implemented to prevent as much environmental harm as possible during a drought. Effective monitoring of environmental indicators also helps to differentiate the natural impacts of drought and impacts caused by human activity such as the implementation of drought permits and orders. This is important to show any temporary deterioration resulted from the natural impacts of the drought.

If the impacts of a drought event temporarily cause deterioration to water body status and all the criteria in Article 4.6 can be met, this exemption can be used after a drought event as a justification as to why an objective which was set in a RBMP has not been met. This is always done on a case by case basis and should be detailed in the update of the RBMP.

Supporting information
Natural Resources Wales is currently revising the drought plan for Wales, which will be available in 2016.

Extreme floods

Natural Resources Wales is responsible for providing flood forecasting and warnings to the public in Wales. This involves monitoring rainfall, river levels and sea conditions. Combined with weather data and tidal reports Natural Resources Wales provides local area forecasts on the possibility of flooding and its likely severity.

There are four levels of flood warning: three of the codes indicate the severity of the warning (Flood Watch, Flood Warning, and Severe Flood Warning) and a fourth is an ‘All Clear’, meaning the threat has passed.

Severe floods may impact on water body status through effects such as the loss of habitat (scouring of sediments and in stream vegetation), the physical displacement of species or increased inputs of pollutants including sediment. These impacts may be localised and of insufficient magnitude to affect the status of an entire water body. Water bodies are classified on an annual basis and therefore any deterioration in status due to a severe flood may not be detected until up to a year after the event.

Accidents

The Environmental Damage (Prevention and Remediation) Regulations 2009 bring the Environmental Liability Directive into effect in Wales. Under the Regulations, environmental damage of either surface water or groundwater is defined as damage causing a change of water body status,

This means either a deterioration of water status overall, for example the water body as a whole would now be classified as ‘poor’ rather than ‘good’ or a deterioration of any of the individual elements or parameters such that the value of that element or parameter is now consistent with a lower status than before. This applies even if the water body is not reclassified as being of lower status. Adverse effects that are short-term or limited in their geographical extent are unlikely to amount to environmental damage.

When environmental damage is confirmed, the Regulations include a remediation objective of achieving the same level of natural resources or services that would have existed if the damage had not occurred.

New modifications or sustainable development

New modifications or new sustainable human development activities may be permitted even though they might compromise the achievement of certain WFD objectives (as set out in article 4.7 of WFD). Certain new developments provide extremely valuable benefits to society that outweigh the environmental or societal benefits of achieving the WFD objectives. Such benefits may include those provided by activities, for example:

- Public water supply
- Flood defence
- Navigation and transport
- Urban development
- Rural land management

Any physical modifications or activities that are considered likely to compromise WFD objectives must undergo a thorough assessment before they can be permitted using the Art 4.7 defence and must also ensure other related objectives are not compromised as a result of the proposed activities. An assessment must provide evidence to satisfy the following are true:

- All practicable steps are taken to mitigate the adverse impact on the status of the water body.
- The benefits to human health or human safety or sustainable development outweigh the benefits of achieving WFD objectives or the activity is of overriding public interest.
- There are no other means of providing the services offered by the activity that are technically feasible or of a proportionate cost and provides a significantly better environmental option.

In addition, the reasons for the modifications or activities are specifically explained in the RBMP and relevant objectives are reviewed every six years.

Natural Resources Wales works with public bodies, developers and its own operational functions to ensure WFD objectives (including the correct application of Article 4.7 defence) are met. Natural Resources Wales utilises regulatory advice/guidance to ensure the specific requirements of Art 4.7 are achieved.

3.2 River basin management planning

River basin management planning is a cyclical process that is punctuated at intervals by consultation and reporting required by the WFD. The ongoing planning process can be broken down into four main stages as shown below:

Stage 1 – identify whether there is an environmental problem

A problem could be the failure of a protected area or water body to achieve its objective, or a deterioration in status over time.

The condition of Protected Areas and water bodies is assessed by Natural Resources Wales. The current status of water bodies is assessed through the process of classification and comparison of these results over time will indicate whether any deterioration in that status is occurring. Classification results can indicate whether there is an environmental

problem in a water body but other information, including information from stakeholders, can also be used (see also section 4).

Stage 2 – identify the cause(s) of the environmental problem

The cause of the problem must be determined in order to identify appropriate solutions.

In order to understand the causes of problems, Natural Resources Wales has completed a large number of investigations since the 2009 RBMPs were published. These have greatly improved the understanding of the reasons why water bodies are not at good status. Investigations will continue where they are required to understand new failures and also where deterioration is detected. (See also section 4)

Stage 3 – identify and assess measures to resolve the environmental problem

Actions (known as measures in the WFD) may be needed to reduce the impact of current problems or prevent future problems such as deterioration in status.

Where more than one technically feasible measure is available options should be assessed (including use of cost-benefit). All of the measures required to fully resolve the problem are identified (see also section 5).

Stage 4 – identify the relevant objectives and when they can be achieved

When objectives will be achieved is determined by considering how and when the measures to achieve the outcomes will be funded and implemented.

Priorities are reflected in the second cycle RBMPs, which were submitted to the Minister of Natural Resources in October 2015 and for cross border plans the Secretary of State who made a decision on affordability and overall ambition.

Once objectives have been agreed, monitoring and classification are used to assess compliance against those objectives (see also section 5).

3.3 Working with others

Working with others is at the heart of a successful river basin management planning process. Protecting and improving the water environment needs action from all parts of society. By working effectively with others, we agree better solutions and protect the things that matter most to people.

The WFD includes legal obligations (under Article 14) on consultation. This includes encouraging the active involvement of all interested parties in the implementation of the Directive, in particular in the production, review and updating of the RBMPs.

Many different groups work towards improving and protecting the water environment. Natural Resources Wales welcome the opportunity to work more closely with all sectors and interested parties who have an interest in improving the water environment, through the RBMP consultation many individuals and organisations offered their assistance by working collaboratively with us to improve the water environment.

3.3.1 Welsh Government Water Framework Directive Stakeholder Forum

This strategic forum was established in 2007 and is chaired by Welsh Government. It is made up of representatives of major stakeholder sectors and important national organisations. The Forum provides a focus for communication and consultation on a broad range of WFD related issues.

3.3.2 River basin district liaison panels

Representatives of major stakeholders make up the RBD liaison panels. The liaison panels continue to be very important in enabling river basin management planning, under the Terms of Reference the panel will:

- work collaboratively to develop RBMPs and other supporting documents;
- be an effective forum and contribute using experience, knowledge, evidence and information exchange to enable decision making, delivery and reporting on RBMPs;
- identify, track and co-deliver measures and projects wherever possible that improve, enhance and protect the water environment leading to no deterioration, meeting protected area objectives and the achievement of good quality water environments;
- discuss and negotiate between panel members and their sectors at the RBD and catchment scale so as to ensure a broad base for decision-making and communication;
- scrutinise the delivery of the RBMPs and ensuring relevant legislation and associated guidance is followed;
- support catchment delivery through their sectors and networks.

3.4 Working at the catchment scale and integrated natural resources management

In response to the 2009 RBMPs stakeholders called for greater engagement and involvement at a more local level to influence those who use water, those involved in land use planning and those involved in land management.

During 2013-14 Natural Resources Wales held a series of catchment workshops across Wales in order to raise awareness of the issues impacting our water environment, develop local partnerships to put actions in place and to help inform the second cycle RBMPs. These workshops have also helped us better understand how WFD outcomes fit within the context of natural resource management as described in the Environment (Wales) Bill.

The Bill is a key element of the Welsh Government's legislative programme. The natural resource management policy framework is still being developed in Wales but the RBMPs reflect the essential principles of sustainable management of natural resources in the following ways:

Manage adaptively, by planning, monitoring and reviewing action

The river basin management process promotes adaptive management. The condition of waterbodies and progress towards achieving good or better status are regularly monitored. The RBMPs are reviewed and updated every 6 years. Any actions and measures are also reviewed as part of this planning process.

Consider the appropriate spatial scale for action

The RBMPs encompass all of the issues and pressures on the water environment and the actions to manage them at a river basin scale. We are developing a catchment approach for delivery of actions which will focus at a scale more relevant to communities and other stakeholders. By looking at a catchment scale (see Figure 3), rather than individual issues or sectors, we can move beyond addressing issues reactively and in isolation. This will enable an integrated, proactive approach, addressing opportunities and constraints in a whole system, cross-sectoral way.

The natural processes we are working with, and the management processes we are aiming to influence, tend to work at different scales. Area based natural resource management

processes should reflect this and aim to manage ecosystem services at the most appropriate scale, whilst taking into account the best management mechanisms for doing so. The WFD requires that we produce and review management plans at the river basin scale. But many of the problems facing the water environment are best understood and tackled at the catchment scale. This will help to tackle local issues such as pollution from diffuse sources which is a significant pressure across Wales.

Promote and engage in collaboration and co-operation

Natural Resources Wales is the competent authority for the WFD but only manages seven percent of Wales' land area itself. It is essential that we involve stakeholders, including local authorities, communities, developers and industry, throughout the process of drawing up and implementing the RBMPs.

Take account of all the relevant evidence and gather evidence in respect of uncertainties

To inform the development of the area based approach we need to use the best available evidence from a range of sources, building on both our knowledge and that of our stakeholders and local communities. We will take a pragmatic approach to evidence and apply the principle of collect once, use many times.

The contents of the RBMP is the result of a significant evidence base, collected through our monitoring programmes, investigations and economic assessments.

Take account of the benefits and intrinsic value of natural resources and ecosystems

The natural resource planning process will need to reflect the principles of co-production and stakeholder engagement. It will need to aim to deliver outcomes that are equitably distributed and focus on delivering benefits for the people of Wales.

By working with others in catchments the aim is to:

- Understand the issues in the catchment and how they interact
- Understand the ways in which water and hydrological systems provide benefits to people, business, and support and sustain the wider environment
- Understand how the issues are affecting the current local benefits and future uses of water
- Involve local people, communities, organisations and businesses in making decisions by sharing evidence
- Identify which issues to tackle as a priority

Take account of the short, medium and long term consequences of actions

To create a sustainable Wales we need to consider the opportunities and constraints Wales will face in the long term. This was considered as part of the Strategic Environmental Assessment along with consequences on the wider environment and cumulative/indirect effects. RBMPs consider long term objectives for improvement and are reviewed every six years.

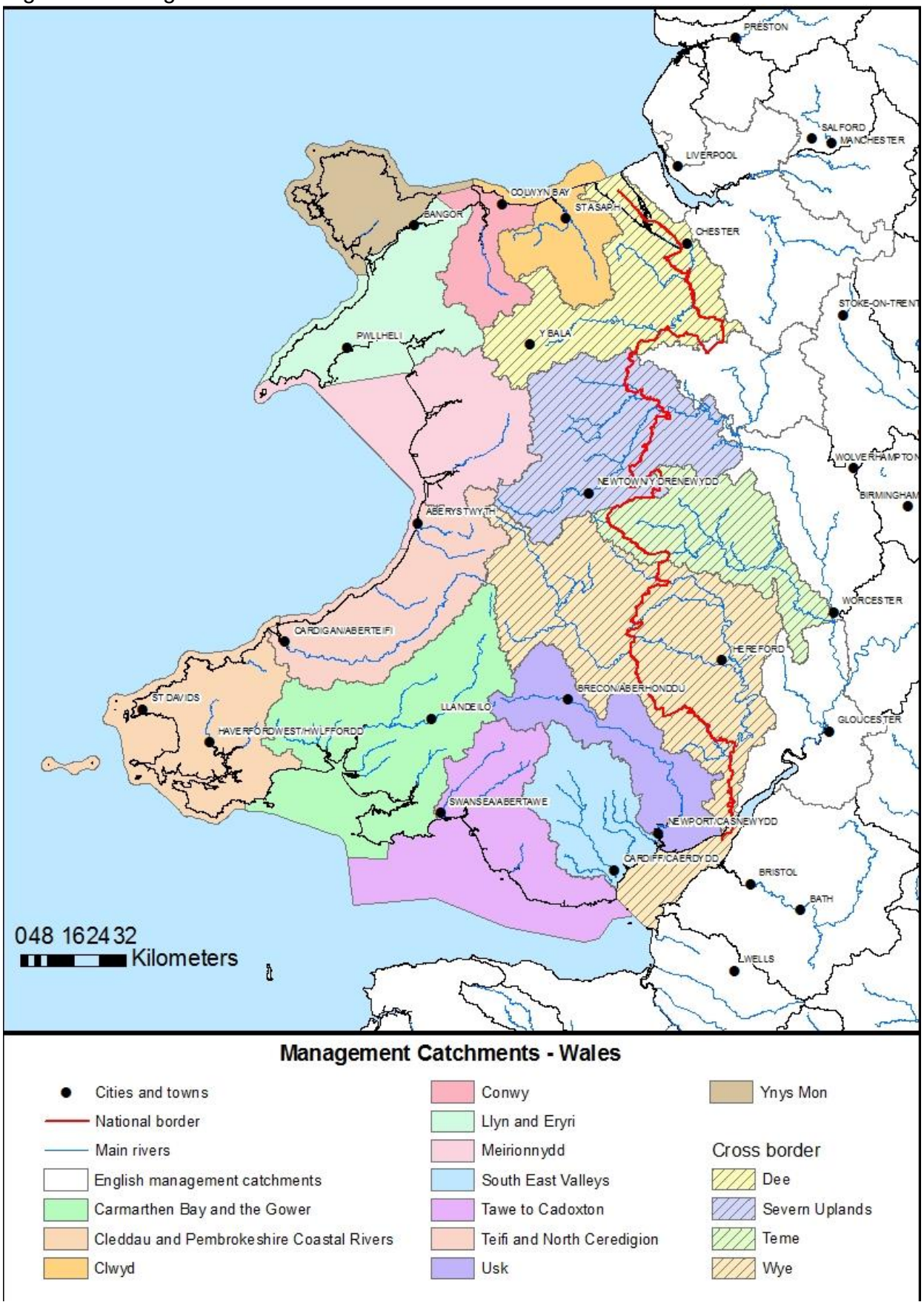
Take account of the resilience of ecosystems

A resilient ecosystem is one that is healthy and functions in a way that is able to address pressures and demands placed on it, and is able to deliver benefits over the long term to meet current social, economic and environmental needs. The new approach will need to plan to deliver multiple, longer term benefits for the environment and also for the economy and society – reflecting long-term well-being goals for Wales. Ensuring that actions

contribute to the resilience of the supporting ecosystems and their functioning will be key to the long term sustainability of the services and benefits they can provide.

The actions proposed in this RBMP can take account of ecosystem resilience and deliver multiple benefits, for example improving land management in the uplands can have significant benefits in climate change resilience, carbon capture, flood storage and improved downstream water quality. Further information on the benefits and potential constraints of measures on ecosystems and consideration of the baseline for each ecosystem and the potential effects with and without the measures, can be found in the Strategic Environmental Assessment.

Figure 3: Management catchments in Wales



3.5 River basin management planning timetable

Although most of the river basin management planning activities are continual and iterative there are defined points at which consultation and reporting take place as part of developing and updating RBMPs. The timetable for these steps is set by the WFD and shown in the table below.

Table 2. WFD river basin management planning timetable

Step	Date and duration	What's the purpose?
Working together consultation	June 2012 6 months	**''How should we all work together to update the RBMPs?''** Asking how you want to be involved Explaining the key steps in the river basin management planning process for cycle 2 Establishing a network of contacts for cycle 2 planning
Challenges and choices engagement	June 2012 to May 2013 Approx. 12 months	**''What are the most significant water environment issues, what are the options for tackling them and which do you prefer?''** Improving the evidence base that will be used to inform the review of the RBMP Seeking broad agreement about the principles behind taking action
Challenges and choices consultation	June 2013 6 months	**''Have the significant issues been fairly summarised and what can be done about them?''** Sharing the latest evidence including results of investigations and assessment of the risk of water bodies deteriorating or not achieving their objectives Seeking views on how to prioritise action Explaining catchment plans and how they relate to the RBMPs
Follow up engagement	October 2013 to May 2013 Approx 8 months	Following the consultation, Natural Resources Wales will consider the responses and where necessary facilitate further engagement for groups of stakeholders where there are areas which need further discussion
Consultation on the draft 2015 RBMPs	10 October 2014 6 months	**''Does this plan set the right level of ambition for the water environment and a strong commitment to deliver?''**

		Estimating the likely state of the water environment in 2021 and 2027 Proposing water body objectives Outlining who would be involved to achieve these objectives, how much it will cost and the benefits
Follow up engagement	November 2014 to August 2015 Approx 10months	Following the consultation, Natural Resources Wales will consider the responses and where necessary further develop the content of the plans with delivery partners to ensure the second cycle plans are the best possible and fully supported
Publish RBMPs	October – December 2015	**''This is the plan to address the issues''** Publishing proposed RBMPs and submitting to Government for approval. These plans will be used as a framework to direct planning and action and to track progress in each RBD.
Report to Europe	March 2016	Natural Resources Wales is required to report progress to the European Commission
Delivery Programme	2016 onwards	Delivery and tracking of the 2nd cycle programme will need to be undertaken to ensure we deliver the 2nd cycle measures for improvement.

3.6 Updating the plans

The RBMPs are based on the data, information and the best understanding of the water environment. The responses to the 'RBMPs' consultation in 2014/15 and Strategic Environmental Assessment have been considered, and where practicable and appropriate, taken into account in the second cycle plans.

Investigations to understand the causes of problems such as a failure to reach good status or deterioration in status will continue throughout the second cycle. Engagement with local stakeholders and partners will also contribute to a better understanding of the causes of problems in catchments and water bodies.

3.7 Economic analysis of water use

In preparation for the 2009 RBMPs, a wide-ranging economic analysis was carried out and reported through a collaborative research programme overseen by UK authorities (in Wales this was undertaken by Defra and Welsh Government) and stakeholder organisations.

Summaries of the economic analysis are included in Annex K of the 2009 RBMPs.

https://naturalresources.wales/water/quality/river-basin-management-plans-2009-2015/?lang=en

Water and sewerage services in Wales are wholly privatised. Therefore, over the long term, the financial costs of water and sewerage services are recovered in full from service users. This includes the internalised environmental and resource costs.

The local economic analysis, included a local assessment of the most cost-effective programmes of measures to prevent deterioration, achieve protected area objectives and achieve good status where technically feasible. This analysis has drawn on the database of costs of measures, maintained and developed since the plans were published and supplemented where appropriate by local and stakeholder information.

Welsh Government has decided that it is not necessary to update any sections of the existing economic analysis as it was not helpful to developing the programmes of measures in the second cycle RBMPs.

3.8 Assessments of the river basin management plan

3.8.1 Strategic Environmental Assessment

A Strategic Environmental Assessment (SEA) has been undertaken to fulfil the requirements of the Environmental Assessment of Plans and Programmes Regulations 2004 (known as the 'Strategic Environmental Assessment Regulations'). This requires plans within certain sectors (including the water sector) that provide a framework for future development to be subject to a strategic environmental assessment to ensure that the environment is considered from the outset.

The RBMP is a plan to improve the water environment. As a result it is anticipated that most environmental effects are likely to be positive. Nevertheless, the plan has the potential to have intended or unintended consequences for people and the wider environment. We have used SEA to assess the potential effects of the plan and reported the results in an Environmental Report that accompanied the consultation on the second cycle RBMP. Our approach to SEA is summarised below.

i. Scope of SEA

The scope of the SEA for the second cycle RBMPs was set out in scoping reports as part of the Challenges and Choices consultation in 2013. It ensures the SEA is focused on potentially significant positive and negative effects at a RBD scale.

ii. SEA and RBMP alternatives

Natural Resources Wales developed four scenarios to help explain and describe at the RBD scale the outcomes that are achievable by 2021; the overall costs and benefits; apportionment of costs across the types of intervention and relative cost-effectiveness. The wider environmental effects of these high level sets of measures were assessed as part of the SEA so that the results could be considered in the selection of an option for the final seco0nd cycle RBMPs.

iii. SEA and local appraisal

The river basin management planning process applied proposed measures to waterbodies aimed at achievement of good ecological status or potential. The positive and negative environmental effects were identified at a management catchment scale using ecosystem services. These management catchment assessments were then aggregated and assessed at the RBD scale.

iv. Reporting the high level SEA

The Environmental Report considers the aggregated effects of the measures across all management catchments on the environmental baseline of the RBD. At this strategic level the SEA does not consider the effects of individual measures and locations, but rather the overall pattern of proposed types of measures in the programme and their overall significance across the RBD. The SEA focuses on the ecosystem services where the most significant positive or negative effects have been recorded.

v. SEA and climate change

The SEA considered the likely impacts of climate change in the absence of the plan, and the extent to which the proposed measures provide mitigation or resilience, across a number of ecosystem services. For example, at this scale of assessment measures could include reducing peat erosion as a natural means of maintaining water quality, as well as improving riparian habitat and setting aside agricultural buffer strips to help build climate resilience. From the evidence used to date, there is uncertainty that climate change effects can be considered to be significant at the RBD scale and therefore these are not assessed in detail in the Environmental Report. It is clear that such measures can help manage local impacts of a changing climate, particularly in vulnerable areas, and should be considered as part of an overall catchment based approach.

vi. SEA Consultation and links to the Environmental Reports

The SEA Environmental Reports were published alongside the consultation on the second cycle RBMPs. The consultation sought views on the information used in the SEA, the approach taken to ensuring the SEA informs the plan, and the significance of effects reported for the RBD.

vii Statement of Particulars

The Statement of Particulars has been published alongside the second cycle plans. This demonstrates how the environment and consultation responses have been taken into account by the Final Plan, the reasons for choosing the Final Plan, as adopted, in the light of other reasonable alternatives and it sets out how we propose to monitor the significant effects brought about by implementing the plan.

3.8.2 Habitats Regulations Assessment

A Habitats Regulations Assessment of each second cycle RBMP has been carried out to consider whether each plan is likely to have a significant effect on any Natura 2000 sites.

The HRA concluded that the plan will have no significant effect on European Designated Sites, indeed the delivery of statutory objectives for Protected Areas aim to improve these sites. This has been published alongside the RBMPs.

3.9 Competent authorities for river basin management planning

In Wales the appropriate authority for the implementation of the WFD is Welsh Government[1]. The appropriate authority has general responsibility for ensuring the WFD is given effect. The appropriate authority also has specific responsibilities for ensuring that appropriate economic analysis is carried out, approving proposals for environmental objectives and programmes of measures and approving RBMPs. The appropriate authority may also give guidance or directions to Natural Resources Wales, and any other public body, on the practical implementation of the WFD.

Natural Resources Wales[2] is the competent authority for producing and updating RBMPs in Wales. Natural Resources Wales is responsible for carrying out the analysis required for characterisation, monitoring, identifying waters used for the abstraction of drinking water, and establishing a register of those waters and other Protected Areas. It has to prepare proposals for environmental objectives and programmes of measures for each RBD and publish RBMPs. Natural Resources Wales must also ensure public participation in

[1] Welsh Government Cathays Park Cardiff CF10 3NQ

[2] Natural Resources Wales Cambria House, 29 Newport Road, Cardiff, CF24 0TP

preparation of the RBMPs and make certain information required under the WFD accessible to the public.

4. Defining and describing the water environment

Summary of this section

This section describes how the water environment is divided up and characterised to support implementation and reporting for WFD. It explains how the water environment is monitored and its condition assessed and reported. The section then describes the main challenges affecting management of the water environment in Wales, how future risks have been assessed and causes of current problems identified.

Topics covered:

RBDs and water bodies; typology; designation of artificial and heavily modified water bodies; Protected Areas; monitoring networks; classification methodologies; recent changes to how classification is carried out; significant water management issues; risk assessments; reasons for not achieving good status.

4.1 River basin districts, management catchments and water bodies

The WFD covers all waters, including inland surface waters, groundwater, estuaries and coastal waters, independent of size and characteristics. For example, 'inland water' is defined as 'all standing or flowing water on the surface of the land'.

For the purpose of implementing the Directive, all waters were assigned to geographical or administrative units, namely the river basin, RBD and water body.

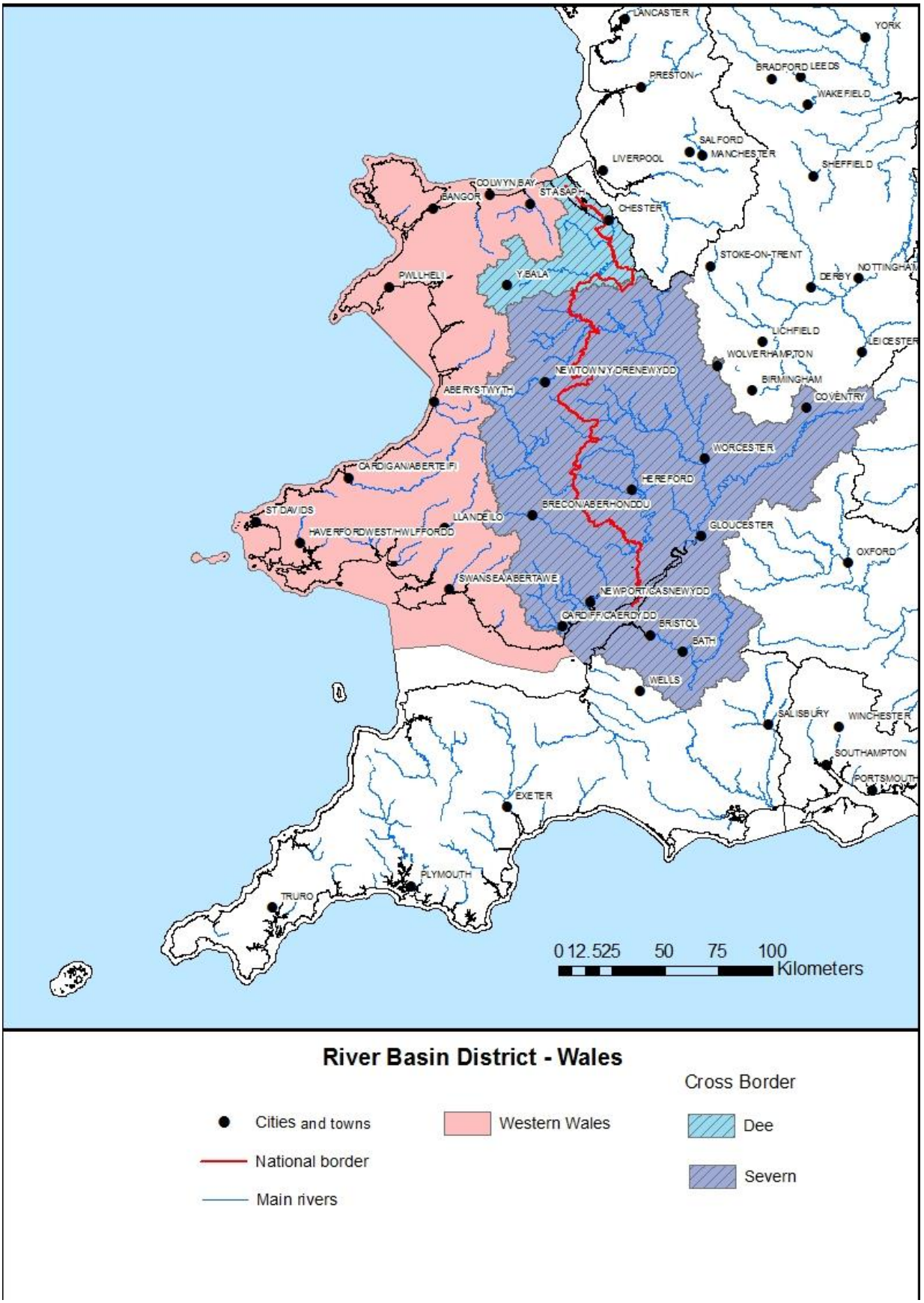
The river basin is the geographical area from which all surface run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea at a single river mouth or estuary.

The RBD is the main unit for management of river basins under the WFD and RBDs were designated by each Member State. A RBD can consist of one or more river basins. In Wales 'management catchments' are being used as the most significant unit for analysis, planning and management. These catchments are amalgamated up to RBDs for reporting purposes. The RBDs in Wales and those that are cross border with England are shown on the map below.

Water bodies are the units used for reporting and assessing compliance with the Directive's principal environmental objectives. The environmental objectives of the Directive apply to 'water bodies' and so the main purpose of identifying water bodies is to enable status to be accurately described and compared to the environmental objectives set out in the Directive.

The Directive defines a surface water body as a "discrete and significant element" of surface water such as a lake or reservoir or entire (or part) stream, river or canal, estuary or stretch of coastal water (out to 1 nautical mile, and for chemical status only this extends to the limit of territorial waters which may extend up to 12 nautical miles). A groundwater body is a distinct volume of groundwater within one or more aquifers. Water bodies in Wales were identified as part of a 'characterisation' process.

Figure 4. River Basin Districts in Wales



Most water body categories, such as groundwater or coastal waters, are delineated as a discrete area and are shown as this total area for reporting purposes.

Whilst each river water body also has a defined catchment area, river water bodies are reported (for example in the RBMPs) using a river line within that catchment. For the first cycle of river basin management planning this river line (often referred to as the 'blue line') was derived from the 1:50,000 scale river network. This has been updated using the 'Detailed River Network'. This river line is purely a reporting network and it is this river line which appears on maps in the second cycle RBMPs.

4.1.1 Surface water body types and reference conditions

Because the sorts of animals and plants found in upland, rocky, fast-flowing streams are very different to those found in lowland, slow flowing, meandering rivers, rivers, lakes, estuaries and coastal water bodies are grouped into different types according to their physical and chemical characteristics. The types dictate, in very general terms, the sorts of plants and animals likely to be present in water bodies of that type.

Reference condition descriptions covering the sorts of plants and animals expected to be found in the different types of water bodies in undisturbed conditions have been produced for each type or group of types (see references below). These types are the ones that have been used in the initial characterisation of each RBD. In some cases there are no examples of reference condition in the UK and descriptions are based on similar types in other Member States, or extrapolation from modelling studies, or historic data.

Reference conditions and the conditions found in high status waters are the same. For example, if a classification tool shows that the diatom community in a water body is at high status, then the species composition and abundance of diatoms in that type of water body are what would be expected under reference or undisturbed conditions. The Ministerial Directions on Environmental Standards give the values for high status for both biological and physico-chemical elements and include screening approaches for high status hydrology and morphology. It is important to understand, that to be in overall high status a water body would need to comply with all the criteria including hydrological regime and morphological criteria.

Supporting information
For more detail on how reference values have been determined for each of the biological elements see the UK Technical Advisory Group (UKTAG) Assessment Methodologies can be found on the WFDUK website here: http://www.wfduk.org/

The reference conditions descriptions for rivers, lakes, estuarine and coastal waters are given in detail here: http://www.wfduk.org/about-uktag

4.1.2 Designation of artificial water bodies and heavily modified water bodies

Prior to publication of the 2009 RBMPs we designated water bodies according to their specified use and the current extent of that use. This followed a series of consultations, cross-references and quality checks, and the involvement of the RBD liaison panels, which comprise representatives of important stakeholder sectors.

Natural Resources Wales has performed a significant review of the designations of all river water bodies. Changes to designations are being proposed in response to a changing environment, stakeholder comments or where errors have been identified in the current designations.

4.2 Assessing the current state of the water environment

4.2.1 Protected Areas

Protected Areas are parts of the environment that have been designated as requiring special protection under Community legislation for the protection of their surface water and groundwater or for the protection of habitats and species directly depending on water. Natural Resources Wales has routine monitoring programmes in place for assessing compliance for Bathing Waters, Habitats and Drinking Water Protected Areas, and Shellfish Water Protected Areas.

Shellfish Water Protected Areas (SWPA) are assessed against the microbial standard in shellfish flesh each year. To allow consideration of inter annual variation a broader timeframe of 10 years is also considered. If a SWPA has met the microbial standard in 8 out of the last 10 years it is considered to be a consistent achievement of the standard and ensuring no deterioration is considered the priority objective for those SWPAs. Data which in many SWPAs covers a wider geographic scope and at a higher frequency (provided by the Food Standards Agency) was used for assessment in 2014, whereas previously quarterly monitoring data from a single 'Representative Monitoring Point' in each SWPA was used. Analysis has shown that whilst these two data sets pre and post 2014 are not directly comparable the difference in assessment outcome is minor when put into the context of inter annual variability observed at the majority of SWPAs. Data used for the 2014 assessment makes better use of, and has better consistency with, data collected to inform the Shellfish Hygiene Directive compliance.

4.2.2 Water body status monitoring networks

A network of monitoring sites is used to establish the actual condition of all water bodies within each RBD in terms of their ecology, water chemistry, flow and groundwater level.

For rivers and lakes a network of monitoring sites is used to classify all water bodies according to the priority pressures acting on the environment. In coastal and estuarine waters our operational programme is focussed on the priority pressures, hydromorphology, nutrients and chemicals. A smaller network of surveillance sites is used across all surface waters to provide information on long-term natural and anthropogenic trends, and to inform development of the assessment tools and design of future monitoring programmes.

For groundwater two monitoring networks are used to provide classifications. A groundwater quality monitoring network meets the surveillance and operational monitoring requirements for chemical status and trend assessment, and a groundwater level monitoring network is used to meet the requirements of quantitative status assessment.

Supporting information
You can find maps showing the monitoring networks for each RBD on **Water Watch Wales** http://waterwatchwales.naturalresourceswales.gov.uk/en/

4.2.3. Assessment of water body status

The WFD requires the status of water bodies to be assessed and this assessment is created by classifying data from the monitoring network. For a particular point in time a classification will show us whether the quality of the environment is good, or where it may need improvement.

Classification is just one part of the evidence base that helps to focus efforts on those water bodies where a difference needs to be made. Additional information is sometimes required to assess whether a classification result is really indicative of an environmental problem. Additional evidence may also indicate where problems exist that are not apparent through classification results alone. Natural Resources Wales's approach to assessing environmental problems is described in more detail in section 4.2.4.

For surface waters there are two separate classifications for water bodies, ecological and chemical. For a water body to be in overall 'good' status both ecological and chemical status must be at least 'good'.

For groundwater there are two separate classifications for groundwater bodies; chemical status and quantitative status. Each must be reported in addition to the overall groundwater body status. For a groundwater body to be at good status overall both chemical status and quantitative status must be good. In addition to assessing status, there is also a requirement to identify and report where the quality of groundwater is deteriorating as a result of pollution and which may lead to a future deterioration in status.

i. Ecological status

Ecological classification consists of:

- The condition of biological elements, for example fish
- Concentrations of supporting physico-chemical elements, for example the oxygen or ammonia levels
- Concentrations of specific pollutants, for example copper
- And for high status, largely undisturbed hydromorphology

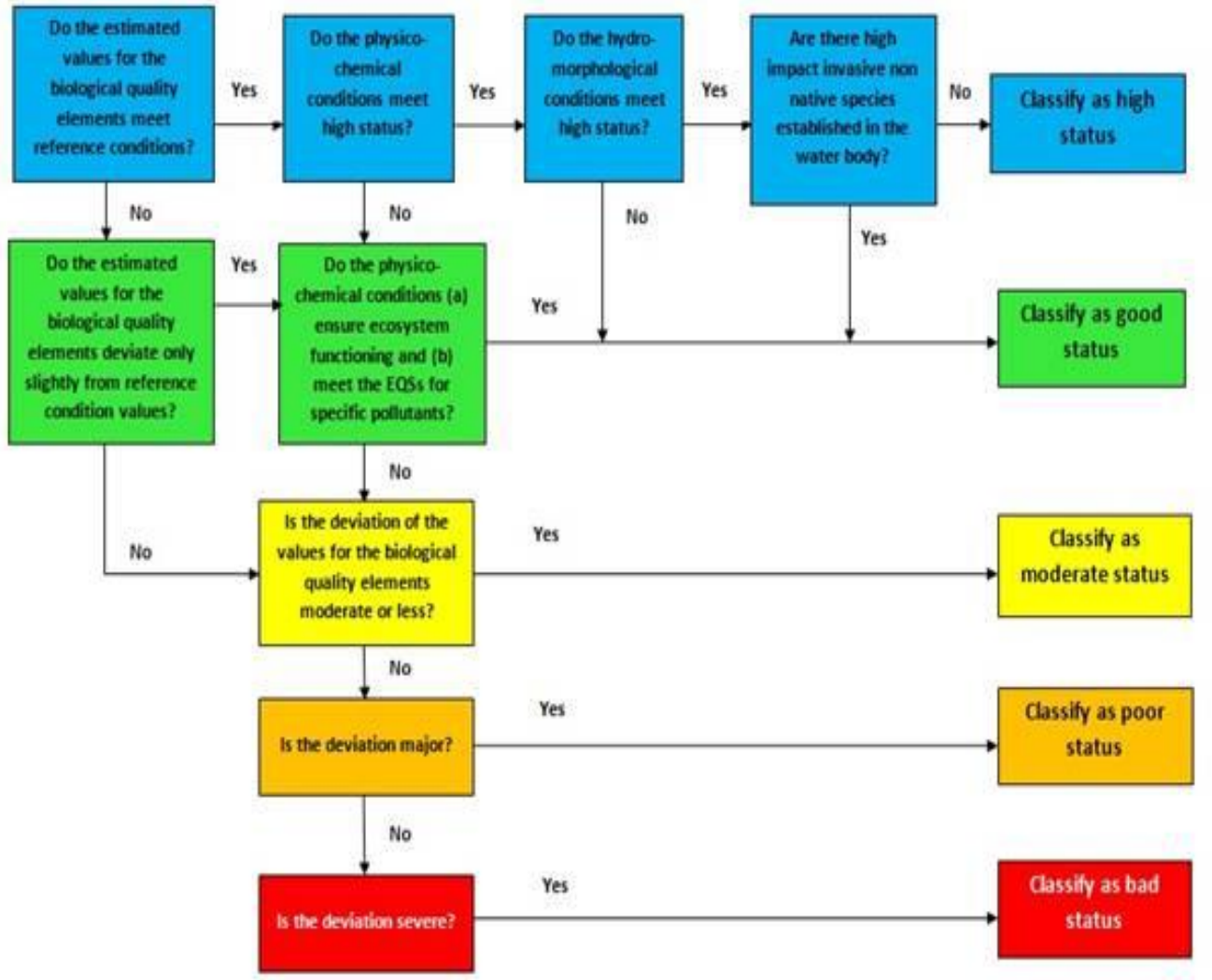
The decision tree below illustrates the criteria used to determine the different ecological status classes.

Ecological status is recorded on the scale of high, good, moderate, poor or bad. 'High' denotes largely undisturbed conditions and the other classes represent increasing deviation from this 'reference condition'. The classification of ecological status for the water body, and the confidence in this, is determined by the worst scoring quality element.

Only biological elements are currently recorded on the full scale, high to bad. Supporting physico-chemical elements are not reported below moderate status. However, the UK Technical Advisory Group (the UK-wide collaboration to develop best practice) has produced standards that distinguish between moderate, poor and bad for physico-chemical elements. Natural Resources Wales uses this information as part of our evidence base as well.

Hydromorphological elements (hydrology and morphology) are considered to be supporting elements of ecological status and are recorded either as supporting or failing to support good ecological status. Hydromorphological elements are used to define high ecological status.

Figure 5. Ecological status, classification decision tree



ii. Surface water chemical status

Chemical status is assessed by compliance with environmental standards for chemicals that are listed in the Environmental Quality Standards Directive. Chemical status is recorded as either good or fail. The chemical status classification, including certainty, for the water body is determined by the worst scoring chemical.

Assessment of chemical status has been based either on monitoring data from within the water body or where this is not available, data from the '*Prioritisation of abandoned non-coal mine impacts on the environment'* project and WFD investigations.

iii. Groundwater status - chemical and quantitative

The achievement of good status in groundwater involves meeting a series of conditions which are defined in the WFD (2000/60/EC) and Groundwater (Daughter) Directive (2006/118/EC). In order to assess whether these conditions are being met, a series of tests has been designed for each of the quality elements defining good (chemical and quantitative) groundwater status.

There are five chemical and four quantitative tests. Each test is applied independently and the results combined to give an overall assessment of groundwater body chemical and

quantitative status. The worst case classification from the relevant chemical status tests is reported as the overall chemical status for the groundwater body and the worst case classification of the quantitative tests reported as the overall quantitative status for the groundwater body. The worst result of these two is reported as the overall groundwater body status. Groundwater bodies are classified as either at good or poor status.

iv. Groundwater trend assessment

For groundwater bodies that have been identified as being at risk of failing to meet their environmental objectives for groundwater quality, there is a requirement to identify any significant and sustained upward trends in pollutant concentrations. A significant trend is one that could lead to a groundwater body failing to meet its environmental objectives before 2021 (the end of two river basin cycles) if measures are not put in place to reverse the trend.

v. Ecological potential

For water bodies that have been designated as heavily modified or artificial, Natural Resources Wales must classify according to their ecological potential rather than status. UKTAG have adopted the ‘mitigation measures approach’ for classifying heavily modified and artificial water bodies.

This approach first assesses whether actions to mitigate the impact of physical modification are in place to the extent that could reasonably be expected. If this mitigation is in place, then the water body may be classified as achieving good ecological potential. If this level of mitigation is not in place, then the water body will be classed as moderate ecological potential.

There may be instances where it is considered inappropriate to implement a mitigation measure if it can be demonstrated that doing so is likely to have a significant adverse impact on the designated use of the water body. If so then that mitigation measure is excluded from the classification process and is not required to be in place for a good ecological potential (GEP) to be reached. Guidelines for significance are assessed individually for each designated use as it is recognised that they will vary between sectors.

Before a classification of overall ecological potential can be produces the second step is for the results of the mitigation measures assessment to be cross-checked with data from biological and physico-chemical assessments.

Where Natural Resources Wales have data for biological quality elements that show signs of impact from pressures other than hydromorphological alterations (for example if the diatom or phytoplankton status is poor because of nutrient pressures) the ecological potential will be changed. To reflect this other pressure the water body will be reported as ‘poor ecological potential’. This also applies where we have data for physico-chemical quality elements. As with diatoms, these are capable of picking up impacts beyond the hydromorphological pressure and must be also be reflected in the overall ecological potential result.

Where the flow conditions do not support good status (for example, due to over abstraction) it is necessary to over-ride the mitigation measures assessment so that the results of the biological surveys dictate the overall ecological potential. Doing this avoids misrepresenting the potential of a water body where, despite all mitigation measures being taken to address the physical pressures, the wildlife is suffering because of an abstraction upstream.

Finally, Natural Resources Wales may sometimes find that a water body has been designated as heavily modified yet the biological elements sensitive to hydromorphological pressures are at good status. Where this is the case we will review the biological evidence and where there is high confidence in the longevity of the ecological status the heavily modified water body designation will be recommended for removal.

Supporting information
The latest assessments of status for water bodies in Wales can be found on **Water Watch Wales**. http://waterwatchwales.naturalresourceswales.gov.uk/en/

4.2.4. Considering wider evidence of an environmental problem

As noted earlier, classification is just one part of the evidence available on the state of the water environment and additional information is sometimes required to assess whether a classification result is really indicative of an environmental problem in a water body.

For surface waters the certainty that an element or water body is at less than good status is expressed using the three categories of very certain, quite certain and uncertain. These definitions are based on statistical certainty from analysis of the monitoring data used to derive the classification results (very certain ≥95%, quite certain ≥75% <95%, uncertain >50% <75%).

The level of certainty we need to have that an element really is at less than good status will be influenced by the actions required to resolve the environmental problem. If costly or targeted regulatory measures are required then a high degree of certainty that there is a problem is usually required to justify the action. However for some low cost, voluntary type measures action may be justified where there is much less certainty in the classification result.

Classification and statistical certainty derived from operational monitoring may be unable, on their own, to provide the certainty needed to justify the actions that may be required, particularly if the failure is caused by pollution from diffuse or intermittent sources. In these cases additional evidence is used to make a pragmatic, qualitative judgement of the certainty that there is a problem to solve. This additional evidence could come from, for example, pollution incident or investigative monitoring data.

The classification results provide part of that evidence but it is important to note that the additional evidence to improve certainty that there is, or is not, a problem to solve does not over-ride the formal classification result.

Assessments for nutrients and eutrophication

Eutrophication is when there is too much nutrient in waters, causing algae and plants to grow excessively. This affects the quality of the water and how it can be used, as well as damaging the local wildlife.

For the impacts of nutrients on biological status, relevant classification results have been combined with wider evidence within ‘eutrophication assessments’. These assessments do not affect classification, which is done element by element, but are used in the targeting of measures for nutrients.

The nutrient standards used for WFD classifications are based on an understanding of the links between nutrients and the biological impacts associated with eutrophication. However, there is uncertainty in the ability to use this knowledge to predict the impacts in particular water bodies; exceeding the WFD nutrient standard alone is

considered insufficient to judge the risk of impacts on the biology. Therefore Natural Resources Wales uses additional evidence in targeting and prioritising control measures.

All elements that are relevant to trophic status are considered and reported in the RBMP. Failures of any elements are investigated to identify reasons for failure. Nutrient element failures where there are no corroborating biology classification failures associated with increased concentrations of nutrients may however be targeted as lower priority for action than those with relevant supporting biology failures.

Wider evidence of eutrophication, for example from investigations, is also taken into account, where appropriate and available, to increase certainty. This assessment of certainty of eutrophication does not affect the classification result but informs decisions on subsequent actions as described above, with high certainty being required if costly targeted regulatory measures would be needed to address the problem. This approach provides a link between standards, classification, investigations and measures.

Natural Resources Wales has developed draft eutrophication assessments for water bodies at risk from nutrients for rivers, lakes, estuaries and coastal waters. These combine the latest classification results with wider evidence in a structured way to make best use of all relevant evidence in identifying whether there is a problem to solve in a given water body.

4.3 Changes since first cycle (new building blocks)

Water body status classifications are based on a set of 'building blocks'. These building blocks are:

- The water body and monitoring networks.
- The designation of artificial and heavily modified water bodies.
- The standards and boundaries used in assessment.
- The tools used to derive classification results for individual elements from monitoring data.

A number of significant methodological changes have been introduced for the second cycle of river basin management planning:

- Updated standards are being used to determine good status for nutrients and some chemical substances. These new standards were developed as part of a UK-wide collaboration and have been widely consulted upon.
- A second generation of biological classification tools will ensure biological classifications are better at reflecting local conditions.
- The size and shape of some water bodies have changed so that they become more logical management units.
- The process to designate heavily modified water bodies has been improved.

For 2013, 2014 and 2015 Natural Resources Wales has produced two sets of WFD classification results:

- Old Building Blocks (OBB): these results are based on the same methodologies that produced the classification results reported in the 2009 RBMPs. They are used to assess progress against the objectives set in the 2009 plans, including improvements in

the quality of water bodies, as well as check for any potential deterioration against the 2009 baseline.

- New Building Blocks (NBB): these results contain the changes outlined above. This will be the first step in developing the baseline for the second cycle RBMPs, and will inform investigations and help determine appropriate measures and objectives.

These changes will make a difference to the number of water bodies reported as being in high, good, moderate, poor and bad ecological status. From 2015 onwards the NBB will become the baseline by which we monitor future improvements.

Natural Resources Wales is currently undertaking a comprehensive review of the monitoring network across Wales to ensure that it is both effective and efficient.

4.4 Challenges

4.4.1 Significant water management issues

In 2013 Natural Resources Wales consulted on what were considered to be the most important issues that challenge the current and potential future uses and benefits of the water environment in each RBD. These significant water management issues are described in the RBMP documents as follows:

- **Changes to the natural flow and level of water** – taking too much water from rivers, canals, lakes and groundwater, means less water flowing and altering water levels can affect habitats.
- **Negative effects of non-native invasive species** – the effect on the health of the natural environment of plants and animals from outside the UK introduced to UK waters.
- **Physical modifications** – changes made by people to rivers, lakes and estuaries, for example flood defences and weirs, and changes to the natural river channels for land drainage and navigation. These modifications alter natural flow levels, may cause excessive build-up of sediment, barriers to migration and the loss of habitats.
- **Pollution from mines** – contaminated water draining from mines, most of which are now abandoned.
- **Pollution from rural areas** – the effects of poor agricultural practice and rural land management on the water environment (also known as 'diffuse rural pollution'), causing sediment, nutrient and pesticide run-off.
- **Pollution from towns, cities and transport –** rainwater running over hard surfaces and carrying pollutants into waters, chemicals from contaminated land, and sewage from houses ‘misconnected’ to surface water drains rather than sewers (also known as ‘diffuse urban pollution).
- **Pollution from waste water** – waste water can contain large amounts of nutrients (such as phosphorus and nitrates), ammonia, faecal bacteria and other damaging substances.

Some of the issues described above relate to a single pressure and others are more complex and involve a range of different pressures. Pressures can come from one or more sources (activities). These include:

- Phosphorus, nitrates and faecal bacteria largely originate from livestock manures and human sewage.
- Surface run-off can be contaminated by fine sediment that has both direct and indirect impacts on the condition of the receiving environment. Direct impacts include alteration of the physical characteristics of river channels leading to impacts on the habitat and to 'muddy floods'. Indirect impacts occur because the sediment acts as a vehicle for the transfer of other pollutants, such as phosphorus, nitrate, pesticides and faecal bacteria to rivers, lakes, estuaries and coastal waters.
- A wide range of chemicals used in everyday life, some of which can adversely affect the environment, enter watercourses from point sources (factory and sewage treatment work effluents) as well as diffuse sources, for example road run-off.
- Sewage treatment works and storm overflows are also important point sources of phosphorus, nitrate, faecal bacteria and sanitary pollution.

Table 3. Significant water management issues, by pressure and activity/source

significant water management issues – pressure	Significant water management issues – activity/source based						
	Changes to the natural flow and level of water	**Negative effects of non-native invasive species**	**Physical modification**	**Pollution from mines**	**Pollution from rural areas**	**Pollution from towns, cities and transport**	**Pollution from waste water**
Abstraction and flow	✓						
Chemicals				✓	✓	✓	✓
Faecal contamination and sanitary pollutants					✓	✓	✓
Fine sediment			✓	✓	✓	✓	✓
Invasive non-native species		✓					
Nitrates					✓	✓	✓
Phosphorus and freshwater eutrophication					✓	✓	✓

	Physical modifications			✓				

The sections below provide more information on the individual pressures that have significant impacts on the water environment.

Supporting information

If you would like more detailed information about any of the significant water management issues below then a technical summary is available on the Environment Agency sharefile site https://ea.sharefile.com/d/sae688784f7946fcb

i. Abstraction and flow

Taking too much water from rivers, canals, lakes and groundwater causes problems for wildlife .

Abstraction is the removal of water, permanently or temporarily, from the water environment such as rivers, lakes, wetlands, canals, reservoirs or from groundwater. Water is abstracted to meet a wide range of uses throughout Wales. The effect abstraction has on the environment depends on the amount and timing of the abstraction and the location and amount of water that may be returned after it has been used. Taking too much water from rivers and groundwater may result in lower flows and reduced water levels, which may not support a healthy ecology, affecting wildlife and the look of a river, as well as impacting on other water users.

In the short term, the current actions being taken to restore sustainable abstraction are reducing the impact on some rivers. In the future, population growth and development are likely to require more water to be abstracted. A changing climate may affect both the demand for water and the natural resource present in rivers and groundwater in future. If abstraction continues at current rates (or increases) and natural water resources become depleted due to climate change, the existing impacts of abstraction on rivers, lakes, wetlands and estuaries will be magnified. Although Wales is often viewed as being wet, there are some parts of Wales that do not have any reliable new supplies of water available from rivers and groundwater to meet these future requirements.

We need to ensure there is no deterioration in the ecological condition of rivers due to abstraction. Taking a proportionate approach to managing abstraction and flow pressures can ensure sustainable supplies of water for the public, businesses and agriculture, while making sure rivers and other wetlands support a good ecology.

ii. Chemicals

Toxic and hazardous substances that enter the water environment and can damage wildlife and people and contaminate sources of drinking water.

A vast range of chemicals are used every day, both at home and at work, some of which can adversely affect the environment. These chemicals can enter the environment by many diverse routes, ranging from emissions from industry and sewage treatment works to runoff from roads or farms that ultimately are discharged to coastal waters directly or via rivers. Many of these chemicals come from using products in homes, hotels, restaurants and offices and get into the water environment via sewage treatment works. Other sources of chemicals include industry and agriculture. For some substances, as well as current

emissions from industry and sewage treatment works, there are significant legacy issues. Some substances are already widespread in the environment as a result of past use which has contaminated land and sediment. Some of these substances can accumulate in the food chain and may adhere strongly to sediment. In addition, historic industrial activity such as mining has led to significant transfer of metals from under the ground into the water environment.

Some chemicals can threaten the long-term sustainability of drinking water sources and lead to increased costs of treatment. They may also hinder the transfer of water from areas with abundant supplies to those where supplies are scarce.

There are major challenges to achieving objectives for some designated chemicals under the WFD. For example brominated flame retardants were banned in 2006 but are still present in many home furnishings like sofas and remain in the environment bound to sediments. These types of chemical which are banned or controlled present particular difficulties to achieve relevant standards due to the legacy amount present in the catchment. For some common persistent toxic substances that can accumulate in the environment, the majority of waters may be at risk of not meeting Environmental Quality Standards (EQS), which are set to protect the environment.

iii. Faecal contamination and sanitary pollutants

Contamination with faecal matter is an important factor to consider when protecting people's health. Sanitary pollutants can have direct toxic effects on wildlife, food products or cause damage by reducing the amount of oxygen in the water.

Faecal bacteria affect public health and so it is important to control the amount in the environment. Sewage effluent and runoff from animal manure are the largest sources of faecal organisms. Climate predictions suggest that there is likely to be increased contamination from farmland and urban runoff due to compacted soils and /or less frequent but intense summer rainfall events. These events may also cause an increased frequency of combined sewer overflows and sewage treatment plant flooding.

Faecal bacteria in the water at coastal and freshwater beaches can affect people using these waters, particularly while swimming. Faecal bacteria can accumulate in shellfish, which may result in shellfish harvested for consumption having to be depurated to make sure that they do not pose a risk to human health. If too many faecal bacteria reach rivers and groundwater used for drinking water, the supplies must be treated to make sure they are fit for consumption. Compliance with bacterial standards has improved significantly since the 1990s in designated bathing waters.

Ammonia, dissolved oxygen and biochemical oxygen demand (BOD) (sanitary pollutants) are indicators of the organic pollution of the water environment. Ammonia is toxic and can kill or be otherwise harmful to aquatic wildlife like fish. The higher the biochemical oxygen demand, the greater the potential from organic pollution to cause a drop in dissolved oxygen which can cause stress or, in extreme cases, kill aquatic life. Sewage effluent is the largest source of sanitary pollutants. Sanitary pollutants leading to reduced dissolved oxygen is primarily an issue for rivers and lakes. Compliance with ammonia and dissolved oxygen standards has improved during the last 20 years, primarily due to investment by water companies. Regulation and improved farming practices have also contributed to improving compliance with ammonia, BOD and dissolved oxygen standards.

Small, private drinking water supplies from groundwater can be at particular risk of bacterial pollution. We are working with the Drinking Water Inspectorate and Local

Authorities to see how we can manage the need for purification treatment at private supplies.

iv. Fine sediment

Fine sediment can smother plants, fish eggs and invertebrates in rivers and lakes and also move other pollutants from land into water. Fine sediment can also increase flood risk and cause problems for drinking water supplies, for example by colouring the water.

Too much fine sediment causes a range of problems, from damaging wildlife to increasing the costs of treating drinking water, and increased risk of flooding from silted up drains. Sediment has direct impacts (smothering plants, fish eggs and freshwater invertebrates) and indirect impacts, carrying other pollutants like nutrients, chemicals and faecal contamination into the water environment. Reducing the amount of fine sediment, particularly through improved soil management measures, not only reduces the direct impacts of sediment but also brings wider benefits, including reducing the risk of flooding. Fine sediment results from soil erosion, soil compaction (which increases surface water run-off) and the erosion of riverbanks and road verges.

Climate predictions indicate that there is likely to be increased contamination from sediments from farmland and farm premises and from urban environments. This will be due to washout from compacted soils and from urban environments after first-flush releases during intense rainfall events. Changing crop types and seasonal patterns of agriculture, such as increased winter cropping, will also affect sediment runoff. Research suggests there will be higher sediment loads to lakes and higher up stream systems which may affect fish spawning grounds.

v. Invasive non-native species (INNS)

These Plants or animals originating outside the UK that are introduced and subsequently have negative effects on the health of the water environment and native plants and animals.

They are a direct threat to the ecological objectives we want to achieve through the WFD. INNS are also considered to be the next biggest threat to biodiversity worldwide after habitat loss and destruction.

The total annual cost of INNS to the Welsh economy is currently estimated at over £125 million with indirect costs estimated to be much more. These costs comprise control and eradication work and the additional operational management costs arising from INNS impacts which include structural damage, blocking intakes and pipes and production losses because of their presence for example.

The pressure and risks from INNS is increasing because of the continuing spread of established species and the likelihood of others being introduced because of increasing international trade and travel. Climate change may also increase the survival, proliferation and spread of these species further. We therefore need to develop and implement measures to reduce this pressure, the risks INNS pose to water body ecological status and to also minimise the risk of undermining all the other associated WFD improvement actions we are looking to undertake.

vi. Nitrates

Too much of this nutrient can put drinking water supplies at risk, increasing treatment costs. It can also cause algae and plants to grow excessively, particularly in estuarine and coastal habitats.

The main source of nitrates in our surface and ground waters are agriculture (the largest source) and sewage and, to a lesser extent, industrial effluents.

Around 2% of the land area of Wales is designated as Nitrate Vulnerable Zones (NVZs) under the Nitrates Directive because fresh surface or ground waters have elevated nitrate concentrations. The Nitrates Directive aims to manage nitrate pollution from agriculture in the context of the 50 mg/l nitrate threshold for drinking water resource protection.

Eutrophication is when there is too much nutrient in waters, causing algae and plants to grow excessively leading to an undesirable balance of organisms. This affects the quality of the water and how it can be used, as well as damaging the local wildlife. Nitrogen is the main nutrient in which can lead to eutrophication of estuaries and coastal waters, and is one of the main issues for these waters in Wales. Recent science indicates that nitrogen may also play a role in eutrophication of freshwaters, particularly lakes. Increased temperatures and lower water levels under a changing climate are likely to exacerbate this.

Concentrations of nitrate in surface waters have been gradually declining since peaking in the early 2000s. In groundwater there are indications that concentrations in many locations are declining, but in some places, due to the very slow movement of water through the ground, peak levels of nitrate have not yet occurred.

vii. Phosphorus and freshwater eutrophication

Too much of this nutrient causes algae and plants to grow excessively. This affects the quality of the water and how it is used, as well as damaging the local ecology.

The main sources of phosphorus in our freshwaters are sewage effluent and agricultural drainage. There are several sources of phosphorus within sewage, notably human metabolic wastes, food additives, detergents and the dosing of drinking waters with phosphorus to control lead levels.

Concentrations of phosphorus in Welsh rivers have been falling since 1990, supported by major reductions in phosphorus inputs from sewage treatment works through investment by the water industry to meet EC directives. However, despite this progress, phosphorus remains a common cause of water quality failures in Wales, with 20% of monitored rivers, 32% of monitored lake water bodies currently exceeding the phosphorus standard for good status. Population growth will increase the amount of phosphorus entering sewage treatment works in some areas which, without intervention, may slow or reverse improvements. As for Nitrates, climate change may exacerbate the future extent and severity of eutrophication problems.

viii. Physical modification

Many water bodies exhibit manmade changes to their natural habitat. These modifications can alter natural flows, cause excessive build-up of sediment, increase erosion and reduce the diversity of habitats, thus potentially reducing the quality and quantity of habitat for fish, invertebrates and plants.

Plants, invertebrates and fish are affected by the flows and physical characteristics of the water environment. These hydrological and morphological features are collectively known as the water body's hydromorphology. Aquatic wildlife can be constrained if the quantity and quality of water flows is altered, and if habitat quality is reduced. Modifications such as straightening river channels, building weirs, dredging and reinforcing banks with concrete can constrain and stabilise the physical nature of water bodies, reducing the development and diversity of physical habitats. This, in turn, tends to reduce the number and diversity of animals and plants present. The way land is managed can also adversely

affect habitats, for example by changing the amount of sediment that washes off both agricultural land and urban areas.

Many of the rivers, lakes and coasts of Wales have been modified to provide benefits to people such as land drainage, reduced flood risk to communities, water storage for public water supply, recreation or improved channels for navigation. In many cases these benefits and uses are still vitally important and need to be retained, whilst also reducing their potentially deleterious impacts on flows and habitats, and subsequently on aquatic wildlife.

There is significant uncertainty about future trends for physical modifications but recent assessments indicate that some pressures will increase in response to climate and population changes. Deterioration in the ecological condition of some rivers by 2030 is forecast unless further action is taken to mitigate the impacts of, and control the development of modifications.

4.4.2. Issues affecting Protected Areas

Protected Areas are a priority for action. The same pressures that lead to water bodies not being in good status frequently also lead to Protected Areas not meeting their objectives.

i. Drinking Water Protected Areas

There are a number of surface water DrWPAs in Wales and all ground waters that are used to provide drinking water are designated DrWPAs. The main issues in surface water DrWPAs are pesticides, 47% are at risk of failure of pesticide standards. 33% are at risk for colour, usually from organic compounds found in upland areas and a smaller number are at risk from eutrophication as a result of excess nutrients.

ii. Economically Significant Species

There are 22 designated Shellfish Water Protected Areas in Wales. In 2014, 14% complied with the microbial standard in shellfish flesh. No Shellfish Water Protected Areas have complied with the microbial standard for more than 8 out of the last 10 years. Microbial pollution of shellfish waters originates from multiple point and diffuse sources including combined sewer overflows (CSOs), emergency overflows, urban surface water runoff and rural losses from ‘natural’ (wildlife), farm livestock and human sources. The proportions of these multiple sources of microbial pollution vary from site to site, and in response to weather patterns. Identifying the source of microbial pollution can be very difficult, however significant work to fill this knowledge gap will be completed in the next cycle as part of AMP5.

iii. Recreational Waters (Bathing Waters)

Tougher new standards apply to bathing waters from 2015. In 2014 all 102 designated bathing waters met the mandatory European standard and 90 also met the stricter guideline standard. The most significant sources of pollution affecting bathing water compliance are from sewage works or combined sewer overflows (CSOs); faeces from grazing animals; urban run-off which contains dog and bird faeces; or from birds and animals on the beach (e.g. seagulls, pigeons, dogs, horses and donkeys). The proportions of these multiple sources of microbial pollution vary from site to site, and in response to weather patterns. Identifying the source of microbial pollution can be very difficult.

iv. Nutrient Sensitive Areas (UWWTD)

Under the UWWTD there are four freshwater and two estuarine and coastal waterbodies designated as either sensitive areas eutrophic. Natural Resources Wales has been

working with the water industry for many years to identify and review the measures that are needed to maintain and improve these Protected Areas. Measures include improving treatment at sewage treatment works (for example to control levels of nutrients or bacteria), reducing the spill frequency of permitted intermittent discharges and installation of event duration monitoring to better understand the impact that intermittent discharges are having on the environment. Recently, the water industry has also been identifying innovative measures such as the use of catchment schemes to reduce loadings of diffuse pollutants to help look after Protected Areas. However it can take 20 years for the marine environment to respond at the biological level.

v. Nutrient Sensitive Areas (Nitrate Vulnerable Zones)

Four lakes are designated as N-eutrophic waters, where nitrates from agriculture contribute to the ecological problems associated with excessive algal and plant growth. Agriculture accounts for some of the nitrate entering surface water and ground waters in Wales, with significant variation between and within catchments.

There have been widespread but modest improvements in river nitrate levels, but for groundwater the picture is more mixed. In some water bodies there are improvements but in others there is continued deterioration as nitrate continues its journey to deeper aquifers.

vi Aligning objectives for Natura 2000 rivers and lakes

Article 4 of the WFD states that for protected areas where more than one of the objectives relates to a given water body, the most stringent shall apply.

Following a review by the UK Government's statutory nature conservation advisor (Joint Nature Conservation Committee (JNCC)) of 'common standards monitoring' (CSM) guidance for rivers[3] and lakes[4], some targets have changed in this UK guidance for Natura 2000 Protected Areas. This includes some water quality parameters, including phosphorus. JNCC is currently reviewing the Freshwater Fauna guidance[5].

In Wales these updated JNCC CSM targets will be considered when the Core Management Plan (CMP) for the relevant Natura 2000 sites are revised. The current CMPs have not been updated since published in 2008. Achieving the Conservation Objective targets may take longer than the six years covered by this plan. Our aim is to meet the most stringent by 2027.

We will work with the UK TAG and JNCC WFD/HD alignment group to develop a technical process to align targets and assessment criteria for Natura 2000 sites and coincident water bodies for use in the third WFD planning cycle. We will keep the Liaison Panels informed of any developments.

Supporting information

For more detailed information on the management and restoration of all protected sites and their features contact regional Natural Resources Wales conservation

[3] http://jncc.defra.gov.uk/pdf/CSM_rivers_jan_14.pdf
[4] http://jncc.defra.gov.uk/pdf/0315_CSM_Freshwater_lakes.pdf
[5] http://jncc.defra.gov.uk/pdf/CSM_freshwaterfauna_Aug05.pdf

officers through general enquiries on our website
http://naturalresources.wales/?lang=en

4.4.3 Assessing risk

i. General approach to assessing risk

Article 5 of the WFD requires Member States to identify pressures acting on each water body. This can mean any pressure that on its own, or in combination with other pressures, may promote current or future risk of failing to achieve the environmental objectives of the Directive. The methodology for each risk assessment was tailored to the pressure but in general it was an assessment of the scale of the pressure and the sensitivity of the water body.

Risk assessments produced for the RBMPs have been reviewed. Where new data and information was available the risk assessments have been updated. The table below shows where updated risk assessments are available and the environmental objectives to which they relate.

Table 4. Significant water management issues - risk assessments

Risk Assessment	Environmental Objective						
	Good ecological status			No deterioration			
	2015	2021	2027	2015	2021	2027	2050
Chemicals & metals	✓						
Eutrophication	✓						
Phosphorus	✓						
Faecal Indicator Organisms						✓	✓
Sanitary pollutants					✓		
Sediment	✓						
Abstraction & Flow			✓			✓	
Physical modification	✓						
Groundwater Chemical	✓	✓	✓	✓	✓	✓	
Groundwater Quantitative	✓	✓	✓	✓	✓	✓	
Invasive non-Native Species				✓	✓	✓	✓
Acidification (Wales)				✓	✓	✓	

The current risk of failing to achieve good ecological status or the risk of deterioration in status in 2015 can be informed by classification (monitoring) results and also a current understanding of pressures and water body sensitivity. The projections of risk beyond 2015 are more reliant on forecasts of changes to activities and pressures such as changes in population size, land use and climate.

Each updated risk assessment shown in the previous table followed a four step process:

1. Describing the “driving forces” such as land use, urban development, industry, agriculture and other activities which lead to pressures, without regard to their actual impacts.
2. Identifying activities or changes in activities that may result in a significant pressure (that is, one that presents a risk of failing to meet WFD objectives) on a water body and considering the magnitude of that pressure.
3. Considering the susceptibility of the water body to impact that might result from the pressure.
4. Evaluating the likelihood of failing to meet the objective.

The work involved in assessing whether a body is at risk of failing to achieve its environmental objectives was proportionate to the difficulties involved in making that judgement. Where information was available (for example data, modelling outputs, expert judgement) an estimation of the magnitude of the pressure could be made. Where no information was available it was not possible to specifically represent a pressure. The confidence associated with each risk assessment was variable and attributable to the level of understanding, availability of information and the geographical scale at which information was available, for example local data provides greater confidence for a water body than regional or national data.

ii. Using risk assessments

The WFD requires risk characterisation information to be used to optimise the design of the monitoring programmes (Article 8) and the programmes of measures (Article 11). Many aspects of catchment scale planning will, in part, be informed by the water body risk assessments.

- To report projected future risk of deterioration and risk to status objectives with associated reasons for risk and apportionment of sources of risk.
- To help inform whether failure to achieve an objective is due to an environmental problem.
- To inform classification as part of a consideration of the weight of evidence.
- To inform design of the monitoring programme, input into designing future investigations and programmes of measures.
- To inform strategic environmental planning to future proof actions and measures and maximise cost effectiveness and benefits into the future.

Supporting information
Risk assessment results are available on our website:
https://naturalresources.wales/water/quality/?lang=en

4.4.4 Reasons for not achieving good status and reasons for deterioration

Where an element is classified as being at less than good status an assessment is needed of the actions that could be taken to improve the status to good. In order to identify appropriate actions it is first necessary to understand the cause of the failure. The cause is recorded using a defined set of reasons. Where a biological element, for example fish or invertebrates, is at less than good status the pressure, for example ammonia or sediments, causing the failure is also identified.

In addition to identifying the pressure responsible for not achieving good status we also identify the type and source of the problem. This consists of three pieces or tiers of information.

- Tier 1 = significant water management issue, for example ‘diffuse source’, ‘point source’ or ‘physical modification’.
- Tier 2 = more detailed activity or source, for example ‘arable field’, ‘sewage discharge (continuous)’ or ‘flood protection structures’.
- Tier 3 = category and sector, for example ‘agriculture and rural land management’, ‘water industry’ or ‘Natural Resources Wales’.

If more than one reason for not achieving good status is identified for a failing element (or for a pressure affecting a biological element) then the source apportionment of each reason is also recorded. For example, if there are two sources of ammonia, a diffuse source and a point source, then the relative contribution of each source to the overall ammonia problem is recorded.
A level of certainty (suspected, probable or confirmed) is also assigned to each reason for not achieving good status, based on a weight of evidence approach:

- Suspected
  - There is some information that points to a possible reason for not achieving good status.
  - Further investigations are required before site specific measures can be identified.
  - Part of the source-pathway-receptor linkage is missing, for example a probable source and receptor has been identified but the pathway is not established.
- Probable
  - There is reasonable evidence that points to the reason for not achieving good status.
  - Further investigations are required before site specific regulatory or expensive measures can be considered.
  - The source-pathway-receptor linkage has been established with reasonable certainty. There is reasonable evidence which generally give a consistent (that is, not contradictory) picture.
- Confirmed
  - There is compelling evidence for the reason for not achieving good status. The available evidence should demonstrate cause and effect in a way that would be compelling to all stakeholders.
  - No further investigations into the reasons for not achieving good status are required before site specific regulatory or expensive measures can be justified.
  - The source-pathway-receptor linkage has been established. There is good evidence which gives a consistent (that is, not contradictory) picture.

Defining the problem in this way supports the appraisal of appropriate actions or measures to address the problem. The source apportionment information informs the targeting of effort and the analysis of the costs and benefits of any actions. The same approach is used for recording reasons for deterioration where a change in status class is detected.

As a result of the programme of investigations carried out since 2009, the certainty associated with the reasons for failure data has improved.

Supporting information
You can find the reasons for not achieving good data for water bodies in Wales on **Water Watch Wales**: http://waterwatchwales.naturalresourceswales.gov.uk/en/

5. Identifying measures and objectives

Summary of this section
This section sets out the overall approach to determining objectives and measures including the role of economic assessment

Topics covered
Environmental objectives, Programme of Measures and economic assessment

The river basin management planning process is about using our evidence base to develop a Programme of Measures and set water body objectives. The following sections provide further information on:

- WFD objectives and our approach to setting alternative objectives
- Our approach to developing the Programme of Measures

Supporting data and information can be accessed on **Water Watch Wales** http://waterwatchwales.naturalresourceswales.gov.uk/en/ and further information is available on request.

5.1 The environmental objectives of the Water Framework Directive.

The environmental objectives of WFD are set out in Article 4 and for these second cycle RBMPs can be summarised as:

- prevent deterioration in WFD status

For Protected Areas:

- achieve the objectives specified in the Directive under which they were established by 2021. For water dependent Natura 2000 sites we will aim to achieve conservation objectives, achieving good status by 2021 is a milestone towards this objective.
- Endeavour to achieve the microbial standard in shellfish flesh for Shellfish Water Protected Areas by 2021 unless it is justified to use an extended deadline to 2027.

For surface waters:

- achieve good ecological status/potential by 2021
- achieve good chemical status by 2021

For all groundwaters:

- achieve good quantitative & chemical status by 2021

WFD also allows for alternative objectives (i.e. an extended deadline or less stringent objective) to be set where certain conditions are met. We must provide justifications within the RBMP. These are set out in Paragraphs 4.4 and 4.5 of the Directive. We can extend a deadline where:

- the scale of improvements required can only be achieved in phases exceeding the timescale, for reasons of technical feasibility
- natural conditions do not allow timely improvement in the status of a water body (can extend beyond 2027)
- completing the improvements within the timescale would be disproportionately expensive

Where appropriate we can set a less stringent objective (i.e. less than good) where measures are:

- technically infeasible, or
- disproportionately expensive

When applying a less stringent objective we must still aim for the highest status possible.

5.2 Setting water body objectives

In line with guidance from government we have set objectives for every water body. Measures to prevent deterioration and protected area objectives set under other European legislation are considered statutory, and are not subject to alternative objectives under WFD.

Objectives have been set at element level and then aggregated to produce an ecological, chemical and overall objective for every water body. The default objective for all elements in this second cycle RBMP is good by 2021. We have only applied exemptions: extended deadlines or less stringent objectives, where we have robust evidence and believe it is not realistic to set an element objective of good by 2021. It is possible for a water body to have more than one justification for not achieving good by 2021.

The first cycle investigations programme provides our evidence base for setting water body objectives. The conclusion of each investigation is summarised within the Reasons for Not Achieving Good dataset. A snapshot of this data from June 2015 provided the basis for setting objectives in the second cycle RBMP.

We have extended the deadline to achieving good by 2027 in the following cases:

- **Technically infeasible** - cause of adverse impact unknown. Further investigation is required during second cycle. Applied to new 2015 failures and existing cycle one failures where reason for not achieving good still needs to be identified.
- **Ecological recovery time** - measures in place but natural ecological recovery will take longer to occur than 2021. Applied to pH and ANC failures, where atmospheric deposition (acidification) is identified as the reason for not achieving good. This is on the basis of evidence of the effectiveness of international measures to address emissions and UK evidence of site recovery.

We have set an objective of less than good by 2027 (less stringent objective) in the following cases:

- **Background (natural) conditions** – not true failures. It is our expert judgement that classification tools have set the wrong baseline for the water body. This applies mainly where our fish classification has not accounted for natural barriers to migration (e.g. waterfalls)
- **Technically infeasible - no known technical solution is available.** Only applied to ground water bodies which fail because of legacy metal mine contamination. In order to pass we would need to address all metal mine impacts on related surface waters.

- **Disproportionately costly – unfavourable balance of costs and benefits.** Costs significantly exceed benefits (greater than 2:1). A small number of sites were identified through a screening process and consulted on in the consultation (See section 5.3).

The affordability of measures has not been considered when applying exemptions.
In order to meet our protected area requirements exemptions have not been applied to water bodies that are part of Natura 2000 sites, or upstream of freshwater Natura 2000 sites. The only exceptions are where water bodies are recovering from acidification, and it is agreed ecological recovery time is an applicable justification for extending deadlines; and where investigation has confirmed a failure is due to natural background conditions, resulting in a less stringent objective.

Water body information can be accessed on **Water Watch Wales**.

http://waterwatchwales.naturalresourceswales.gov.uk/en/

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

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

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

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

The current condition of Natura 2000 water dependant features are given in the **Progress Report**. In Wales the default objective for all Natura 2000 sites is favourable condition by 2021. We have only proposed an extended deadline where we have robust evidence that 2021 is not achievable. There are two circumstances where this is the case:

1. Ecological recovery time. A number of sites are still impacted by historical acid deposition. Measures to reduce emissions have been implemented and there is UK and local evidence of recovery. However we do not think objectives will be achieved by 2021.
2. Technically infeasible. A number of sites are impacted by the presence of invasive non-native species (INNS) (e.g. American signal crayfish, Himalayan balsam). In most of these cases it is technically infeasible to eradicate the INNS by 2021.

In England extended deadlines were applied to Natura 2000 sites based on expert judgement and data held in the Site Improvement Plans (SIPs). SIPs were used to identify

which sites had WFD relevant issues and remedial actions identified from 2021 onwards, and also sites where none had been identified or a pressure was not yet confirmed.

5.3 Screening for disproportionate cost

In order to identify the water bodies which it might be least cost-effective to deliver to good overall status a broad-based cost-benefit analysis (CBA) was undertaken. To make effective use of resources, this was not intended as a definitive analysis but one which used 'averaged', indicative costs together with more detailed information gathered from Natural Resources Wales local teams and the Environment Agency's National Water Environment Benefits Survey (for England and Wales).

The primary purpose of using CBA was to identify where we believe good overall status by 2021 is most likely to be disproportionately costly at the water body scale. With regard to these 'disproportionate costs', draft alternative objectives were only set where it seems likely that net present costs appreciably exceed net present benefits and local expert knowledge supported this judgement (in line with European guidance on alternative objectives – document 20). The critical Benefit Cost Ratio (BCR) threshold was set at 0.5 – where costs seem likely to outweigh the benefits by a factor of 2:1. For completeness, the process was run on all water bodies. In the case of Protected Areas and heavily modified water bodies alternative objectives were not set on the basis of disproportionate cost.

Estimating the costs

Indicative costs were applied to the water body measures required to achieve good overall status by 2021. Where more specific and detailed costs were available (e.g. for water company and minewater schemes) Natural Resources Wales utilised this information and sought to clarify accuracy with local expert knowledge.

The table below shows the measures and indicative costs applied per water body, along with a summary explanation of how these costs have been estimated.

Table 5. Measures and indicative costs

Measure	Data source & assumptions	Indicative cost per water body (discounted value)
Target sustainable agricultural interventions	Estimate of targeted improvements to riparian management, based on review of river walk data. Unit cost for fencing = £15k per km fence both banks. Assumed 15 year fence replacement.	Costs vary according to river water body length: <10km = £50k; >10km = £100k Typical value = £140k
Improve fish passage	Estimate of implementing a single large barrier removal or non-technical fish pass.	£100k
Minewater scheme	Estimate based on EA costs for Force Crag scheme, further informed by local expert knowledge.	Varies but discounted valuation was around £1.9 million. Some water bodies required more than one scheme. Typical value = £2.4m

Measure	Data source & assumptions	Indicative cost per water body (discounted value)
Tackle misconnections	Based on information from the Swansea Bay 'Clear Streams' project. Costs are employee remuneration for a targeted campaign over a 2 year period.	Typical value = £130k
Reduce pollution from septic tanks	Estimated as similar to misconnections work (above). Costs are employee remuneration for a targeted campaign over a 2 year period.	Typical value = £130k
Mitigate impacts of flood and coastal defences	Estimates based on local mitigation measures investigations. All costs assumed to be capital expenditure.	Typical value = £1.7m
Reduce pollution from sewage treatment	Based on costs provided by water companies. Some water bodies require more than one scheme. Asset renewal assumptions based on split between asset types.	Typical value = £3m
Target sustainable woodland and forestry management	Estimate of improving riparian management costs based on unit costs per km length of river water body.	Typical value = £188k.
Acidification restoration	Data extrapolated from the Plynlimon project and based on unit costs per km.	Typical value = £45k.

In the main these are the most common interventions that are required. Most attention was given to those where capital outlay is highest – flood defences, sewage treatment works and metal mine remediation. In contrast, many of the smaller scale interventions were left as indicative values. Some lower cost interventions were modelled at a multiple of a unit cost per length of water body. Furthermore, where possible, costs were broken down into capital expenditure and annual operational expenditure and asset lifespans estimated. In some cases this required an apportioning of asset replacement based on the mix of assets.

Examples of interventions that were not costed specifically are:

- basic regulatory measures (e.g. the cost of meeting existing requirements)
- no deterioration measures
- protected area measures – except for shellfish waters
- investigations (ongoing and new)
- contaminated land remediation
- interventions to resolve urban diffuse and industrial estate pollution
- heavily modified flows and impoundment mitigation measures
- non-heavily modified flood and land drainage interventions
- navigation mitigation measures

- invasive species management
- mitigation of other physical modifications (non-heavily modified)

Not all failures are fully understood and, therefore, it was impossible to estimate the costs of remediation in circumstances where for example investigations are still ongoing or required.

Estimating the benefits

The benefits side of the CBA was focused entirely around valuations of water environments from the National Water Environment Benefits Survey (NWEBS). NWEBS is a stated preference survey examining how people value the water environment. When undertaken (and, more recently, updated) it produced estimates of the non-market benefits generated from improving the ecological quality of all water body types (rivers, lakes, estuaries and coastal waters). This has allowed Natural Resources Wales to quantify the benefits of improving overall quality from, say, Moderate to Good or Poor to Good in different catchment areas. The divergence between valuations in different catchments is driven essentially by population density.

Benefits were estimated on the basis of improving the whole water body length or area to good overall status.

Discounting

Discounting converts future values into net current values. This is necessary because the recent is valued more than the future for a number of reasons, including:

- Pure time preference: the simple fact that people prefer to have things now rather than in the future;
- The risk of something catastrophic happening at some point over the period in question;
- The assumption of ever-increasing future consumption.

Monetary values for costs and benefits were discounted over a 40 year period in accordance with the HM Treasury Green Book framework and factors were applied to both the costs side and the benefits side using a 3.5% rate of discount for the first 30 years and 3.0% thereafter.

Local expert knowledge

Costs and benefits were ‘sense-checked’ by local teams. The focus was on higher cost interventions – for example, the likelihood that a minewater remediation scheme would deliver good overall status; and on identifying additional down or upstream benefits within the catchment.

Results

A small number of water bodies with BCRs lower than 0.5 were identified (see Table 6). In all cases this was the result of a high capital cost intervention (sewage treatment works or minewater remediation) being required. Lower cost interventions such as agriculture/forestry management and fish passage improvement tended to be highly effective in BCR terms and, therefore, where there were no high capital cost interventions in a water body, interventions tended to indicate a very high social return to investment.

It was important for Natural Resources Wales to critically assess confidence in the results. Generally, the results for rivers seem reliable. However, whilst Natural Resources Wales followed the standard Environment Agency methodology with regard to lakes, we do not believe that the results are robust.

First, we applied the same modelled costs to lakes as for river water bodies. However, we believe that it is likely there may be some additional costs to achieving WFD objectives in a lake environment, because of their ecological sensitivity. Second (and more importantly), we believe that NWEBS may not accurately be representing the potential benefits of getting lakes to good overall status. A much higher proportion of lake water bodies fell initially within the disproportionately costly zone when compared to river water bodies, this suggests that there was some sort of mismatch between the area-based valuation of the former and the length-based valuation of the latter. Therefore we believe that the potential benefits of raising the standard of lakes is undervalued in the survey.

The CBA also provided the basis for estimating the costs and benefits of the Programme of Measures across Wales and allowed us to model a number of different scenarios in order to support the consultation.

Table 6. Water bodies in Wales where we have proposed good overall status by 2021 is disproportionately costly.

Water body ID	Short name	RBD	Main cost drivers
GB110063041590	Melindwr	Western Wales	Minewater, sewage treatment and other
GB110063041630	Bow Street Brook	Western Wales	Minewater
GB109054044720	Afon Cerist	Severn	Minewater and other
GB109057027080	Nant Dowlais	Severn	Sewage treatment and other

5.4 Programme of Measures

The challenges that threaten current and future uses of the water environment are managed by measures to maintain and enhance the water environment. In the second cycle RBMPs we have summarised water body (local) and strategic measures that are planned for delivery:

- water body measures – those actions that are required to take place at the local scale. For example, the removal of invasive plants along a length of designated river or changes in land management practice to address diffuse pollution. This information is available on **Water Watch Wales**.
- strategic measures - these usually apply to the whole of Wales, England and Wales, or the United Kingdom. In general these set the legislative, policy or strategic approach and support, or are critical to local delivery and environmental outcomes. For example, a national ban on using a particular chemical or a national strategy for prioritising and funding the remediation of abandoned mines. The second cycle RBMPs include a summary for each of the significant issues of updated measures which are planned to be delivered during the second cycle (2015-21). The information is also available on **Water Watch Wales**.

The updated Programme of Measures is informed by new evidence and information developed during the first cycle. This includes:

- review of progress in implementing the Programme of Measures established for the 2009 RBMP (2009-15)
- conclusions from the first cycle WFD investigations programme.

- for Natura 2000 sites actions identified by the LIFE Natura 2000 programme in developing the Prioritised Improvement Plans (PIPs) and Thematic Plans - August 2015. See below for more information.
- water company actions identified in the National Environment Programme (September 2015), including actions and investigations to achieve WFD good status, no deterioration and Protected Areas objectives.
- actions required to meet no deterioration and protected area objectives.
- priority actions identified within Welsh Government's Water Strategy for Wales
- feedback from stakeholders via consultation and engagement (e.g. WFD, LIFE project)

All the measures reported in the RBMP are currently identified as resourced and planned. We have not included measures where there is uncertainty of funding. We will review delivery of this programme and envisage that it will evolve during 2015-21 e.g. funding for new measures may be identified.

Water body measures

During the development of the second cycle RBMP we have worked with a Liaison Panel Task and Finish Group to try and better understand how we can facilitate the delivery of local environmental improvements, in particular where a water body requires delivery of more than one solution to achieve good status.

To support the delivery of the RBMPs we have published a summary of planned local water body actions on **Water Watch Wales**.

All the planned water body measures are those currently identified as resourced. These include:

- Natural Resources Wales' programme
- WFD and Natura 2000 programmes
- Water company actions identified in the National Environment Programme

Supporting information

Further information on the LIFE Natura 2000 Programme is available on the Natural Resources Wales website.

5.5 Economic appraisal

The valuation of environmental costs and benefits is an evolving and developing field. Knowing that the benefits are likely to justify the costs of implementing an intervention ensures that public finances are used appropriately and effectively. In order to develop a costed programme an ex-ante CBA was undertaken of what return in terms of public value could be expected from investments in Welsh waterbodies. For the consultation four scenarios were developed to help explain and describe the outcomes that are achievable by 2021; the overall costs and benefits; apportionment of costs across the types of intervention and relative cost-effectiveness.

The CBA method provided the basis for estimating the total costs and benefits of the Programme of Measures for water bodies in Wales. To be consistent with the water industry appraisal the costs and benefits were discounted over 40 years.

As described in the CBA method not all measures were costed, therefore in order not to under-estimate the overall programme, total costs were multiplied by an additional factor of 20%. It should also be noted that potentially benefits have been under-estimated in our model. Ecosystems services, for example, such as flood regulation, water company treatment cost savings and commercial fishery benefits, as well as other potential benefits have not been monetised. There is no value in spending additional resources to monetise these welfare gains once the benefit cost ratio (unity) threshold had been crossed. Where no cost data was available for measures to improve a water body no benefits have been calculated.

For the second cycle RBMPs we have planned on the basis of our current understanding of existing resources. Alongside this we also assessed discounted costs and benefits for Natural Resources Wales planned measures to improve water bodies from bad, poor, and moderate status by 2021, in order to inform decision making:

- expected values were calculated based on the risk that an action could fail to meet objectives. For example, for catchment sensitive farming schemes not every landowner targeted will take up the recommended actions. Expert judgement was used at the local level to determine the risk of failure (of getting to good) for each bundle of measures.
- for each water body the risk that a bundle of measures could fail was ranked either as high, moderate or low in relation to the risk factor, e.g. landowner participation = moderate risk of failure.
- we have included factors for Natural Resources Wales staff time and input duration.

5.6 Objectives for Shellfish Water Protected Areas

Measures have been proposed for Shellfish Water Protected Areas, which aim to improve those waters in order to endeavour to observe the microbial standard in flesh. The preliminary analysis of benefit to cost ratio of meeting objectives of Shellfish Water Protected Areas was presented as part of the consultation. It has not been possible to complete the knowledge and information gaps of that analysis to be able to present a satisfactory cost/benefit analysis to all stakeholders. It is envisaged that the cost/benefit analysis will be re-evaluated to a higher degree of accuracy during the second cycle and presented directly to stakeholders and via the RBMP Liaison Panels.

It is anticipated that in the future, measures to endeavour to observe the microbial standard will be proportionate to benefits gained by achieving relevant objectives. There is a significant amount more understanding of the behaviour of microbial pathogens in the estuarine and coastal environment and their interactions with shellfish required before we can be confident of achieving and maintaining the microbial standard in flesh. For this reason the objective to endeavour to achieve the microbial standard is extended to 2027 due to reasons of technical infeasibility.

6. Summary of Engagement

Summary of this section
This section looks at the engagement work we have done including public access to information, consultations and forward look.

An important principle of the WFD is the engagement and involvement of a wide range of partners and stakeholders. As a first step to raise awareness and help secure this, stakeholders and the public need access to the information for the second cycle plans.

In order to gain a more detailed insight into the views of stakeholders on the RBMPs, there have been a number of consultations on specific aspects, this is also required by the Directive. This has helped Natural Resources Wales develop proposals in the second cycle RBMPs the outcomes from these consultations are summarised in this section.

Producing the RBMPs has benefitted from the active involvement of many stakeholders in the planning process and will be critical for the implementation and delivery over the coming years. This includes the input of the RBD Liaison Panels and those who attended the management catchment workshops held across Wales.

In the cross border catchments, Natural Resources Wales is committed to working with the Environment Agency, Natural England and our partners in England.

6.1 Public access to information

Information has been made available to stakeholder and the general public through the following;

Natural Resources Wales Website

Technical water body level information on objectives, classification status and identified risks as presented in the plan.

A river basin management web page includes:

- Background documentation used in RBD Liaison Panel meetings and the minutes of meetings.
- Information about RBDs and guidance for key sectors.
- All documents and supporting information
- Publication of responses to consultations
- Contact details for Natural Resources Wales staff involved in river basin management.
- For the Severn RBD, details of where the 2015 RBMP for the Severn can be accessed and contact details for the Environment Agency.

Water Watch Wales

This is an interactive spatial web based tool that provides supporting information and data to assist partners. It enables the user to navigate to their area of interest and review the available information about that specific area and a user guide is provided on screen.

Other methods that we have used to communicate include;

- Direct electronic mail outs

- Presentation
- Public Notes
- Fact Sheets/Briefings
- Social Media
- Living Waters for Wales External Update and Case Studies

6.2 Consultations

To date there have been three formal consultations leading up to the second cycle RBMPs. These include:

Working Together: 22 June 2012 to 22 December 2012

We sought views on how stakeholders could work together to contribute to the second cycle RBMPs

From the Working Together consultation you told us that:

- you want to be involved in your local area and on specific issues that are important to you.
- we need to engage with a wider audience – not just the usual organisations.
- you want liaison panels to be more active in the planning process.
- we need to make it easier for people to be involved – by using language appropriate to the audience we are talking to, and improving our information and the way it is made accessible.
- for Western Wales RBD – number of management catchments should be increased from 5 to 9.

The consultation was published on the website. It was promoted at meetings and workshops including the Wales Biodiversity Partnership Conference and a conference run by the Welsh Local Government Association. We also raised awareness and obtained feedback from meetings for each sector that were held by others.

We also highlighted the consultation across 400 organisations and individuals. Use was made of social media and social networking sites such as Linkedin, Wales Small Business Forum and Local Authority network. Local papers (Western Mail and Liverpool Daily Post) with a combined coverage of over 50,000 people were also used.

The Liaison Panels provided support and contributed to the development of the consultation at RBD panel meetings and promoted the consultation through their networks.

Across Wales 80 responses were received and included those from individuals and different types of groups and organisations.

Challenges and Choices: 22 June 2013 to 22 December 2013

We sought views on the significant issues for the water environment, the best ways to tackle them and what the priorities should be.

This was accompanied by a strategic environmental assessment scoping document that we asked for views on whether we have focussed on the key environmental effects and if there any additional information that we should take into account.

The Challenges and Choices consultation documents for the Dee and Western Wales were published on our website and the Severn on the Environment Agency's website; hard copies were also available on request.

The consultation was promoted at meetings and workshops including the Water Health Partnership annual conference, the Royal Welsh Show, Abstraction Reform Workshop and local events such as the Pembrokeshire Agricultural Show and the Big Dee Day.

The consultation was promoted across 522 organisations and individuals using email and through social media tweeting to over 4,000 twitter followers. Local papers with a combined coverage of over 50,000 people were also used. This included the Western Mail and Liverpool Daily Post. Internally we promoted the consultation Natural Resources Wales staff through Yr Wythnos, our internal weekly newsletter.

Natural Resources Wales were supported by the liaison panels. They contributed to the development of the consultation document at RBD panel meetings and promoted the consultation through their networks. For example, the National Farming Union Cymru included a news article in Farming Wales which is received by 8,000 farmers and landowners across Wales.

Across Wales 50 individuals and 54 different types of organisations responded to the Challenges and Choices consultation. A copy of the responses are included in the 'Supporting Evidence – Responses to the Challenges and Choices Consultation' document and are available on our website.

Management Catchment Workshops December 2013 and March 2014

A series of 16 Management Catchment workshops were held across Wales.
The Severn Uplands workshop was arranged jointly with the Environment Agency.
The Wye workshop was arranged by the Wye and Usk Foundation and three workshops were arranged by the Welsh Dee Trust.

These gave us an opportunity to explore with our partners how we can work together at a local scale. They have been key to our on-going engagement and have helped provide essential local knowledge. The information gathered was used in the management catchment summaries that supported the second cycle RBMPs.

Consultation on the second cycle River Basin Management Plans: 10 October 2014 to 10 April 2015

This consultation gathered views on how we update the second cycle plans. These views were essential to shape and develop the statutory RBMPs and the actions planned for improvements between 2015 and 2021.

The consultation documents for the Dee and Western Wales were published on our website and the Severn on the Environment Agency's website; hard copies were also available on request.

The consultation was mailed out to 658 organisations including those individuals who had attended the 16 catchment workshops using email and social media. We reached 115 more stakeholders than we did for the Challenges and Choices consultation in 2013, both as a result of the catchment workshops and requests to be added to our circulation list.

The consultation was promoted via existing networks at a national and local level. It was shared at a total of 62 various national and local workshops sector meetings/workshops in locations across Wales, 16 of these were national meetings. Events included the Lakes

Conference, Energy UK Forum, Wales Land Management Forum, Marine Strategy Framework Directive Workshop, National Access Forum, Pembrokeshire Coastal Forum, Mine Waters Conference, Wales Environment Link, Wales Shellfish Forum, Bangor Mussel Producers, Wales Water Industry Forum, Welsh Government Stakeholder Forum Group, Trade Liaison event as well as local fisheries groups and wildlife trusts. A total of 1,082 people attended the meetings and events.

Through social media, we issued tweets, it is estimated that 4,261 twitter followers have read the tweets. Adverts were placed in the Western Mail and Daily Post with a combined coverage for Wales' RBDs of over 50,000 people. The consultation was promoted in the Living Waters for Waters Update; an external newsletter that captures good stories of those groups and organisations that are delivery improvements to the water improvement.

Natural Resources Wales were supported by the Liaison Panels. They contributed to the development of the consultation document at RBD Liaison Panels and promoted the consultation through their networks.

A total of 100 responses were received to the consultation; five at an all Wales level, 29 for the Dee RBD and 66 for the Western Wales RBD. A summary document of the responses was published on 10 July 2015. It included a summary of the comments received and an analysis of the main themes raised by respondents. It also gave an overview of the actions we proposed to take in finalising the second cycle RBMPs (2015-2021). The consultation summary is available on our website and has been circulated to all consultees.

The responses for the Welsh part of the Severn RBD will form part of the summary of responses produced by the Environment Agency in consultation with Natural Resources Wales.

6.3 Forward Look 2015-2021

If we are to achieve the aspirations and objectives of the WFD work will need to begin on some of the more challenging solutions to improve the water environment. In some cases it will take many years to both identify and implement cost effective solutions and release the environmental benefits of the actions that are taken. It is also recognised that in some instances we already know the solutions and have the tools but we need the application of these through a planned programme with appropriate resources (people and money).

During this cycle the aim will be to set out the steps required to deliver additional improvement. In some instances there may be opportunity to bring forward these improvements rather than wait until the next six year review in 2021, or at a minimum ensure the correct steps are in place to deliver these improvements by 2027 to meet the overall aspirations of WFD within three complete planning cycles from 2009 to 2027. Wherever possible we will bring forward improvements to meet the objectives of the WFD, the natural resources management approach set out in Section 3.4 will be key to achieve these additional wider outcomes for people and wildlife.

The environment is under constant pressure from change and this needs to be recognised as part of the river basin planning process, this may include the effects of;

- Changes in government policy
- WFD Risk Assessments forecasts to 2027

- Climate Change
- Population growth and distribution
- New major infrastructure projects
- Our productive capacity
- Changing demand on our natural resources
- Invasive non-native species
- New chemical pollutant concerns
- New evidence, emerging science and research

7. Annex VII requirements

WFD Annex VII requirement	Location within updated plans
A1. a general description of the characteristics of the river basin district required under Article 5 and Annex II. This shall include:	
A1.1 for surface waters:	
- mapping of the location and boundaries of water bodies	Water Watch Wales
- mapping of the ecoregions and surface water body types within the river basin	RBMP summary section 2 and Water Watch Wales
- identification of reference conditions for the surface water body types	Annex section 4.1.1
A1.2 for groundwaters:	
- mapping of the location and boundaries of water bodies	Water Watch Wales
A2. a summary of significant pressures and impact of human activity on the status of surface water and groundwater, including:	
- estimation of point source pollution	RBMP summary section 2.3 and 3.3; Annex section 4.4
- estimation of diffuse source pollution, including summary of land use	RBMP summary section 2.3 and 3.3; Annex section 4.4
- estimation of pressures on the quantitative status of water including abstractions	RBMP summary section 2.3 and 3.3; Annex section 4.4
- analysis of other impacts of human activity on the status of water	RBMP summary section 2.3 and 3.3; Annex section 4.4
A3. identification and mapping of protected areas as required by Article 6 and Annex IV	RBMP summary section 3.2, 3.3 and 4.2 and Water Watch Wales
A4. a map of the monitoring networks established for the purposes of Article 8 and Annex V and a presentation in map form of the results of the monitoring programmes carried out under those provisions for the status of:	
A4.1 surface water (ecological and chemical)	RBMP summary section 2.2 and Water Watch Wales
A4.2 groundwater (chemical and quantitative)	RBMP summary section 2.2 and Water Watch Wales

WFD Annex VII requirement	Location within updated plans
A4.3 protected areas	RBMP summary section 2.2 and Water Watch Wales
A5. a list of the environmental objectives as established under Article 4 for surface waters, groundwaters and protected areas, including in particular identification of instances where use has been made of Article 4.4, 4.5, 4.6 and 4.7 and the associated information required under that Article	RBMP summary section 4; Annex section 5 and Water Watch Wales
A6. a summary of the economic analysis of water use as required by Article 5 and Annex III	Annex section 3.7
A7. a summary of the programme or programmes of measures adopted under Article 11, including the ways in which the objectives established under Article 4 are thereby achieved	
A7.1 a summary of the measures required to implement Community legislation for the protection of water	RBMP summary section 3
A7.2 a report on the practical steps and measures taken to apply the principle of recovery of the costs of water use in accordance with Article 9	Annex section 3.7
A7.3 a summary of the measures taken to meet the requirements of Article 7	RBMP summary section 3
A7.4 a summary of the controls on abstraction and impoundment of water, including reference to the registers and identification of the cases where exemptions have been made under Article 11.3(e)	RBMP summary section 3
A7.5 a summary of the controls adopted for point source discharges and other activities with an impact on the status of water in accordance with the provision of Article 11.3(g) and 11.3(i)	RBMP summary section 3
A7.6 an identification of the cases where direct discharges to groundwater have been authorised in accordance with the provision of Article 11.3(j)	RBMP summary section 3
A7.7 a summary of the measures taken in accordance with Article 16 on priority substances	RBMP summary section 3
A7.8 a summary of the measures taken to prevent or reduce the impact of accidental pollution incidents	RBMP summary section 3
A7.9 a summary of the measures taken under Article 11(5) for bodies of water which are unlikely to achieve the objectives set out under Article 4	RBMP summary section 3
A7.10 details of the supplementary measures identified as necessary in order to meet the environmental objectives established	RBMP summary section 3
A7.11 details of the measures taken to avoid increase in pollution of marine waters in accordance with Article 11.6	RBMP summary section 3
A8. a register of any more detailed programmes and management plans for the river basin district dealing with particular sub-basins, sectors, issues or water types, together with a summary of their contents.	No supplementary plans have been produced

WFD Annex VII requirement	Location within updated plans
A9. a summary of the public information and consultation measures taken, their results and the changes to the plan made as a consequence	Annex section 3.3 and 6
A10. a list of competent authorities in accordance with Annex I	Annex section 3.9
A11. the contact points and procedures for obtaining the background documentation and information referred to in Article 14.1 and in particular details of the control measures adopted in accordance with Article 11.3(g) and 11.3(i) and of the actual monitoring data gathered in accordance with Article 8 and Annex V	RBMP summary section 1
B. the first update of the river basin management plan and all subsequent updates shall also include	
B1. a summary of any changes or updates since the publication of the previous version of the river basin management plan, including a summary of reviews to be carried out under Article 4(4), (5), (6) and (7)	RBMP summary section 1
B2. an assessment of the progress made towards the achievement of the environmental objectives, including presentation of the monitoring results for the period of the previous plan in map form, and an explanation for any environmental objectives which have not been reached	RBMP summary section 2; Progress report section 2.4, 3.4, 4.4and 5.4 and water watch wales
B3. a summary of, and an explanation for, any measures foreseen in the earlier version of the river basin management plan which have not been undertaken	RBMP summary section 2.4 and Progress report section 2.2, 3.2, 4.2 and 5.2
B4. a summary of any additional interim measures adopted under Article 11(5) since the publication of the previous version of the river basin management plan	RBMP summary section 2.4 and Progress report section 2.2, 3.2, 4.2 and 5.2

8. Mechanisms for protecting the water environment

This section focuses on the statutory and voluntary mechanisms needed to translate measures into outcomes.

Mechanisms describe the policy, legal or financial tools needed to implement a particular measure. For example, a legal mechanism may require that a particular activity can only be carried out in accordance with an environmental permit and its conditions. In this case the measure would be to ensure that all such activities have appropriate permits in place, and the legislation underpinning it provides the 'mechanism' to ensure the environment is protected.

A range of mechanisms can be used, from regulatory interventions for example, permitting and enforcement to non-legislative approaches such as providing advice and guidance. Mechanisms are often used in combination to give effect to particular measures.

Some mechanisms have been established at the European Union level to deal with issues that are common across several European Union countries or which occur across state boundaries. Individual member states can also put in place mechanisms to address local problems or to supplement European Union wide mechanisms.

Bathing Water Directive

Bathing Water quality is assessed using the revised Bathing Water Directive (2006/7/EC) which includes tighter microbiological standards and a requirement to provide information about bathing waters on signs at beaches and online. In addition, the public must be informed about bathing water quality and beach management. The directive classifies waters into four categories - excellent, good, sufficient and poor. Bathing waters must be classified as at least 'sufficient' standard by 2015.

How this directive is implemented

The Bathing Water Directive is implemented through the Bathing Water Regulations 2013. Natural Resources Wales is the competent authority under the Regulations. These regulations are supported by other mechanisms that control pollution from particular points or from more widespread, or diffuse, sources. There have been significant improvements in bathing water quality as a result of improving discharges from water company sewage treatment works and the sewerage infrastructure. These improvements have been funded through the price review of water companies' spending, which includes environmental investments. The revised directive was transposed into domestic law in 2008 and the requirements are being phased-in during the period to 2015.
You can find further information here:
http://naturalresources.wales/water/quality/?lang=en

Habitats and Birds Directives

The directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) aims to protect biodiversity through conservation of natural habitats and wild plants and animals. Representative areas with these habitats and species must be designated as Special Areas of Conservation. Measures must be introduced to maintain or restore to 'favourable conservation status' the natural habitats and populations of wild plants and animals identified as important within the European Union (as specified in annexes to the directive).
In order to protect these strategically important sites, plans and projects can only be authorised if they can be shown to have no adverse effect on the integrity of the site. Projects may still be permitted if there are no feasible alternatives, and there are imperative reasons of overriding public interest. In such cases compensation measures will be necessary to ensure the overall integrity of the network of sites. As a consequence of amendments to the Birds Directive these measures are also applied to Special Protection Areas. Special Areas of Conservation and Special Protection Areas form a network of protected European sites known as Natura 2000.
The directive on the Conservation of Wild Birds (2009/147/EC) aims to control the hunting and killing of wild birds and to protect their eggs and nests. The overall objective of the directive is for the populations of all species of naturally occurring

wild birds in the EU to be maintained at a level which “corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements”. European Union member states must also preserve, maintain or re-establish habitats for wild birds and must designate a series of Special Protection Areas to protect birds listed on Annex I of the Wild Birds Directive and any other regularly occurring migratory species.
The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Government policy is to treat Wetlands of International Importance (Ramsar sites) as European sites designated under the European Union Habitats and Wild Birds Directives. As such the considerations to protected areas, designated under Article 6 and annex IV of the WFD, also apply to environmental water objectives for Ramsar sites.

How these directives are implemented

The Habitats and Birds Directives are implemented by the Conservation of Habitats and Species
Regulations 2010 (as amended), known as 'the Habitats Regulations', and the Wildlife and Countryside Act 1981. Terrestrial Special Areas of Conservation and Special Protection Areas are also notified as Sites of Special Scientific Interest.
The Habitats Regulations requires every competent authority, including Natural Resources Wales to have regard to the requirements of the Habitats Directive while exercising their functions.
The Habitats Regulations also require all competent authorities to review extant consents granted prior to a European site being designated to determine if they may impact on the integrity of the site and modify or revoke them where necessary to remove effect or risk of effects on European site.

You can find further information here: http://www.jncc.gov.uk/page-1374

Drinking Water Directive

The Drinking Water Directive (98/83/EC) aims to protect the health of consumers and make sure that the water is wholesome and safe to drink. It sets standards for the quality of water intended for drinking or for use in food and drink manufacture to protect human health. A total of 48 microbiological and chemical water quality standards must be complied with and these are monitored mainly at the tap inside private and public premises. European Union member states can include additional and tighter standards in their national regulations that implement the directive, but must not set less stringent standards. This directive also helps to protect the environment, as sources of drinking water must be free enough from contamination to allow inexpensive water treatment.

How this directive is implemented

The Drinking Water Directive is implemented through the Water Supply (Water Quality) Regulations 2000, as amended, by water undertakers and the Private Water Supplies Regulations 2009 by the local authorities, who are also the

regulators of such supplies. The Drinking Water Inspectorate is the competent authority for the Drinking Water Directive. These regulations are supported by other mechanisms that control pollution from point and diffuse sources.
You can find further information here:
http://dwi.defra.gov.uk/stakeholders/legislation/index.htm

Control of Major Accidents Directive

The Directive on the control of major-accident hazards involving dangerous substances
(2012/18/EU) (also known as the Seveso III Directive) aims to prevent accidents, and limit their consequences if they do occur. It applies at sites using or storing certain dangerous substances above specified thresholds. The directive deals with exceptional risks for example, fires, explosions and major emissions of dangerous substances when an activity gets out of control and the steps to be taken to prevent major accidents. Operators of establishments where the largest quantities of dangerous substances are used or stored (known as upper tier establishments) must produce a safety report and an on-site emergency plan. In addition, the relevant local authority must produce an off-site emergency plan, and the public must be told of safety measures and what to do in the event of an accident.

How this directive is implemented

In Wales the directive is implemented by either the Health and Safety Executive or the Office for Nuclear Regulation acting jointly with Natural Resources Wales through the Control of Major Accident Hazards Regulations 2015.
You can find further information here: http://www.hse.gov.uk/comah/

Environmental Impact Assessment Directive

The Environmental Impact Assessment Directive (2011/92/EU) requires an assessment to be made of the effects of certain development projects, such as large-scale industrial or infrastructure projects, which are likely to have significant effects on the environment. The assessment must be made before the competent authority grants development consent so that it is aware of any likely significant effects of the development on the environment. The aim of the environmental impact assessment is also to ensure that the public are given early and effective opportunities to participate in the decision making procedures.
The project developer must compile the information reasonably required to assess the likely significant effects of the development. The information finally compiled by the applicant is known as an environmental statement. The environmental statement must be publicised. The competent authority must then take into account the environmental statement and any other information which is relevant to the decision when deciding whether or not to give development consent. When considering the available information, the competent authority should identify, describe and assess the impacts on people, plants and animals, soil, water, air, climate and the landscape, the built environment and cultural heritage, including how these factors link together. This enables the competent authority to assess whether a proposed development will have significant impacts on water bodies, and other elements of the environment, whether there are mitigation or avoidance

measures that could remove or reduce any significant adverse effects and whether the development may prevent environmental objectives being achieved.

How this directive is implemented

The Environmental Impact Assessment Directive is implemented through a number of statutory instruments, covering the consenting procedures for various categories of development, including activities such as forestry and quarrying. Projects in Wales that require planning permission are governed by the Town and Country Planning (Environmental Impact Assessment) Regulations 2011, as amended. Projects that require a marine licence are governed by the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).
Environmental Impact Assessment regulations covering other consenting regimes include:
Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999
Harbour Works (Environmental Impact Assessment) Regulations 1999 as amended
Marine Works (Environmental Impact Assessment) Regulations 2007 as amended
Water Resources (England and Wales) Environmental Impact Assessment Regulations 2003 as amended Environmental Impact Assessment (Agriculture) (Wales) regulations 2007

Natural Resources Wales is a statutory consultee for Environmental Impact Assessments for developments that may affect the water environment. Natural Resources Wales also acts as a developer for example, for flood risk improvement and waterways projects, and carries out Environmental Impact Assessments for these where needed.
Natural Resources Wales is a competent authority for certain developments under the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations and The Water Resources (Environmental Impact Assessment) (England and Wales) Regulations.
You can find further information on the town and country planning regulations here: http://planningguidance.planningportal.gov.uk/blog/guidance/environmental-impact-assessment/

Sewage Sludge Directive

The Sewage Sludge Directive (86/278/EEC) aims to protect people, animals, plants and the environment against the possible harmful effects from the uncontrolled spreading of sewage sludge on agricultural land.
It encourages sewage sludge to be used correctly and prohibits it being applied to soils unless the concentration of heavy metals in the soil is below certain limits. Monitoring must be carried out to make sure that the soil does not exceed these limits after sludge has been spread. Sludge must be treated before it is used, for example, to reduce pathogen levels, unless it is injected or worked into the soil. Animals cannot graze on land that has been spread with sludge, and crops cannot be harvested from the land, for three weeks after the sludge has been spread. Preventing soils becoming contaminated in this way also protects surface water and groundwater from polluted run-off.

How this directive is implemented

The Sewage Sludge Directive is implemented through the Sludge (Use in Agriculture) Regulations 1989 as amended, with Natural Resources Wales as competent authority.

All water companies follow the Safe Sludge Matrix, an agreement made in December 1998 between Water UK and the British Retail Consortium, which bans the use of untreated sludge on agricultural land. There is also a non-statutory code of practice.
Water and sewerage companies are responsible for managing recycling and disposal routes of sewage sludge produced by their sewage treatment works. They must comply with the requirements of the Sewage Sludge Directive, the Waste Framework Directive and the Urban Waste Water Treatment Directive.
Natural Resources Wales is the enforcement authority for the relevant legislation.
You can find further information here: https://www.gov.uk/managing-sewage-sludge-slurry-andsilage
The Water Services Regulation Authority (Ofwat) is responsible for ensuring water companies are adequately funded to carry out their functions, including sewage sludge disposal.

The Urban Waste Water Treatment Directive

The Urban Waste Water Treatment Directive (91/271/EEC) regulates the collection and treatment of waste water from homes and industry. It protects the environment from the negative effects of urban waste water and discharges from certain industrial sectors, such as food and drink processing plants (some of which produce waste that has a similar polluting effect to untreated sewage). Sewerage systems must be provided, to collect sewage and convey it to treatment works whilst limiting pollution from storm overflows. The directive lays down minimum levels of treatment for urban waste water and emission limits for effluent discharges. These depend on the population served and the type and sensitivity of the receiving waters. Most waste water must have at least secondary treatment (biological treatment). Sensitive receiving waters are identified where sewage requires more stringent, tertiary treatment before discharge into them. One type of sensitive area is eutrophic waters where nutrients (nitrate or phosphate) stimulate excess growth of algae and other plants damaging the water environment and its uses. Another type of sensitive area is where water is intended for abstraction for use as drinking water but nitrate levels are high. In these areas larger sewage discharges must be treated to reduce their load of nutrients. The directive also bans the disposal of sewage sludge at sea.

How this directive is implemented

The directive is implemented through the Urban Waste Water Treatment Regulations 1994. Powers to permit discharges, with conditions to protect the receiving waters, are available under the Environmental Permitting (England and Wales) Regulations 2010.
Sewerage undertakers are required to develop a programme for improving discharges every five years. This programme, which is approved by Ofwat, Natural Resources Wales, Drinking Water Inspectorate and Welsh Government, provides the mechanism for funding and implementing the changes necessary to implement the Urban Waste Water Treatment Directive.
There are financial incentives for sewerage undertakers to comply with permit conditions established under the Ofwat operator performance assessment scheme, which links overall service provision to the price that customers pay.

You can find further information here:

https://www.gov.uk/government/policies/improving-water-quality/supporting-pages/reducing-andcontrolling-pollution-in-wastewater-discharges-sludge-and-septic-tanks

Plant Protection Products Regulation

The Plant Protection Products Regulation (1107/2009) aims to prevent adverse impacts from plant protection products by controlling their marketing and use. Plant protection products include herbicides (weed killers), insecticides, fungicides, molluscicides (slug and snail killer) and other pesticide products used to protect plants.

Active substances must be approved for use in plant protection products. To gain approval, the producers must submit a dossier identifying the active substance (and a plant protection product which contains it); it's physical and chemical properties; its effects on target pests; and any possible effects on people, the environment and non-target plants and animals. The dossiers are evaluated at European Union level and a decision is made on whether the substance can be approved for use and any conditions on use should apply across all European Union member states. Individual plant protection products which contain those active substances must be authorised at member state level before they can be placed on the market or used. Approved active substances and authorised plant protection products are regularly reviewed, to ensure that they continue to meet modern standards of safety.

How this regulation is implemented

The Plant Protection Products Regulation applies directly to member states. It is underpinned by the Plant Protection Products Regulations 2011 (which provide enforcement powers and penalties), the Plant Protection Products (Sustainable Use) Regulations 2012, and administered in the UK by the Chemicals Regulation Directorate, part of the Health and Safety Executive.

You can find further information here:
http://www.pesticides.gov.uk/guidance/industries/pesticides/topics/pesticideapprovals/legislation/plant-protection-product-legislation-in-the-uk

Nitrates Directive

The Nitrates Directive (91/676/EEC) is designed to reduce water pollution caused by nitrates from agriculture sources and prevent further such pollution occurring. It requires nitrate vulnerable zones (NVZs) to be designated as areas of land which drain to waters that contain, or are likely to contain 50 mg/l or more of nitrate, or waters which are, or could become, eutrophic, if no action is taken. Within these zones farmers are required to follow mandatory rules known as the 'action programme' to reduce the risk of nitrate pollution. The rules cover a requirement for farmers to plan their nitrate use, the storage of manure, place restrictions on the timing and rate of spreading of organic manure and manufactured fertiliser and specify certain spreading controls. A code of good agricultural practice for voluntary implementation on all farms is also required.

The effectiveness of the action programme and the designations must be reviewed and any necessary revisions made at least every four years.

How this directive is implemented

The Nitrates Directive is implemented in Wales by the Nitrate Pollution Prevention Regulations 2015. Natural Resources Wales is the enforcing authority for these regulations.

Natural Resources Wales assess compliance with the NVZ rules which are a Statutory Management Requirement (SMR1) under cross compliance for farmers that are in the Basic Payment Scheme or who claim other direct payments, e.g. through Countryside Stewardship.

You can find further information here:
http://gov.wales/docs/drah/publications/150111smr1factsheeten.pdf

The Integrated Pollution Prevention Control Directive

The Industrial Emissions Directive (2010/75/EU) referenced below replaced the repealed

Integrated Pollution Prevention Control Directive (2008/1/EC). It is designed to prevent, reduce and eliminate pollution at source by using natural resources efficiently and to help industries operate in a more environmentally sustainable way.

The following community and domestic legislation is not directly referred to in Annex VI of the WFD, but provides protection to the water environment.

Environmental Liability Directive

The Environmental Liability Directive (2004/35/EC) seeks to prevent and remedy environmental damage to habitats and species protected under European Community law damage to water resources and land contamination which presents a threat to human health. It reinforces the polluter pays principle and makes operators financially liable for threats of or actual damage.

How this directive is implemented

The Environmental Liability Directive is implemented in Wales through the Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009 for which the competent authorities are:

Natural Resources Wales, who deal with damage caused by activities that it regulates and all water damage with damage relating to biodiversity on land

Local authorities, who deal with all land damage and the prevention of damage caused by activities regulated by them

Welsh Government, who deal with damage relating to biodiversity in marine waters if the damage is not caused by an activity regulated by Natural Resources Wales

The regulations apply only to the most serious types of damage:

- damage that would lower the status of a WFD water body
- damage that adversely affects the site integrity of a Site of Special Scientific Interest or significantly affects the conservation status of a protected species or habitat
- damage to land that causes a significant risk of adverse effects on human health

Those who carry out economic activities must prevent and remediate any damage their activities cause. For damage to water and biodiversity, the regulations require much more extensive remediation than under existing legislation.
You can find further information here:
http://gov.wales/topics/environmentcountryside/epq/environmental-damage-regulations/?lang=en

Floods Directive

The European Directive on the Assessment and Management of Flood Risks (2007/60/EC of 23 October 2007, the Floods Directive) is a common framework for member states to assess the risk of flooding, map its potential impact and plan objectives and measures to reduce potential and significant flood risk, with a focus on human health, cultural heritage, the environment and economic activity.

How this directive is implemented

The Floods Directive came into force in 2007 and is implemented in England and Wales through the Flood Risk Regulations 2009. This requires the preparation of preliminary flood risk assessments (December 2011), publishing flood hazard and flood risk maps (December 2013) and the production of Flood Risk Management Plans (December 2015). The Regulations require the measures within flood risk management plans and river basin management plans to be coordinated.
You can find further information here: https://www.gov.uk/government/policies/reducing-thethreats-of-flooding-and-coastal-change

Groundwater Directive

The Groundwater Directive (2006/118/EC), also known as the Groundwater Daughter Directive, provides supporting detail to the WFD on the protection of groundwater against pollution and deterioration. The previous Groundwater Directive (80/68/EEC) was repealed in December 2013.
The WFD sets out objectives for groundwater quantity and quality and provides the framework for achieving good status in all groundwater bodies. The Groundwater Daughter Directive provides more detail around protecting groundwater quality. It clarifies the requirements for assessing groundwater chemical status, identifying and reversing upward trends in pollutants and measures to prevent or limit inputs of pollutants into groundwater. The directive controls inputs of hazardous and non-hazardous substances and other activities that might lead to accidental losses.

How this directive is implemented

The 2006 Groundwater Directive is implemented by the Environmental Permitting (England and Wales) Regulations 2010, the Water Environment (Water Framework Directive)(England and Wales) Regulations 2003 but many measures are used to achieve its aims. Permits impose conditions on potentially polluting activities and carrying on a groundwater activity without a permit is an offence.

You can find further information here:
https://www.gov.uk/government/publications/groundwaterprotection-principles-and-practice-gp3

Industrial Emissions Directive

The Industrial Emissions Directive (2010/75/EU) replaced the repealed Integrated Pollution Prevention Control Directive (2008/1/EC). It is designed to prevent, reduce and eliminate pollution at source by using natural resources efficiently and to help industries operate in a more environmentally sustainable way.
The activities covered include those arising from energy, metals, mineral, chemical, waste management industries, as well as others such as paper/board production, slaughterhouses, food and drink production, intensive pig and poultry farms. To comply with the regulations, operators need a permit and must use best available techniques to prevent emissions to air, land and water or, where that is not practicable, they must reduce them to an acceptable level. They must also minimise waste and recycle it where they can, conserve energy, prevent accidents and limit their environmental consequences, and return the site to a satisfactory state after operations cease.

How this directive is implemented

The Industrial Emissions Directive is implemented by the Environmental Permitting (England and Wales) Regulations 2010. Competent authorities for these regulations are:

- Natural Resources Wales, which has responsibility for A(1) installations
- local authorities, which have responsibility for A(2)

This legislation helps achieve the WFD objectives in a number of ways. For example:

- by stopping or phasing out discharges and emissions, and reducing losses of priority hazardous substances
- by minimising other releases from major installations

You can find further information here:
https://www.gov.uk/government/collections/technical-guidance-for-regulated-industry-sectorsenvironmental-permitting

Marine Strategy Framework Directive

The Marine Strategy Framework Directive came into force on 15th July 2008. The directive establishes an integrated policy for the protection of the marine environment, in a similar manner to the WFD and requires the achievement of good environmental status in marine waters. The scope of the Marine Strategy Framework Directive is broader than that of the WFD covering a greater range of environmental components and indicators. There are however, significant areas of overlap with good ecological and chemical status for WFD, particularly in relation to chemical quality, eutrophication and aspects of ecological and hydromorphological quality. Where both directives apply in coastal waters, the Marine Strategy Framework Directive covers those aspects of good environmental status not covered by the WFD (for example noise, litter and aspects of biodiversity).
Considering that most of the anthropogenic activities which cause significant pressures relating to contaminants and eutrophication, are either terrestrial in nature or are taking place in the coastal zone, it is considered highly likely that measures taken under the WFD and its related directives will be sufficient to achieve and maintain good environmental status under the Marine Strategy Framework Directive across the UK's wider marine area particularly for those two descriptors. For hydrographical conditions, it is considered that the application of the WFD in the coastal area, plus the wider application of the

Environmental Impact Assessment Directive through the marine licensing process, will be sufficient to achieve good environmental status under the Marine Strategy Framework Directive across the UK's marine waters.
The Marine Strategy Framework Directive requires member states to take necessary measures to maintain or achieve good environmental status in marine waters by 2020. However, the directive does not apply to estuarine waters.

How this directive is implemented

The Marine Strategy Framework Directive is implemented by the Marine Strategy Regulations 2010 with the Welsh Minister being the competent authority. Natural Resources Wales along with all other public authorities must have regard to the marine strategy when exercising their functions so far as they affect any marine strategy area. The UK targets and indicators for good environmental status have been aligned, as far as possible, with existing WFD assessment tools. The UK's overall approach to implementing the Marine Strategy Framework Directive is set out in the UK Marine Strategy Part 1. The UK's marine monitoring programme to monitor progress towards Good Environmental Status was completed in July 2014 with the publication of the UK's Marine Strategy Part Two. The third stage is the implementation of management measures to maintain or achieve good environmental status by 2020. A public consultation on the programme of measures ran between January and April 2014. The final programme will be published in December 2015 and implemented by December 2016.

Further information on the Marine Strategy Framework Directive can be found here: http://gov.wales/topics/environmentcountryside/marineandfisheries/marine-fisheries-policy/directives/marine-strategy-framework-directive/?lang=en

The Marine and Coastal Access Act 2009 also enabled the introduction of national Marine Protected Areas known as Marine Conservation Zones (MCZs) that will help to protect nationally important biodiversity.

You can find further information here:
http://gov.wales/topics/environmentcountryside/marineandfisheries/marine/marine-planning/?lang=en
Links on reporting between the two directives: The WFD Reporting Guidance 2016 now includes a number of fields which ask how the MSFD has been taken into consideration in the implementation of the directive through river basin management plans.

Maritime Spatial Planning Directive

The EU Maritime Spatial Planning Directive (2014/89/EU) came into force in July 2014. The directive sets out a framework against which all member states are required to establish and implement marine spatial planning; putting in place marine plans for their marine area by 2021. The UK marine area extends from the seaward limit of the territorial sea adjacent to the UK up to the mean high water spring tide level; including estuaries, rivers and channels.
The aim of maritime spatial planning is to encourage sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. Marine plans enable member states to better plan for and prioritise the various and growing number of demands placed upon marine areas, taking into account land-sea interactions, environmental, economic and social aspects. Development of

marine plans will be informed by existing legislation and plans, including river basin management plans and will contribute to realising good environmental status of waters by 2020; as required by the Marine Strategy Framework Directive. It will also support the establishment of a coherent network of Marine Protected Areas.

How this directive is implemented

The UK's Marine Policy Statement provides the policy framework for preparing marine plans and taking decisions affecting the marine environment across the UK. Within the UK, the marine area has been subdivided into inshore and offshore marine planning regions. Development and implementation of marine plans is devolved to the UK administrations with transposing legislation required by September 2016.

Strategic Environmental Assessment Directive

The Strategic Environmental Assessment Directive (2001/42/EC) on assessment of the effects of certain plans and programmes on the environment requires a formal environmental assessment of plans and programmes which are likely to have significant effects on the environment. Authorities which prepare and/or take on such a plan or programme must prepare a report on its likely significant environmental effects, consult environmental authorities and the public, and take the report and the results of the consultation into account during the preparation process and before the plan or programme is implemented. They must also make information available on the plan or programme as implemented and how the environmental assessment has been taken into account. River basin management plans fall within the scope of the Strategic Environmental Assessment Directive.

How this directive is implemented

The Strategic Environmental Assessment Directive is implemented through the Environmental Assessment of Plans and Programmes Regulations 2004.
You can find further information here:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguides ea.pdf

Sustainable Use of Pesticides Directive

The Sustainable Use of Pesticides Directive (2009/128/EC) establishes a legislative framework which:

- contributes to reducing the impact of plant protection products on human health and the environment
- aims to achieve a more sustainable use of plant protection products
- encourages a significant overall reduction in risks and hazards of using plant protection products consistent with necessary crop protection

There are 2 articles of particular relevance to WFD objectives:

- Article 11 - specific measures to protect the aquatic environment and drinking water
- Article 12 - reduction of pesticide use or risks in specific areas, including protected areas under the WFD
-

How this directive is implemented

The directive establishes a framework for promoting 'best practice' in the storage, use and disposal of pesticides, and their packaging. Main features include:

- establishment of national action plans
- compulsory testing of spray machinery and certification of spray operators, distributors and advisors
- a ban, subject to derogations, on aerial spraying
- special measures to protect the aquatic environment, public spaces and Special Conservation Areas
- minimising risk of pollution through handling, storage and disposal; and promotion of Integrated Pest Management

The UK's National Action Plan is available here:
https://www.gov.uk/government/publications/pesticides-uk-national-action-plan

The Chemicals Regulation Directorate of the Health and Safety Executive is the competent authority for overseeing implementation of the Plant Protection Products (Sustainable Use) Regulations 2012.
You can find further information here:
http://www.pesticides.gov.uk/guidance/industries/pesticides/topics/pesticideapprovals/legislation/plant-protection-product-legislation-in-the-uk.htm

Waste Framework Directive

The Waste Framework Directive (2008/98/EC) deals with protection of human health and the environment against harmful effects caused by collection, transport, treatment, storage and disposal of waste. Regulation under this legislation includes a system of permits and plans which set out essential factors to be taken into consideration in respect of various waste disposal and recovery operations.

How this directive is implemented

Waste operations that give rise to point and diffuse sources of pollution are controlled through the Environmental Permitting (England and Wales) Regulations 2010 (as amended) for land based operations. Waste operations in estuarine and marine waters are controlled by the Marine Licensing Team under the Marine and Coastal Access Act 2009.
The carriage of waste is regulated by the Control of Pollution (Amendment) Act 1989, Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991, the Hazardous Waste (England and Wales) Regulations 2005, and the Waste (England and Wales) Regulations 2011 which include a system of registration and waste transfer notes (now called waste information).
Part II of the Environmental Protection Act 1990 prohibits deposit of waste or knowingly causing or permitting such waste to be deposited in or on any land except in accordance with an appropriate environmental permit. This is reinforced by the waste duty of care which places a duty on those producing waste to ensure that it is only passed to an authorised person and to take appropriate reasonable measures to prevent the escape of waste from their control or that of another person.

You can find further information here:

- on waste management generally at https://www.gov.uk/managing-your-waste-an-overview
- on whether you need a waste permit at https://www.gov.uk/environmental-permit-check-if-youneed-one
- on agricultural wastes at https://www.gov.uk/browse/business/farming

Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

REACH (EC Regulation 1907/2006) entered into force on 1st June 2007. The Regulation's aims are to:

- streamline and improve the legislative framework on the manufacture supply and use of chemicals within the European Union
- provide a high level of protection for human health and the environment from the use of chemicals
- make the people who place chemicals on the market (manufacturers and importers) responsible for identifying, understanding and managing the hazards associated with their use
- allow the free movement of substances on the European Union market
- enhance innovation and competitiveness within the European Union chemicals industry
- encourage the use of alternative methods for the assessment of the hazardous properties of substances, for example, through the Quantitative Structure-Activity Relationships (QSAR) Toolbox software application and read across

A major part of REACH is the requirement for manufacturers or importers of substances to register them with the European Chemicals Agency. A registration package will need to be supported by a standard set of data on that substance. The amount of data required is expected to be proportionate to the amount of substance manufactured or supplied. If a substance is not registered then the data on it will not be available and as a result it will no longer be possible to manufacture or supply it legally within the EU.

REACH applies to substances manufactured or imported into the European Union in quantities of 1 tonne per year or more. Generally, it applies to all individual chemical substances on their own, in preparations or in articles (if the substance is intended to be released during normal and reasonably foreseeable conditions of use from an article).

Some substances are specifically excluded, for example, radioactive substances, substances under Customs supervision, the transport of substances, non-isolated intermediates, waste and some naturally occurring low hazard substances. Some substances, covered by more specific legislation, have tailored provisions, including human and veterinary medicines, food and foodstuff additives and plant protection products and biocides.

Others have tailored provisions within the REACH legislation, as long they are used in specified conditions, such as isolated intermediates and substances used for research and development. REACH also allows for the restriction of substances where they pose a particular threat that is deemed to require Community-wide action to mitigate the risk. For substances of very high concern a company wishing to market or use such a substance must submit an application to the European Chemicals Agency for an authorisation for continued use.

How this regulation is implemented

The competent authority for REACH within the UK is the Health and Safety Executive, supported by others, in particular Natural Resources Wales. Implementation of REACH is by the REACH Enforcement Regulations 2008 and is phased with registration deadlines up to end-May 2018, depending on the annual tonnages involved.
Information on the hazardous properties of chemicals and their risk to the environment will be available through the International Uniform Chemical Information Database (IUCLID) http://iuclid.eu/.

You can find further information here: http://www.hse.gov.uk/reach

Veterinary and medicinal products

Veterinary and human medicinal products in the European Union are regulated by the European Medicines Agency under Regulation (EC) No. 726/2004. The community code relating to veterinary medicines is Directive 2001/82/EC, as amended.

How the regulation is implemented

The Veterinary Medicines Directorate (VMD) is the competent authority responsible for regulating the issue and use of veterinary medicines in the UK, in accordance with European Community and UK legislation.
You can find further information here:
https://www.gov.uk/government/organisations/veterinarymedicines-directorate

The Committee for Medicinal Products for Veterinary Use (CVMP) is the committee at the European Medicines Agency that is responsible for preparing opinions on questions concerning medicines for veterinary use. In addition, the CVMP is responsible for conducting the assessment of veterinary medicines for which an EU-wide marketing authorisation is sought 'centralised procedure'. Furthermore, the CVMP prepares scientific guidelines in consultation with the competent authorities of the European Union member states to help applicants prepare marketing authorisation applications for medicinal products for veterinary use.

You can find further information here:
http://www.ema.europa.eu/ema/index.jsp?curl=pages/about_us/general/general_content_000262.j sp&mid=WC0b01ac0580028dd8
Environmental impacts assessments are carried out in two phases. In Phase I the potential for environmental exposure is assessed based on the intended use of the veterinary medicinal product. Where a potential environmental risk is identified in Phase I, a detailed procedure of environmental risk assessment is carried out under Phase II. This provides a common basis for testing of veterinary medicinal products between the European Union, Japan, United States of America, Canada, Australia and New Zealand.

Biocidal Products Regulation

EU Regulation 528/2012 (EU Biocidal Products Regulation (BPR)), concerning the making available on the market and use of biocidal products, applies to substances that are used to destroy or prevent the action of harmful organisms by chemical or biological means. Common examples of biocidal products include rodenticides, disinfectants, wood preservatives and insect repellents. They are used in a wide variety of industries to control

organisms such as viruses, bacteria, fungi and animals. The main purpose of EU BPR is to:

- harmonise the European market for biocidal products, their active substances and product authorisation
- provide a high level of protection for people, animals and the environment from the use of biocidal products. Authorisation under EU BPR requires the submission and evaluation of data on chemistry of the substances concerned, their toxicity to humans, and their toxicity and fate in the environment.

How this regulation is implemented

The Health and Safety Executive is the competent authority for EU BPR, which is directly acting. The Regulation is enforced by both the Health and Safety Executive and some aspects by local authority inspectors and trading standards officers.
There are 22 different biocidal product types which include disinfectants, preservatives, pest control and speciality biocides such as antifouling products and embalming and taxidermist fluids.

You can find further information here: http://www.hse.gov.uk/biocides/bpd/index.htm

Eel Regulation

The European Commission published Council Regulation 1100/2007 in September 2007, which aims to establish measures for the recovery of the stock of European eel. The regulation requires member states to develop and implement eel management plans (EMPs) comprising measures appropriate to effect eel stock recovery based on the pressures eels face within the river basin districts. The target is to achieve migration to sea of at least 40% of historic silver eel biomass levels.

How this regulation is implemented

EMPs have been produced for the river basin districts in Wales. Natural Resources Wales is implementing the EMPs in Wales following their approval by the European Commission. Each plan sets out short-term and long-term measures to manage and monitor eel populations within each river basin district. Measures include regulation of eel fisheries, removal of barriers to migration, increasing available habitat and reducing the impacts of entrainment. The status of the stock and progress against these measures must be reported to the European Commission every three years. The first report was submitted in June 2012 and the second in June 2015.
The Eels (England and Wales) Regulations 2009 implement the eel passage measures of the European Union Eel Regulation by giving Natural Resources Wales powers regarding provision of eel passes, screens and removal of barriers.
You can find further information here:
https://www.gov.uk/government/policies/managingfreshwater-fisheries/supporting-pages/increasing-eel-stocks

Shellfish Waters Protected Areas

In the river basin management plans published in 2009, shellfish waters were designated as protected areas under the Shellfish Waters Directive (2006/113/EC). The directive was repealed at the end of 2013 since protection of shellfish waters is now ensured by the WFD. Shellfish waters protected areas have been maintained and continue to be protected. Monitoring used to assess compliance with guideline shellfish flesh standards has significantly increased. The aim of shellfish protected areas is to support shellfish (bivalve and gastropod molluscs) life and growth, in order to contribute to the high quality of shellfish for people to eat. This will be achieved by aiming to observe the guideline shellfish flesh standard. Natural resources Wales is the competent authority. Government formally designates waters through the issue of a Notice and Schedule. This places an obligation on Natural Resources Wales to ensure that designated waters meet the requirements of shellfish protected areas. The latest shellfish waters designation notice was issued in 2010. Designations were reviewed in 2014 and proposed changes consulted upon during the consultation on the proposed update to the River Basin Management Plans published in October 2014. Shellfish Water Pollution Reduction Plans were last prepared in 2009.

Efficient and sustainable use of water

Under the WFD water must be used efficiently and in a way that can sustain future supplies. Mechanisms for the efficient and sustainable use of water include those in Table 1.

Table 1: Mechanisms for efficient and sustainable use of water

Mechanism	What this does
Water Resources Act 1991 Part II	Sets out controls for abstraction and drought management.
Water Industry Act 1991 Part IIIA	Establishes general duties for protecting, managing the quality and sufficiency of supplies and promoting efficient use of water.
Water Act 2003 s 81-83	Establishes a duty for Welsh Government to encourage water conservation and for public authorities (including local authorities and statutory undertakers) to take into account, where relevant, the desirability of conserving water supplied or to be supplied to premises. This could include promoting water efficiency through exercise of their land use planning functions, production of development plans and control of development.
Town and Country Planning Act 1990; Planning and Compulsory Purchase Act 2004(as amended), Planning Act 2008 (as amended).	The Town and Country Planning Act 1990, Planning and Compulsory Purchase Act 2004 (as amended) sets the legal framework for deciding planning applications and developing local plans. The Planning Act 2008 defines "nationally significant infrastructure projects". Development which falls within the thresholds for a nationally significant infrastructure project has to be authorised by means of a Development Consent Order (DCO). A DCO is made by the relevant

Mechanism	What this does
	Welsh Minister after being processed and examined by the Planning Inspectorate.
Environment Act 1995 s 6(2)	Places a duty on Natural Resources Wales to conserve, redistribute or augment water resources and to secure their proper use including their efficient use.

Protection of waters used for abstracting drinking water

The mechanisms which protect the quality or quantity of water also protect water bodies that have abstractions for drinking water. These mechanisms include statutory protected areas and their related requirements under the WFD.
More formal mechanisms for protecting waters abstracted for drinking water are shown in Table 2.

Table 2: Mechanisms for protecting drinking water

Mechanism	What this does
Water Resources Act 1991 s93	Provides the legislation for establishing statutory Water Protection Zones (WPZs).
Water Industry Act 1991 Part III dealing with water supply	Sets out general duties for protecting and managing quality and sufficiency of supplies.
Water Supply (Water Quality) Regulations 2000 as amended	Establishes a risk-based approach to assessment and monitoring of water intended for public supply, requiring water supply operators to consider issues in the environment.
Private Water Supplies Regulations 2009 (administered by local authorities)	Sets objectives and minimum standards for drinking water from private supplies and introduce powers for local authorities and a risk based assessment element for protection of larger private supplies.
Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Enacts the requirements under Article 7.1 of the WFD to identify Drinking Water Protected Areas and set objectives for them. Allows for creation of Safeguard Zones within which necessary protection measures can be focused.
Environmental Permitting (England and Wales) Regulations 2010	Provides regulation of water discharge and groundwater activities including permitting which protects surface waters and groundwater.

Drinking Water Protected Areas

Drinking water protected areas are water bodies that are used now, or may be used in future, for abstracting water for drinking, cooking, preparing food, or in food production businesses. A drinking water protected area is defined if the water body provides more than an average of 10m^3 a day in total or serves more than 50 people.

Existing mechanisms for dealing with diffuse and point sources of pollution are used to protect water quality in these protected areas but are not always sufficient to provide the protection needed, particularly from diffuse sources of pollution. Protected areas and more specifically the associated safeguard zones will provide a focus for reinforcing existing measures or implementing additional measures where these may be needed so that WFD objectives can be met. Natural Resources Wales uses a tiered, risk-based, approach to drinking water protection, with:

- a general level of protection for all drinking water sources (existing measures maintained) including use of environmental permits to control and prevent pollution of water supplies
- safeguard zones around sources at particular risk where new voluntary measures can be focused
- the consideration of Water Protection Zones for sources at particular risk where existing and voluntary measures have failed or are unlikely to prevent failure of WFD objectives

Other approaches

Several water companies have established land management schemes in catchments to their public supply sources, funded through the Price Review process, to reduce diffuse pollution. These schemes can also help to reduce downstream flooding and enhance biodiversity.

Abstraction and impoundment of water

Under the Water Resources Act 1991 most abstractions or impoundment of water require a licence although certain exemptions apply (see below). This applies to inland waters, including: rivers, lakes, canals, reservoirs, groundwater, tidal rivers, docks, bays, creeks, and arms of sea.
Table 3 summarises the mechanisms to control abstraction and impoundment of water.

Table 3: Mechanisms to control abstraction and impoundment

Mechanism	What this does
Water Resources Act 1991 Abstraction and impoundment licensing system Chapter II of Part II (as amended by Water Act 2003 and the Water Act 2014)	The Water Resources Act 1991 makes it a requirement to have an abstraction licence. Conditions are applied to these licences to manage impacts on the environment, for example, flows and resources. All new licences are subject to a time limit and those licences are reviewed, and amended where necessary, upon renewal.
Modification of licences under s51	Licence holders may apply to vary or revoke their licence voluntarily.

Mechanism	What this does
Modification of licences under s52 and s53	Natural Resources Wales may vary or revoke an abstraction licence as directed by Government.
s27 Water Act 2003	Withdraws compensation for licence changes (for specified types of licences, for example not time limited licences) under s52 and s53 necessary to protect the environment from serious damage.
s61(4) Water Resources Act 1991	Withdraws compensation for licence changes under s52 and s53 where the licence has not been used for the previous 4 years.
s58 Water Act 2014	Removes Water Companies' right to compensation for licence changes under s52 and s53.
Agreements under s20, 20A and s158 Water Resources Act 1991	Allows operational arrangements with water companies and other abstractors to reduce the impact of abstractions, for example river support schemes.
Drought orders and drought permits under Chapter III of Part II Water Resources Act 1991	Allows the amendment of controls on authorisations for abstraction and impoundments during droughts.
Restrictions under s57 Water Resources Act 1991	Allows Natural Resources Wales to temporarily restrict abstraction for spray irrigation following an exceptional shortage of rain or emergency.
Wildlife and Countryside Act 1981 s.28I	Abstractions and impoundments need to be assessed to determine whether they are likely to damage a SSSI, and if it is, to engage in consultation with Natural Resources Wales.
Natural Environment and Rural Communities Act 2006 (NERC) s.40	Requires public bodies to 'have regard, so far as is consistent with the proper exercise of those functions (e.g. granting licences), to the purpose of conserving biodiversity'.
Regulation 63 of the Conservation of Habitats and Species regulations 2010 (as revoke amended) and the Water Resources Act 1991	After the required review of existing plans, projects and consents Natural Resources Wales can amend abstraction licences to reduce any unacceptable impacts of abstraction on Natura 2000 nature conservation sites (SACs and SPAs) as well as Ramsar Sites

Mechanism	What this does
Salmon and Freshwater Fisheries Act 1975 s.9 and s.14	Requires persons responsible for dams to (at their cost) provide and maintain fish passes and screens (that function to our satisfaction) in any waters frequented by salmon or migratory trout. Under s.11(1) 'any approval given to or in relation to a fish pass may, if in giving it Natural resources Wales indicates that fact, be provisional until Natural Resources Wales notifies the applicant for approval that the pass is functioning to its satisfaction.'
The Eels (England and Wales) Regulations 2009 (which partially implement 'Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel', 'European Council Regulation on Eels', or 'Eels Regulations')	Requires that 'a responsible person must immediately notify the Agency of any obstruction occurring since the coming into force of these Regulations'. The Regulations give powers to the Agency to serve notices requiring eel passes on structures and obstructions. They also require the provision of screens on all intakes capable of abstracting at least 20 cubic metres per day, and outfalls, unless exempted by notice by Natural Resources Wales

Time limits have been applied to licences for many years as a way of managing environmental uncertainty. The Water Resources Act 1991, amended by the Water Act 2003 introduced a mandatory requirement for time limits on all new licences. Before then, most licences were granted with no time limit, and some licences in the past may have had an unacceptable effect on the environment. Although Natural Resources Wales has powers to amend or revoke these licences under the Water Resources Act 1991, compensation may be claimed by the licence holder. (This is not applicable to water companies since the Water Act 2014 or in cases where serious damage has occurred or is at risk of occurring).

Natural Resources Wales can re-assess the environmental sustainability of a time limited licence when the licence expires and the holder applies for a replacement licence. Where a time limited licence is not sustainable, a new licence will be granted on more restrictive terms or worst case scenario, not at all.

There are currently a number of exemptions from the need for an abstraction or impoundment licence. Some of the exemptions relating to abstraction will be removed when the remaining provisions of the Water Act 2003 are implemented by Government. For example the exemption will be removed for trickle irrigation, quarry dewatering, transfers of water for navigation and the previously exempt areas.

Government is committed to the reform of the current abstraction licensing system in Wales and is finalising its policy approach for reforms to be implemented by the early 2020s.

You can find further information at https://www.gov.uk/government/collections/water-abstractionlicensing-strategies-cams-process

Other plans and programmes

Under the Water Industry Act 1991, water companies are required to prepare Water Resources Management Plans to show how they will manage and develop water resources to supply their customers. Water Resources Management Plans show how companies will balance water demand and supply over a 25 year period. Water Resources Management Plans should ensure an efficient, sustainable use of water resources. They should focus on delivering efficiently the outcomes that customers want, while reflecting the value that society places on the environment.

Natural Resources Wales sets out the environmental improvements that water companies must make in the National Environment Programme (NEP) every 5 years. Successive water company improvement programmes since privatisation of the industry have resulted in substantial benefits to the water environment. Water companies may need to make changes to their operations to deliver the NEP, including those needed to meet WFD objectives such as preventing deterioration in status and to deliver actions needed to meet or move towards good status or potential. This does not replace water companies' obligations to meet their legal responsibilities with regards to all existing permits.
Natural Resources Wales has overall responsibility for safeguarding the environment during drought including overseeing the actions water companies take to secure public water supplies. Plans for each of the operational areas set out the actions that will be taken at different stages throughout a drought and give details on the arrangements for reporting and communications. Water companies are also required to produce drought plans under the Water Industry Act 1991. These set out the measures that would be taken to minimise environmental impacts and maximise available supplies during a drought.
You can find further information on drought planning here:
https://naturalresources.wales/water/resources/drought-management-and-planning/?lang=en

Point source discharges

This section provides a summary of mechanisms for controlling discharges from identifiable point sources by limiting or preventing pollutants entering the water through prior authorisations and emission controls.

Table 4: Mechanisms to control point source discharges

Mechanism	What this does
Water Resources Act 1991 Works Notices under s161A Water Protection Zones under s93	Any activity polluting or likely to pollute controlled waters can be served a 'works notice' to prevent the activity or require certain improvements or remediate the effects of polluting activity. Can be used to implement specific point source controls within a formally designated zone.
Environmental Permitting (England and Wales) Regulations 2010	It is an offence to pollute inland freshwaters, coastal waters and relevant territorial waters by causing or knowingly permitting entry or discharge of polluting matter.

	Require a permit with conditions for point source discharges to water. Require a permit for disposals/discharges that might lead to inputs to groundwater, including small sewage discharges in sensitive areas. Allows notices to prohibit any activity that might lead to an input of a pollutant to groundwater. Requires a permit with conditions to control deliberate emissions and minimise accidental losses from major installations; conditions prevent, minimise or render emissions harmless using the best available technologies as directed in guidance notes. Requires a permit with conditions to control waste management operations.
Salmon and Freshwater Fisheries Act 1975	Allows for enforcement action against polluters who harm or injure fish, spawning grounds or fish food.
Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 2010	Specifies the design, siting, construction and maintenance of Silage, Slurry and Agricultural Fuel Oil stores.
Control of Pollution (Oil Storage) (England) Regulations 2001	Sets minimum design standards for new and existing above ground oil storage facilities.
Water Industry Act 1991 s166	Requires consent for operational (construction or maintenance) discharges by water undertakers relating to water treatment.
Town and Country Planning Act 1990, Planning and Compulsory Purchase Act 2004 (as amended); Planning Act 2008 (as amended); Planning guidance provided in National Planning Policy Framework (NPPF), 2012 and supporting National Planning Practice Guidance (NPPG), 2014 National Policy Statements (NPSs).	Planning policy contributes to the protection and improvement of the environment, principally through the consideration of appropriate uses of land.
Environmental Protection Act 1990, Part 2A	Controls point source discharges from contaminated land sites (local authorities lead, with Natural Resources Wales regulating 'special sites').

Other plans and programmes

Water industry planning

Discharges from the water industry can be improved by modifying environmental permits. The environmental requirements for the WFD and other directives are planned through the development of the NEP. Water companies should embed the measures within the NEP into their business plans. These are then submitted to Ofwat through the five yearly Price Review process. Ofwat will confirm the level of investment that water companies require to meet these environmental needs.

The NEP for Price Review 2014 has also been used as a mechanism to plan measures to investigate discharges from sewage treatment works and investigate best available treatment solutions. The NEP also achieves a range of other outcomes, including improvements for water resources, eel passage solutions and protected area objectives.

Water company business plans will use information from local plans, where available, to help anticipate future demand for wastewater treatment and investment that may be required. Where it is justified, Development Plan policies can link the rate of planned development to the available capacity of wastewater treatment infrastructure and require planning authorities to investigate further through, for example, water cycle strategies.

Spatial planning

The spatial planning system defined by the Town and Country Planning Act 1990, Compulsory Purchase Act 2004 (as amended) sets the framework for controlling development. The planning system makes a major contribution to protecting and improving the environment, the quality of life, and local and global ecosystems.

The National Planning Policy Framework (NPFF) states the planning system should protect the environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of water pollution. It also states that planning authorities should include strategic policies for the provision of infrastructure for water supply and wastewater, and assess its ability to meet forecast demands and consider impact of climate change on water supply in their local plans.

The Planning Practice Guidance states adequate water and wastewater infrastructure is needed to support sustainable development, highlights that local councils in exercising their functions should have regard to river basin management plans and advocates a catchment based approach to managing water resources through the planning system.

Diffuse source pollution

Diffuse pollution represents a myriad of smaller, scattered, episodic sources that together have a significant effect, but individually have limited environmental impact. Examples of diffuse pollution include:

- the cumulative effect of many individual activities, such as run-off from transport in urban environments or the poor management practice of soils and nutrients in the rural environment. Although individually they can be small and hard to detect, at a catchment scale they can have a significant impact on groundwater and surface water quality.
- the dispersal of pollutants over a larger area, for example, the leaching of nutrients through soil and underground drainage or run-off from land during rainfall events which erodes soil causing sediment, nutrients and pesticides to pollute surface waters or groundwater.

There will be continued focus on taking an integrated approach to effectively tackling diffuse pollution using a mix of advice, incentives, industry led initiatives and regulation.

Agricultural pollution

Natural Resources Wales take an evidence-led and risk based approach to prioritise the farm businesses with which there is the greatest need for engagement, advice and support, and to target where our regulatory effort should be focused. These farm businesses may have a poorer record of complying with regulations or where there is a greater risk of pollution as a result of their location (e.g. proximity to water, slope, soil type and rainfall) and their activities. . This approach will also consider the benefits with other environmental outcomes.

- we use an evidence and risk led approach to target and prioritise regulatory activity in Wales
- we target activities that have the greatest actual (or potential) impact on the environment and those farms with a poor compliance record
- we seek to target our activity where multiple benefits (synergies) can be realised across water quality, water resources, climate change, biodiversity and flood risk management
- we work with Welsh Government agencies to schedule and co-ordinate activity, to help reduce the risk of multiple visits, minimise the regulatory burden on the industry and focus on delivering environmental outcomes
- we inform the targeting of effort by others that will lead to improved levels of compliance
- we work with others to provide further incentives for action where needed

Table 5: Mechanisms for managing agricultural diffuse pollution

Mechanism	What this does
Water Resources Act 1991 Anti-pollution Works Notices, s161A Water Protection Zones s93	Requires a person to carry out works and operations to prevent or deal with the consequences of any poisonous, noxious or polluting matter or any solid waste entering controlled waters. Restricts or prohibits activities in order to protect the water environment from entry of poisonous, noxious or polluting matter.
Environmental Permitting (England and Wales) Regulations 2010	Allows enforcement action for various offences where surface water and/or groundwater are polluted. Requires permits for disposals/discharges that might lead to pollutants entering groundwater, including small sewage discharges in sensitive areas. Requires permits for spreading waste on agricultural land to improve or maintain the physical, chemical and biological properties of the soil to grow crops.

	Allows notices prohibiting any activity that might lead to an input of pollutants into groundwater. Requires permits for pig and poultry farms exceeding a certain size, with conditions to protect the environment. Makes sure that agricultural waste is recovered or disposed of without putting people's health at risk and without using processes or methods that could harm the environment.
Nitrate Pollution Prevention Regulations 2015	On farms within Nitrate Vulnerable Zones require farmers to follow an action programme that reduces the risk of nitrate entering water.
Plant Protection Products Regulations 2011; underpin EC regulation (EC) No 1107/2009 of the European Parliament and of the Council	The placement of plant protection products on the market
Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 2010 ('SSAFO')	Sets standards for all farms storing silage, livestock slurries and agricultural fuel oil, to minimise the risk of water pollution.
Environmental Protection Act 1990, Part 2A	Provides a system for identifying and improving land where contamination is causing unacceptable risks to people's health, crops and livestock or the environment.
Environmental Damage (Prevention and Remediation) (England) Regulations 2015	Require operators to carry out measures to prevent imminent or actual damage to the environment.
Wildlife and Countryside Act 1981 (as amended)	Allows consent to be refused for activities that may damage Sites of Specific Scientific Interest and action against third party damage to Sites of Specific Scientific Interest
Salmon and Freshwater Fisheries Act 1975	Allows for enforcement action against polluters who harm or injure fish, spawning grounds or fish food.
The Sludge (Use in Agriculture) Regulations 1989	Makes sure that recycling sludge to agricultural land is carried out in a way that protects human and animal health and the environment.
Sustainable Use of Pesticides Directive (2009/128/EC)	A legislative framework which:

	Contributes to reducing the impact of plant protection products on human health and the environment. Aims to achieve a more sustainable use of plant protection products. Promotes a significant overall reduction in risks and hazards of using plant protection products consistent with necessary crop protection.

Other plans and programmes

The Common Agricultural Policy (CAP) helps to deliver improvements to water quality through two mechanisms, cross compliance and the rural development programme.

Cross compliance

Steps towards achieving basic expectations and requirements are encouraged by financial support payments through Common Agricultural Policy (CAP) cross compliance conditions. For a farm business to receive the Basic Payment in full it must meet certain conditions. The conditions include implementing good soil management and putting a portion of arable land into Ecological Focus Areas and implementing measures to benefit water quality. These will help prevent deterioration and may significantly reduce the loss of sediment and associated nutrients and pesticides from some catchments. Government supports an advice service to help recipients of these payments to comply with these rules.

Rural Development Programme (2014 – 2020) for Wales

The Rural Development Programme is a 7 year investment programme supporting a wide range of activities which contribute to the following objectives:

- fostering the competitiveness of agriculture
- ensuring the sustainable management of natural resources, and climate action
- achieving a balanced territorial development of rural economies and communities including the creation and maintenance of employment

All projects funded by the Programme must align with one or more of the following European Rural Development Priorities:

- fostering knowledge transfer and innovation in agriculture, forestry, and rural areas
- enhancing farm viability and competitiveness of all types of agriculture in all regions and promoting innovative farm technologies and the sustainable management of forests, promoting food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture restoring, preserving and enhancing ecosystems related to agriculture and forestry
- promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors
- promoting social inclusion, poverty reduction and economic development in rural areas.

Project funding can be accessed through different schemes. Some schemes operate through windows that will open and close regularly through the life of the programme. Expressions of Interest (EOIs) must be submitted for each scheme, providing an outline of the proposed investment, explaining how the project will deliver against each of the assessment criteria.

Glastir
Glastir is the sustainable land management scheme, through which we offer financial support to farmers and land managers. It is funded by the Welsh Government Rural Communities - Rural Development Programme 2014-20.
Glastir pays for the delivery of specific environmental goods and services aimed at:

- combating climate change
- improving water management
- maintaining and enhancing biodiversity.

It is designed to deliver measurable outcomes at both a farm and landscape level in a cost effective way.

You can find further information here:
http://gov.wales/topics/environmentcountryside/farmingandcountryside/cap/ruraldevelopment/wales-rural-development-programme-2014-2020/?lang=en

Safeguard Zones

Safeguard zones are non-statutory areas identifying parts of the catchment where land use activities pose risks to drinking water quality. Within the zones, measures are targeted to help meet Drinking Water Protected Areas objectives. Natural Resources Wales develops Safeguard Zone Action Plans with water companies and local stakeholders to identify and deliver measures to meet Drinking Water Protected Areas objectives.

Additional actions

Water protection zones can be designated under the Water Resources Act 1991 to establish additional statutory provisions to prevent water pollution where evidence shows that existing statutory or voluntary measures have been or are unlikely to be sufficient to meet WFD objectives. Before a water protection zone is designated, Natural Resources Wales is required to make an appropriate case to the Welsh Government. Natural Resources Wales is also required to carry out a public consultation, which will include assessments of the costs and benefits of any proposed measures to be used within a zone. The size and nature of the zones depends on the location and the nature of the problem.

Progress towards reducing the impacts of diffuse pollution can be achieved by:

- Better targeting of existing regulatory compliance
- Additional mandatory rules for all farmers that will reduce phosphate in surface waters
- Considering the need the additional use of regulation such as water protection zones
- Using additional compliance mechanisms (for example, cross-compliance and farm assurance).
- Engagement by industry led initiatives and partnerships to encourage better uptake of “Key
- Actions for water management” by farmers.

Non-agricultural pollution

Run off from transport, on-street activities such as car washing, industrial estates, forestry and leisure industries, misconnections of foul water into the surface water sewer network

and discharges from contaminated land and disused mines all contribute to diffuse pollution from non-agricultural sources. Formal mechanisms for managing diffuse pollution from non-agricultural sources are set out in Table 6 below. Spatial planning procedures and policies, supported by the planning consultation process are also valuable mechanisms for reducing diffuse pollution and are set out in Table 7.

Table 6: Mechanisms for managing non-agricultural diffuse pollution

Mechanism	What this does
Water Resources Act 1991, Anti-pollution works notices s161A	Notices can be served on polluters or prospective polluters to prevent or remediate water pollution.
Abandonment of mines s91A and B as amended and the Mines (Notice and Abandonment) Regulations 1998	Requires mine owners to notify Natural Resources Wales if they plan to abandon a mine and to produce a closure plan.
Water Protection Zones s93	Restricts or prohibits activities in order to protect the water environment from poisonous, noxious or polluting matter.
Environmental Permitting (England and Wales) Regulations 2010 Causing or knowingly permitting entry of pollution to inland freshwaters and coastal waters	Allows prosecution for various offences where surface water or groundwater is polluted. Require permit for disposals/discharges that might lead to inputs of pollutants to groundwater. Allows notices to prohibit any activity that might lead to an input of a pollutant to groundwater.
Water Industry Act 1991, s101A	Encourages first time sewerage as a solution where there may be pollution from multiple septic tanks or cesspools, providing certain conditions are met.
European Union driven authorisation / approval mechanisms for the marketing and use of plant protection products, biocides and veterinary medicines. These are enforced via equivalent UK Regulations covering plant protection products, veterinary medicines and biocides.	Require human health and environmental risk assessment of products and requirement for 'authorisation' or 'approval' by the UK competent authorities before the products can be marketed or used.

Environmental Permitting (England and Wales) Regulations 2010	Allows conditions in permits that can include pollution prevention and other measures to prevent diffuse pollution, including air emissions that can lead to acidification. Requirements for secure storage, safe transport and controlled disposal reduce the potential for waste materials of all kinds to enter the water environment.
Coal Industry Act 1994 as amended by Water Act 2003 and the Energy Act 2011, and supported by Ministerial Statements and Memorandums of Understanding with Natural Resources Wales and Welsh Government	Provides powers to the Coal Authority to clean up and prevent water pollution from abandoned coal mines through a prioritised programme, and mines other than coal, subject to available funding.
Trade effluent controls under Water Industry Act 1991	Regulates discharges and drainage arrangements from certain industrial and trade sites.
The Detergents (Amendment) Regulations 2013	Limits the amount of phosphate in domestic laundry detergent and will potentially limit the use of phosphate in dishwasher detergent too.
Environmental Protection Act 1990, Part 2A (remediation of contaminated land) and the Contaminated Land (Wales) Regulations 2006 as amended	Provides for Notices to require remediation of contaminated land to improve the quality of groundwater and surface water.
The Environmental Permitting (England and Wales) (Amendment) (England) Regulations 2014	Sets rules for the operation of septic tanks and sewage treatment plants, and the conditions that are required to be met (general binding rules) in order to operate systems without an environmental permit.

Table 7: Local authority controls for managing non-agricultural diffuse pollution

Mechanism	What this does
Public Health Acts 1936 and 1961 and the Building Act 1984	Gives local authorities powers relation to wrong sewer connections.
Building Regulations 2010 – Part H	Deals with sewers and encourages the sustainable urban drainage systems approach to surface water drainage. Deals with non- mains sewerage systems e.g. septic tanks
Flood and Water Management Act 2010, Schedule 3	Deals with sustainable drainage.

Mechanism	What this does
Town and Country Planning Act 1990, s215	Gives local authorities powers to serve a notice on the owner or occupier of amenity land, or adjacent land, in their area to improve the condition of the land.

Morphology - physical modifications

Hydromorphology is a term used in the WFD to describe the processes operating within, and the physical form of, a water body, which could be a river, lake, estuary or coastal water. The term encompasses both hydrological and geomorphological characteristics that, in combination, help support a healthy ecology within these freshwater and marine environments. The directive requires that these water bodies are managed to protect or improve hydromorphological conditions so that the ecology is protected or enhanced. In doing so, the directive recognises the important role that water resources and habitats play in supporting healthy aquatic ecosystems.

The sections below provide an overview of mechanisms to implement physical improvements to the morphology of surface water bodies and to control morphological pressures with the aim of preventing deterioration of ecological status or potential as a consequence of:

- navigation
- development
- land drainage
- flood and coastal erosion risk management
- dredging, disposal and development in estuaries (transitional waters) and coastal waters
- other controls, plans and programmes

Navigation and Recreational Boating

Along the coast ports and harbour authorities have various environmental duties. This includes general duties which are applicable to all authorities. These are set out in national legislation such as the Harbours Act 1964. It also includes specific duties which are only applicable to individual harbour authorities. These are set out in local legislation such as harbour revision orders. Harbour authorities are also public bodies for the purposes of the WFD.

This is also the case for inland navigation authorities, including the Canal and River Trust which has general environmental duties which include conservation of flora and fauna. Natural Resources Wales is also a navigation authority in its own right.

The Association of Inland Navigation Authorities has prepared the report, 'Management strategies and mitigation measures for the inland navigation sector in relation to ecological potential for inland waterways'. This formed part of the United Kingdom Technical Advisory Group (UKTAG) project to develop a methodology to classify good ecological potential (GEP) for artificial water bodies (AWBs) and heavily modified water bodies (HMWBs).

The Green Blue is a programme set up by the Royal Yachting Association (RYA) and the British Marine Federation (BMF). Through publications like the Green Guide to Coastal Boating and the Green Guide to Inland Boating, the Green Blue programme aims to help

boat users, boating businesses, sailing clubs and training centres to reduce their environmental impact on coastal and inland waters.
You can find further information here: http://www.thegreenblue.org.uk/
The majority of UK inland Navigation Authorities, including Natural Resources Wales, have introduced the common minimum standards of the Boat Safety Scheme (BSS).
The BSS is a public safety initiative owned jointly by the Canal and River Trust and Natural Resources Wales. The navigation authorities' purposes for the Scheme are to help reduce the risks of fire, explosion and pollution on small craft. This is done by promoting fire safety and pollution avoidance advice to help boat owners keep themselves and their crews' safe as well as regular examination of fuel systems, gas systems, electrical systems and appliances.

Development

Under the planning system local councils and other planning authorities must consider environmental protection and enhancement when assessing development proposals. The statutory processes of Sustainability Appraisal (incorporating Strategic Environmental Assessment), Habitats Regulation Assessment and individual Environmental Impact Assessment processes (or other relevant assessments) provide a means of screening potential impacts of plans, programmes and individual proposals. Further information is provided in the Planning Practice Guidance supporting the National Planning Policy Framework.
By law, any planning application for development has to be determined against policies in the Development Plan for the area, unless material considerations indicate otherwise. These considerations include the National Planning Policy Framework which states that the planning system should contribute to conserving and enhancing the natural environment by

- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

The Planning Practice Guidance draws attention to the requirements of the WFD and highlights that local planning authorities should have regard to river basin management plans in exercising their functions. The guidance provides further information on how planners should take account of impacts on the water environment in Local Plans and planning applications, with reference to the WFD.
To achieve this, the guidance advises that local planning policies will need to consider water supply, wastewater and water quality issues, including:

- how to help protect and enhance local surface and ground waters that allow new development to proceed;
- the type and location of new development where an assessment of the potential impacts on water bodies may be required.

The guidance provides further information on the consideration of planning applications where there are water quality or supply issues.

Where the assessment indicates that the development will have a significant adverse impact on water quality, the proposed development will only be acceptable in terms of the WFD in the circumstances set out in the river basin management plan.
The consideration of any hydromorphological impacts are likely to be particularly important where new development requires new or changed flood defences or improved coastal defences as these can often be designed to combine improving ecological quality with providing recreation facilities ('green infrastructure') for the local community.

Influencing the final planning decision

Under planning law, an application for planning permission must be determined in accordance with the development plan for the area, unless material planning considerations indicate otherwise. Natural Resources Wales is a statutory consultee for local plans and is also a consultation body under the Strategic Environmental Assessment Directive. Natural Resources Wales advice, including on the measures in the river basin management plan, is therefore important in informing local plan policies and land allocations that will provide the basis for future decision on planning applications.
Some developments may have to be assessed against the requirement to prevent deterioration in ecological status or potential and will have to comply with Article 4.7 of the WFD. The river basin management plan should record decisions that are justified using Article 4.7.

Table 8: Mechanisms for managing development and hydromorphological pressures

Mechanism	What this does
Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 (as amended)	Requires an Environmental Impact Assessment for certain activities (listed in the Schedules to the Regulations) to determine the likelihood that a proposed project (development or other activity) will have significant environmental effects. Consenting authorities can modify or reject proposals that would significantly impact on hydromorphological conditions and can secure additional conservation gains as a condition of project approval.
Environmental Assessment of Plans and Programmes Regulations 2004	Ensures the environmental implications are taken into account before certain plans and programmes are adopted. The strategic environmental assessment process is integrated throughout the development of a plan or programme, notably during data gathering, feasibility of options, development of the preferred option, and monitoring its implementation. Natural Resources Wales is a consultation body to Environmental Assessments (Strategic Environmental Assessments and Environmental Impact Assessments) produced by other public bodies and developers.

Town and Country Planning Act 1990, Planning and Compulsory Purchase Act 2004 (as amended); Planning Act 2008 (as amended);	Establishes the sustainable development duty of spatial planning and establishes the principles of and need to produce local plans.

Land Drainage

Natural Resources Wales has the power to carry out various actions on main river to cleanse, repair or otherwise maintain existing watercourses. It has the power to improve any existing watercourse or drainage by deepening, widening, straightening, raising or otherwise improving, or by removing or altering mill dams, weirs or other obstructions. It has the power to make any new watercourse or drainage or do any other act required for the efficient drainage of any land. Local authorities and Internal Drainage Boards have similar powers to act on ordinary watercourses. These powers cannot be used to undertake works for the sole purpose of improving the physical condition or conservation interest of rivers, although in some cases it can be possible to realise these benefits additionally.

The Natural Environment and Rural Communities Act 2006 gave Natural Resources Wales amended byelaw-making powers to ensure that the broader effects of drainage systems on the environment can be taken into account when considering flood defence matters under byelaws.

The Natural Environment and Rural Communities Act 2006 provide similar byelaw-making powers to local authorities and Internal Drainage Boards. This power could be used by these authorities to redraft their byelaws to help reduce impacts in ordinary watercourses.

Dredging and land drainage byelaws

Dredging on ordinary watercourses for the purposes of land drainage, flood risk management or navigation in ordinary watercourses may require an ordinary watercourse consent from the Local Authority or Internal Drainage Board. This will depend on the local byelaws. In all cases Natural Resources Wales advises that the dredging work adheres to good practice guides.

Table 9: Mechanisms for managing land drainage

Mechanism	What this does
Water Resources Act 1991, s109	Provides Natural Resources Wales with regulatory control (through flood defence consenting) of the construction, alteration or repair of structures in, over or under any main river. Power is also given to Natural Resources Wales to alter or remove any works in contravention of section 109 and recover the costs of this. Conditions can be imposed only in relation to the time and manner in which work can be carried out. Where the main river is an estuary, main river dredging may also require a marine licence unless carried out by harbour authorities for navigation under their own powers. The Government is intending to expand the environmental permitting regime (under Environmental Permitting (England and Wales) Regulations 2010) to cover flood defence consenting for main river under section 109 Water Resources Act 1991 in early 2016.
Water Resources Act 1991, s165 Land Drainage Act 1991 s14(2)	Empowers Natural Resources Wales to maintain or improve existing drainage works or to construct new works on a main river. Power also extends to maintain, improve or construct drainage works for the purpose of defence against sea water or tidal water. Work can only be undertaken to improve flow conveyance and ensure the efficient working of the drainage system, though other conservation benefits may also be achieved. Equivalent powers are conferred upon Internal Drainage Boards and local authorities through section 14(2) of the Land Drainage Act 1991. Any work carried out by third parties that may impact on flow conveyance is subject to a land drainage consent from the relevant authority (Natural Resources Wales, Internal Drainage Board or local authority) – see below
Water Resources Act 1991 s107	Provides Natural resources Wales's power to serve a notice in regard to main river to ensure that necessary works to improve flow conveyance are carried out, or to undertake the works and recover reasonable costs.
Land Drainage Act 1991, s21 and s25	Provides Internal Drainage Boards and local authorities with powers to serve a notice in regard to ordinary watercourses to ensure that necessary works to improve flow conveyance are carried out, or to undertake the works and recover reasonable costs.
Land Drainage Act 1991, s23	Provides local authorities and Internal Drainage Boards with regulatory control (through land drainage consenting) of the erection, raising or otherwise altering of mill dams, weirs or other like obstructions to flow. Written consent is also required for the erection or alteration of any culvert that is likely to affect the flow in ordinary watercourses.

Mechanism	What this does
Water Resources Act 1991, Schedule 25 as amended by s100 Natural Environment and Rural Communities Act 2006	Provides power to Natural Resources Wales to make byelaws necessary for the efficient working of any drainage system and for regulating the effects of any drainage system on the environment
Land Drainage Act 1991s 66 as amended by s100 Natural Environment and Rural Communities Act 2006	Confers byelaw-making powers on Internal Drainage Boards and local authorities that are deemed necessary for the efficient working of the drainage system and for regulating the effects of any drainage system on the environment. Powers for Internal Drainage Boards only extend to ordinary watercourses.
Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999	Requires an Environmental Impact Assessment for certain activities (listed in the Schedules of the Regulations) to determine the likelihood that a proposed project (development or other activity) will have significant environmental effects. Consenting authorities can modify or reject proposals that would significantly impact on hydromorphological conditions and can secure additional conservation gains as a condition of project approval.

Flood and Coastal Erosion Risk Management

Under the Flood and Water Management Act 2010, Natural Resources Wales, lead local flood authorities, district councils, internal drainage boards, water and sewerage companies, and highway authorities have a duty to co-operate to put in place better flood risk management for the benefit of their communities.

Natural Resources Wales flood risk management activities, and how they can benefit river basin management through the use of particular mechanisms, are guided by the following plans and strategies:

- Catchment Flood Management Plans – are prepared by the Environment Agency and set long term policies for sustainable flood risk management within a catchment.
- Shoreline Management Plans – are prepared by coastal local authorities and natural Resources Wales, and encourage sustainable management policies for the coastline over a 100 year period.
- Flood Risk Management Plans – prepared under the Flood Risk Regulations 2009 and set out actions to address flood risk in significant flood risk areas.
- Delivery Plans - specific ‘delivery’ plans will be developed to determine the best measures to implement the policy intents of Shoreline Management Plans and Catchment Flood
- Management Plans. These plans could include for example, Water Level Management Plans, System Asset Management Plans, Local Flood Warning Plans, and Multi-Agency Response Plans for flooding.

Lead Local Flood Authorities also publish Local Flood Risk Management Strategies which covers flood risk management from surface runoff, groundwater and ordinary watercourses.
Any flood and coastal erosion risk management strategies or schemes which are promoted in accordance with policies in Shoreline Management Plans and Catchment Flood Management Plans will have to be assessed against the requirement to prevent deterioration in ecological status or potential or will have to comply with the conditions set out in Article 4.7 of the WFD where deterioration cannot be prevented. Government policy on the appraisal of flood and coastal erosion risk management was published in 2009. More detailed practical guidance on appraising flood and coastal erosion risk management projects, which addresses the requirements of the WFD, was published by the Environment Agency in 2010.
Flood risk management grant in aid can contribute towards the provision of environmental benefits, such as river restoration work, where it is integral to a flood or erosion risk management scheme. Flood risk management authorities may also manage water levels specifically for the purpose of nature conservation, preserving cultural heritage and promoting peoples enjoyment of the environment (Sections 38 and 39 of the Flood and Water Management Act 2010, Incidental Flooding or Coastal Erosion). This expenditure remains subject to Government spending rules and priorities.

Dredging, Disposal and Development in Estuaries, Coastal and Marine Waters

Alongside the terrestrial planning system, there is a system of marine planning and marine licensing for regulating development and other activities in the marine area. In broad terms, this comprises the area seaward of mean high water springs and within estuaries to the extent of tidal influence.
The Marine Licensing Team is responsible for producing the marine plans. This follows a similar approach to terrestrial plans – setting the direction for decision-making at a more local level to lead to efficient and sustainable use of marine resources.
The Marine Licensing Team is also responsible for marine licensing in Wales. Amongst other things, a marine licence is likely to be required for the construction, alteration or improvement of any works; for the deposit of substances or objects from vessels; for the removal of substances or objects from the seabed; and dredging. Certain exemptions can also apply, for example, harbour authorities are often able to undertake dredging under their own powers without a licence.
Unlike terrestrial planning, there are no statutory consultees for marine licensing. However, Defra and Welsh Government have issued guidance on the bodies that should be considered primary advisors and regularly consulted by the Marine Licensing Team. This includes Natural resources Wales.
The Marine Licensing Team is also responsible for determining applications for harbour orders. These are a form of statutory instrument which create or amend legislation governing harbour authorities. Amongst other things, they can give harbour authorities power to undertake development and dredging.
Natural Resources Wales also has a regulatory role in estuarine and coastal waters through mechanisms such as flood defence consenting, environmental permitting (to 12 nautical miles, although its role in relation to pollution control in, and permitting of discharges to, water extends only to 3 nautical miles) and abstraction licensing (in tidal rivers, bays, creeks and arms of the sea).
Both the Marine Licensing Team and Natural Resources Wales have adopted the coastal concordat. This sets out the important principles for coordinating the consenting process

for coastal development. One principle encourages authorities to dispense with consents where appropriate. Natural Resources Wales has the ability to dispense with flood defence consenting in favour of marine licensing when satisfied that the terms of the marine licence would provide adequate mitigation for flood risk.

Table 10: Mechanisms for managing development, dredging and disposal in estuaries, coastal and marine waters

Mechanism	What this does
Marine and Coastal Access Act 2009	Controls the deposit or removal of any substance or object in, on or under the sea bed including below the mean high water springs mark and in any tidal river to the extent of the tidal influence, from a vehicle, vessel, aircraft, marine or land-based structure or floating container. The construction, alteration or improvement of any works either in or over the sea or on or under the seabed and any form of marine dredging. Requires implementation of marine plans and marine conservation zones.
Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)	Requires an Environmental Impact Assessment for certain activities (listed in the Schedules of the Regulations) to determine the likelihood that a proposed project (development or other activity) will have significant environmental effects.
Harbour Revision and Empowerment Orders	Controls the dredging and other activities carried out by harbour authorities within a set area associated with a port or marina.
Harbour Works (Environmental Impact Assessment) Regulations 1999	Requires an Environmental Impact Assessment for certain activities (listed in the Schedules of the Regulations) to determine the likelihood that a proposed harbour and associated activities will have significant environmental effects.

In determining marine licence applications, the Marine Licensing Team must consider the need to protect the environment. This may include consideration of physical changes and morphology. Marine licences and harbour orders may also be subject to the same statutory assessment processes as the terrestrial system, such as environmental impact assessment. Conditions can then be used to mitigate adverse impacts.

As public bodies, the Marine Licensing Team must also have regard to the river basin management plans and any supplementary plans in exercising their functions. This includes assessing and determining marine licence and harbour order applications. Harbour authorities undertaking activities under their own powers must also have regard to river basin management plans.

Important environmental considerations for regulators are potential hydrological effects, interference with other marine activities, possible turbidity, noise, drift of fine materials smothering seabed flora and fauna, habitat loss and impact to designated conservation areas. In this way new physical modifications can be assessed to see if they will cause deterioration of the hydrological and morphological conditions. This will also highlight opportunities to make improvements, where this is possible.

Similar to terrestrial areas, many estuaries and coastal waters have environmental designations and protected sites which must be considered in assessing any consent application. This includes European and Ramsar sites and Sites of Special Scientific

Interest. It also includes marine conservation zones which are a national marine protected area. These additional protections may also help to achieve WFD objectives. Under the Maintenance Dredging Protocol some harbour authorities have produced baseline documents to review whether activities will impact on local protected sites. These assessments can also incorporate WFD objectives in addition to protecting hydromorphological conditions.

Other plans, programmes and controls

The management of activities with potential to affect hydromorphological conditions is relevant to many different sectors of industry and to a number of functions within Natural Resources Wales. Consequently managing hydromorphological pressures requires an integrated catchment management approach. This section and Table 11 below lists other relevant mechanisms for managing hydromorphological pressures.

Table 11: Mechanisms for managing hydromorphological pressures

Mechanism	What this does
Salmon and Freshwater Fisheries Act 1975, Part II	Requires that new obstructions to the passage of salmon and migratory trout (or the raising or repair of existing obstructions) be fitted with appropriate fish passes. Includes powers to serve notice (under section 9) to require these works to be undertaken. Section 2(4) of this Act makes it an offence to wilfully disturb any river or lake bed, bank or shallow on which any spawn or spawning fish may be.
Eels (England and Wales) Regulations 2009	Enables Natural Resources Wales to serve notice to require removal of an obstruction to eel migration or installation of an eel pass; from 1 January 2015 requires all water intakes (taking more than 20 cubic metres per day) and outfalls to be screened to prevent entrainment of eel unless exempted by Natural Resources Wales notice.
Water Act 2003, s 3 and 4	Empowers the Natural resources Wales to license existing unlicensed impoundments or remove or else modify existing unlicensed impoundments where necessary for the protection of the environment by serving notice under section 4.
Water Resources Act 1991 sections 161ZA and ZB	Allows for service of notice or taking action in relation to ‘harm’ to the physical condition of surface waters. Harm is defined as an adverse impact on any hydromorphological quality element that is likely to prevent achievement of WFD environmental objectives. Natural Resources Wales use of these powers, which came into effect in December 2009, must explicitly be linked to the achievement of WFD environmental objectives.

Mechanism	What this does
Conservation Habitats and Species Regulations 2010 (as amended)	The legislative framework (along with the Wildlife and Countryside Act 1981) through which the Habitats Directive and Birds Directive are implemented. Regulations 9(1), 9(3), 9A, 61 and 63 provide a conservation duty for Natura 2000 sites that overrides all other statutory regimes. Powers are employed to assess new and existing consents and permissions for significant adverse impacts and to provide compensatory habitat if required. Habitats Directive objectives are reflected in WFD protected areas objectives and so the requirements of Habitats Directive have to be met under WFD. The Review of Consents process does not include land drainage consents
Wildlife and Countryside Act 1981, s28G	Places a duty on public bodies in exercising their functions to take reasonable steps to further the conservation and enhancement of the special features of Sites of Special Scientific Interest. Limited geographical application
Wildlife and Countryside Act 1981, s28J	Gives Natural Resources Wales powers to put in place a management scheme to conserve or restore the flora, fauna, geological or geophysical features of Sites of Special Scientific Interest. May need Natural Resources Wales (or other drainage authority) consent for the works. Limited geographical application
Wildlife and Countryside Act 1981 s 28K	Gives Natural Resources Wales powers to serve a management notice to ensure that conservation or restoration works are implemented. Also empowers Natural Resources Wales to carry out the works itself and recover the costs from the owner or occupier. May need natural resources Wales (or other drainage authority) consent for the works.

Measures to control diffuse pollution have significant potential to prevent deterioration of hydromorphological conditions, and to restore water bodies to a more natural condition. Various plans and strategies can also be used to target the mechanisms outlined in this section, including:

- fisheries action plans
- salmon action plans
- eel management plans
- national trout and grayling strategy
- sea trout and salmon fisheries strategy
- Species action plans
- habitat action plans
- local biodiversity action plans
- water resources strategy

Many restoration and enhancement projects are undertaken in partnership with, or in some cases solely, by Natural Resources Wales and other conservation bodies such as the rivers trusts. Many projects are undertaken through voluntary agreements at local level.

Fishing and fish stocking

Natural resources Wales is responsible for the management of freshwater and migratory fisheries in Wales. This responsibility extends 6 nautical miles out to sea. Natural resources Wales aim is to protect and enhance the environment and sustainable development. With regards to fisheries, Natural Resources Wales is required to maintain, improve and develop fisheries of migratory and freshwater fish to:

- conserve and maintain diversity of fish and conserve and the aquatic environment
- enhance the contribution that salmon and freshwater fish make to the economy
- enhance the social value of fishing

Natural Resources Wales is also required to maintain, improve and develop salmon fisheries, trout fisheries, freshwater fisheries and eel fisheries. This includes making sure that inappropriate fish species are not introduced and that the diseases or parasites they may carry are adequately controlled.

In most recreational migratory and freshwater fisheries it has become popular to practice catch and release (almost 100% for coarse fish and eel and more than 70% for salmon) or to re-stock to maintain the fish population (noting that Natural Resources Wales policy is generally not to allow salmon stocking).

Formal mechanisms to conserve and protect fish populations are set out in Table 12.

Table 12: Mechanisms for managing fisheries

Mechanism	What this does
National spring salmon byelaws 2009	Prohibits the killing of salmon before 1 June in net fisheries and 16 June in rod fisheries each year.
Fisheries byelaws	Control fishing activities, such as bans on use of live bait and restricting the fishing methods used as well as fishing seasons and (for net fisheries) times and areas of fishing.
Aquatic Animal Health Regulations 2009	Requires fish farms, suppliers and fisheries to be registered or authorised so that the transfer of fish diseases is better controlled.
Import of Live Fish Act (ILFA) 1980	Controls spread of non-native species. Regulates the import, keeping and release of non-native fish by means of Orders relating to specific listed species.
Prohibition of Keeping of Live Fish(Crayfish) Order 1996	Prohibits (with the one exception of signal crayfish Pacifastacus leniusculus in areas where it has become established) the keeping of any non-native crayfish except under licence.
Wildlife and Countryside Act 1981	Prohibits release to the wild of scheduled invasive non-native species or allowing them to escape into the wild.
Salmon and Freshwater Fisheries Act 1975	Provides various powers for the protection and management of fisheries, including the introductions of orders that limit the number of nets fishing in a public fishery.

Mechanism	What this does
Water Resources Act 1991	Sets out the responsibilities of Natural Resources Wales in relation to water pollution, water resource management, flood defence, fisheries, and in some areas, navigation.
Eels (England and Wales) Regulations 2009	Allows Natural Resources Wales to translocate or stock eel, serve notices requiring eel passes in obstructions and requires provision of screens to protect eels.

Other approaches

Salmon action plans and eel management plans have been prepared that identify a range of pressures that need to be addressed to improve salmon and eel stocks. Whilst the strategy recognises the need to maintain a national overview of salmon conservation, the important component requires individual stocks to be managed effectively. This approach is endorsed by the North Atlantic Salmon Conservation Organisation which is an inter-governmental body concerned with salmon conservation at an international level.

Eel management plans are a requirement of the European Union Eel Regulation and aim to improve the eel stock in each river basin district. Measures may include: eel net limitations; closed seasons; maximum size limits; regulation of eel traders; traceability of imports and exports of eels, stocking, reducing losses through entrainment and improved connectivity in rivers.

Local fisheries action plans have been developed in some places in partnership between Natural Resources Wales and local angling and fisheries groups, with input from conservation and other interest groups. They are based on river catchments, but cover canal and still-water fisheries as well as rivers. They can cover a wide range of subjects from fish habitat through to angling promotion and land management. Each fisheries action plan is different and reflects the concerns and priorities of local angling and fisheries interests.

The Marine and Coastal Access Act 2009 provides Natural Resources Wales with powers to make emergency byelaws to respond effectively and promptly to unforeseen threats to fish stocks; to operate an authorisation regime for some fishing activities extending the fisheries licensing system.

The Marine Licensing Team has responsibility for enforcing sea fisheries regulations out to 200 nautical miles or the median line with neighbouring states under the European Union's Common Fisheries Policy. It also enforces national fisheries measures, including those implemented under the Sea Fish (Conservation) Act 1967 and associated regulations.

Controls on the operators of shellfisheries and fish farming are available through IFCAs, the Centre for Environment, Fisheries, and Aquaculture Science (Cefas) register, seabed licences from the Crown Estate and several regulating Orders.

Natural Resources Wales works with the Welsh Government Marine Licensing Team, Centre for Environment, Fisheries, and Aquaculture Science to enable appropriate measures to be taken to regulate sea fish for the protection of salmon and other migratory species.

Invasive non-native species

A non-native species is one that has been transported from its native range to a new region with the assistance of humans. There are around 2000 non-native species established in Great Britain, and 10-15% of those have negative impacts. In freshwaters, non-native species have a greater chance of becoming invasive and causing ecological and economic impacts: around 40% of species introduced to freshwaters have a negative impact.

The approach to managing the problem is set out in the "Invasive Non-native Species Framework Strategy for Great Britain", Defra, May 2008 (available at the Great Britain Non-Native Species Secretariat website http://www.nonnativespecies.org/). The strategy was updated in 2015.

Main measures in the strategy include:

- educating people on the risks from invasive non-native species, and how to help avoid introducing these species
- maintaining and developing the web-based shared Non-Native Species Information Portal that shows the distribution of non-native species and more detailed factsheets for around 300 species
- sharing and developing expertise for early identification of potential problem species that may already be here or on their way, and the best ways to handle them
- developing a clear framework for rapid responses when invasive species are detected for the first time in Britain
- encouraging a partnership approach to managing invasions of species
- supporting research on cost-effective methods to address established invasions
- identifying main pathways of invasion

Table 13: Mechanisms for managing invasive non-native species

Mechanism	What this does
Import of Live Fish Act (ILFA) 1980	Controls spread of non-native species. Regulates the import, keeping and release of non-native fish by means of Orders relating to specific listed species.
Prohibition of Keeping of Live Fish (Crayfish) Order 1996	Prohibits (with the one exception of signal crayfish Pacifastacus leniusculus in areas where it has become established) the keeping of any non-native crayfish except under licence.
Wildlife and Countryside Act 1981	Prohibits sale and releasing to the wild of scheduled invasive-non-native species or allowing them to escape into the wild.
Fisheries byelaws	Controls fishing activities, such as bans on use of live bait (or by using the licence schemes described above).
Alien and Locally Absent Species in Aquaculture (England and Wales) Regulations 2011	Requires permits for movement of non-native fish in aquaculture.

Mechanism	What this does
EU Invasive Alien Species European Union Regulation 1143/2014	Covers prevention, early detection and rapid eradication, and management of invasive species.
On the prevention and management of the introduction and spread of invasive alien species	A list of invasive alien species of Union concern will be agreed by early 2016. Species listed as being of “Union concern” could not be introduced, transported, placed on the market, kept, bred, grown or released in the environment.
Marine Strategy Regulations 2010	Sets targets for reduction in risk of introduction and spread of non-indigenous species, in particular invasive species, in marine waters to achieve objectives of the Marine Strategy Framework Directive by 2020.
Infrastructure Act 2015 (Part 4 Environmental control of animal and plant species)	Allows statutory bodies to serve control agreements and orders for invasive non-native species

Other approaches

The most effective approach to the invasive non-native species pressure is to reduce the introductions of new species and slow the spread of those that are already present by applying good biosecurity (measures which reduce the risk of spreading diseases and invasive non-native plants and animals) and promoting the 'Check, Clean Dry' and ‘Be Plantwise’ campaigns. Vulnerable locations such as those with high biodiversity value or at risk from plant-induced flooding should have measures to improve and raise awareness of biosecurity as a priority.
Direct measures to detect and eradicate invasive non-native species may be taken locally, often in partnership with others and as part of Local Biodiversity Action Plans. Flood risk river management programmes often include measures to manage non-native plant species where they have an impact on flood risk.

Direct discharge of pollutants into groundwater

Direct discharges of hazardous substances into groundwater are prohibited by the WFD which is put into effect through the Environmental Permitting (England and Wales) Regulations 2010 and other legislation, subject to certain exemptions.
There are exceptions set out in Article 11(3)(j) of the WFD and Article 6(3) of the Groundwater Directive. These essentially allow the direct discharge of hazardous substances only where the discharge does not cause pollution (i.e. the status of the groundwater body is not reduced and there is no significant rising trend of pollutants that needs to be reversed).

Priority substances

The WFD provides for identification at European Union level of priority substances. The directive requires progressive reduction of discharges, emissions and losses of these substances and, for a subset of priority hazardous substances, cessation or phasing-out of discharges, emissions and losses within 20 years. It also requires environmental quality

standards, set at European Union level, to be used as criteria for the assessment of good chemical status for surface water bodies. The initial list of priority substances was agreed by co-decision (Decision 2455/2001/EC) in 2001.
The initial list contained 33 priority substances (or groups of substances), of which 13 were identified as priority hazardous substances. Environmental quality standards for these substances were published in December 2008 in a daughter directive of the WFD, the Environmental Quality Standards Directive (2008/105/EC) and otherwise known as the Priority Substance Directive.
Further standards are being implemented following amendments (2013/39/EU) to the directive. There are now 45 priority substances of which 21 are priority hazardous substances. This number includes 11 new substances where the standards do not come into force until 2018.
Objectives to achieve good chemical status and for progressive reduction of priority substances and cessation of priority hazardous substances are subject to disproportionate cost and technical infeasibility considerations.
A further requirement of the Environmental Quality Standards Directive is for member states to take measures to ensure, subject to WFD Article 4, that concentrations of certain priority substances that tend to accumulate in sediment and/or biota do not significantly increase. The directive has a requirement to establish an inventory of emissions, discharges and losses of the priority substances for each river basin district.
The WFD also requires member states to identify substances that qualify as Specific Pollutants, i.e. substances that are considered to potentially cause environmental problems in a particular Member State, but have not otherwise been identified as priority substances requiring action at European Union level. Member states derive environmental quality standards for these using a similar process to that for priority substances, and then implement these through domestic legislation. An initial list of Specific Pollutants was set out in Directions from Government. (A direction is a form of legislation made under the Environment Act 1995).
The initial Directions have been revoked and replaced by the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. The new Directions will introduce revised standards for some Specific Pollutants and introduce new Specific Pollutants to the list.
Since June 2009, risks to human health and the environment (including the water environment) have been assessed for many chemicals under the REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) Regulations.
Many of the mechanisms under point source pollution and diffuse pollution can be used to avoid or limit pollution from priority substances and specific pollutants. Other available mechanisms for managing these substances are given in Table 14.

Table 14: Measures for managing substances

Mechanism	What this does
Controls on point or diffuse sources of pollution under the Environmental Permitting Regulations (England and Wales) 2010	Places controls on discharges or disposals of substances; eliminates, reduces and renders emissions harmless.
Control of Pollution Act 1974	Bans use of tributyltin (TBT) on boats less than 25m long.

Mechanism	What this does
European Regulation 782/2003	Requires the removal of tributyltin (TBT) from hulls by July 2003. No vessels in European Union waters by 2008 with TBT on their hulls.
International Convention on the Control of Harmful Anti-fouling Systems on Ships of the International Maritime Organization 2008	Introduces an international ban on use of tributyltin (TBT) as an antifoulant on boats.
Marketing and Use Restriction under Regulation European Community 850/2004	Bans use of particular substances in the European Union.
European Regulation 1107/2009 concerning the placing of plant protection products on the market	Controls active substances for use in plant protection products across the EU. Several priority hazardous substances and priority substances are banned from use in plant protection products.
World-wide treaty on Persistent Organic Pollutants	Bans marketing and use of these substances.

Other approaches

The European Union mercury strategy and the work of the OSPAR Commission[6] have reduced the use of mercury in industry, including a ban on mercury thermometers.

Natural Resources Wales' Memorandum of Understanding with the Coal Authority deals with the prevention of new discharges and remediation of existing discharges from abandoned coal mines, exchange of information, research and to ensure (as far as possible) operators deal with potential pollution from closure of licensed coal mines. Discharges from closed coal mines typically contain iron and manganese (both are Specific Pollutants).

Abandoned metal mines are a significant source of metals particularly cadmium (Priority Hazardous Substance), lead and nickel (Priority Substances), zinc and copper (Specific Pollutants). Natural Resources Wales, Welsh Government and the Coal Authority are working together to identify priority discharges and implement remedial measures in Wales subject to funding.

There are several national initiatives to help minimise the environmental risks from pesticides and prevent further environmental damage. These include the pesticide Voluntary Initiative, the Amenity Forum and other pesticide product stewardship campaigns, and water company catchment schemes. Registration of users and certificates of competence under BASIS minimises the environmental risks from sheep dip and other chemicals and prevents further environmental damage.

Accidental pollution incidents

Mechanisms set out in the sections above on point source discharges, diffuse source pollution and priority pollutants can also be used to help avoid or deal with the effects of accidental pollution. Educational programmes and raising public awareness are also valuable mechanisms.

[6] The 1992 OSPAR (Oslo-Paris) Convention is the current instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. See http://www.ospar.org/

Specific measures to prevent or reduce the impact of accidental pollution incidents are set out in Table 15.

Table 15: Mechanisms to prevent or reduce accidents

Mechanism	What this does
Control of Major Accident Hazard Regulations 2015 in partnership with Health and Safety Executive	Minimises risks to health and the environment from stored pollutants.
Environmental Permitting Regulations (England and Wales) 2010	Regulates industrial processes to minimize accidental emissions: makes sure sewerage undertakers (owners/operators) prevent illegal inputs to sewage treatment works introduces notices to prohibit any activity that might lead to an input of a listed substance/ WFD pollutant to groundwater.
Water Resources Act 1991 Works notices, s161A Storage of pollutants and use of Water Protection Zones, s93	Requires action by a responsible person to prevent/remediate pollution. Minimises/prevents accidents from stored pollutants.
The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009	Prevention and remedying of environmental damage to habitats and species protected under EC law and to species or habitat on a site of special scientific interest. Natural Resources Wales, local authorities, and Marine Licensing team

Other approaches

Planning for accident management can help prevent a spill becoming a pollution incident. Emergency Planning activities are carried out by a range of organisations, including the Natural Resources Wales, central government local authorities Local Resilience Forums, and by industry and business. Partnerships who work with Natural Resources Wales to

reduce the number and impacts of pollution incidents include the Fire Rescue Service, Network Rail, BASIS, British Safety Industry Federation and Oil Care Campaign.
An example is the Maritime and Coastguard Agency's National Contingency Plan which deals with pollution incidents in the marine environment. Owners and masters of ships and the operators of offshore installations have the responsibility for ensuring that they do not pollute the sea. Harbour authorities are responsible for ensuring that their ports avoid marine pollution and for responding to incidents within their limits. The Maritime and Coastguard Agency will also provide national support to ships, offshore installations, harbour authorities and coastal local authorities where this is necessary.
The majority of inland navigation authorities have also took on the common minimum standards of the Boat Safety Scheme. At least 12 other navigation and harbour authorities have also introduced it. The navigation authorities' purposes for the Scheme are to help reduce the risks of fire, explosion and pollution on small craft. This is done by promoting fire safety and pollution prevention advice to help boat owners keep themselves and their crew safe as well as regular examination of fuel systems, gas systems, electrical systems and appliances.

9. Glossary

The following list aims to provide brief explanations of many of the words, phrases and acronyms relating to river basin management.

Term	Explanation
Agri-environment scheme	Land management schemes that aim to combat climate change, improve water management, and maintain and enhance biodiversity at both a farm and landscape level.
Alternative objectives	In certain circumstances (set out in Article 4.4 and 4.5 of the WFD) Member States may deviate from achieving the default objectives (e.g. good status by 2015). Objectives which are different from the default objectives are referred to in this RBMP as alternative objectives. The types of alternative objective are: - an extended deadline, e.g. achieving good ecological status by 2027; - a less stringent objective, e.g. achieving moderate ecological status by 2015; - different objectives for heavily modified or artificial water bodies, e.g. good ecological potential.
Angiosperms	The flowering plants. In transitional and coastal waters they include sea grasses and the flowering plants found in salt marshes.
Area Based Approach	The Environment (Wales) Bill outlines the requirement on Natural Resources Wales to develop and implement an area-based approach for natural resource management. This will be a planning and priority setting process that co-ordinates resource so that the long term sustainable benefits are optimised for the people, environment and economy of Wales in the present and in the future. It will align catchment based approaches to water management and water resource planning with other land management activity.
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Artificial Water Body	A man-made surface water body, rather than a modified natural water body, which supports important aquatic ecosystems. It includes canals, some docks and some man-made reservoirs.
Asset Management Plan	See Periodic Review.
Bathing Waters Directive	The European Union's revised Bathing Water Directive (2006/7/EC) came into force in March 2006 and replaces the current Bathing Water Directive (76/1160/EEC). The overall objective of the revised directive is the protection of public health, but it also offers an opportunity to improve management practices at bathing waters and to standardise the information

Term	Explanation
	offered to bathers across Europe. The directive introduces a new classification system with more stringent water quality standards and puts an emphasis on providing information to the public.
Biodiversity Action Plan	The UK Biodiversity Action Plan describes the biological resources of the UK and provides plans for their conservation. Action plans exist for the most threatened species and habitats. Local plans have also been produced (LBAPs).
Biological element	A collective term for a particular characteristic group of animals or plants present in an aquatic ecosystem (for example phytoplankton; benthic invertebrates; phytobenthos; macrophytes; macroalgae; phytobenthos; angiosperms; fish).
Biological indicators	A parameter that can be monitored to estimate the value of a biological quality element. Indicators may include the presence or absence of a particularly sensitive species.
Biological quality element	A characteristic or property of a biological element that is specifically listed in Annex V of the WFD for the definition of the ecological status of a water body (for example composition of invertebrates; abundance of angiosperms; age structure of fish).
Catchment	The area from which precipitation contributes to the flow from a borehole spring, river or lake. For rivers and lakes this includes tributaries and the areas they drain.
Characterisation (of water bodies)	A two-stage assessment of water bodies under the WFD. Stage 1 identifies water bodies and describes their natural characteristics. Stage 2 assesses the pressures and impacts from human activities on the water environment. The assessment identifies those water bodies that are at risk of not achieving the environmental objectives set out in the WFD. The results are used to prioritise both environmental monitoring and further investigations to identify those water bodies where improvement action is required.
Chemical Status (surface waters)	The classification status for the surface water body. This is assessed by compliance with the environmental standards for chemicals that are listed in the Environmental Quality Standards Directive 2008/105/EC, which include priority substances, priority hazardous substances and other pollutants carried over from the Dangerous Substance Daughter Directives. Chemical status is recorded as good or fail.

Term	Explanation
Chemical Status (groundwater)	An expression of the overall quality of the groundwater body. The classification status for a groundwater body against the environmental criteria set out in the WFD and the Groundwater Directive (2006/118/EC), as set out in Common Implementation Strategy (CIS) guidance document No 18 and UKTAG guidance Paper 11b(i): Groundwater Chemical Classification for the purposes of the WFD and the Groundwater Daughter Directive. All five of the component tests for chemical status must be assessed as good or poor and the overall chemical status.
Classification	Method for distinguishing the environmental condition or "status" of water bodies and putting them into one category or another.
Co-deliverer	Agencies and institutions with statutory powers or who have it in their power to deliver actions needed to implement RBMPs.
Common Implementation Strategy (CIS)	This strategy was agreed by the European Commission, Member States and Norway in 2001. The aim of the strategy is to provide support in the implementation of the WFD and its daughter directives, by developing a common understanding and guidance on key elements of the Directives.
Competent Authority	An authority or authorities identified under Article 3(2) or 3(3) of the WFD. The Competent Authority will be responsible for the application of the rules of the Directive within each RBD lying within its territory.
Conservation Objective	Under the Habitats Directive: it is the target for the species and/ or habitats for which a site is designated, for it to contribute to maintaining or reaching Favourable Conservation Status (see below) at the biogeographical level.
Cost effective	In the context of the WFD, it describes the least cost option for meeting an objective. For example, where there are a number of potential actions that could be implemented to achieve Good Ecological Status for a water body, Cost Effectiveness Analysis is used to compare each of the options and identify which option delivers the objective for the least overall cost.
Cross compliance	A form of conditionality by which, farmers in receipt of public subsidies are required to comply with all legislation affecting their businesses, including European Union environmental legislation. The requirements of Cross compliance are: i) an obligation to maintain agricultural land in Good Agricultural and Environmental Conditions and ii) an obligation to comply with specified Statutory Management Requirements according to European Union legislation, for example the Nitrates Directive, Groundwater Directive.
Diffuse pollution	Pollution resulting from scattering or dispersed sources that are collectively significant but to which effects are difficult to attribute individually.

Disproportionate cost	The determination of disproportionate cost requires a decision making procedure that assesses whether the benefits of meeting good status in a water body are outweighed by the costs.
Drinking Water Directive 98/83/EC	This Directive relates to the quality of water intended for human consumption and covers both public and private supplies, setting standards for quality and monitoring.
Drinking Water Inspectorate	The Drinking Water Inspectorate is the independent regulator of drinking water in Wales and England. Their role is to ensure that water companies supply safe drinking water that is acceptable to consumers and meets standards set down in law. In addition, the chief Inspector of Drinking Water publishes annual reports about the quality of private and public drinking water in Wales.
Drinking Water Protected Areas	Bodies of water that are used or could be used in the future for the abstraction of water intended for human consumption.
Ecological continuum	The persistence of the ecological structure and functioning of aquatic ecosystems over time and space.
Ecological potential	The status of a heavily modified or artificial water body measured against the maximum ecological quality it could achieve given the constraints imposed upon it by those heavily modified or artificial characteristics necessary for its use. There are five ecological potential classes for Heavily Modified Water Bodies/Artificial Water Bodies (maximum, good, moderate, poor and bad).
Ecological status	Ecological status applies to surface water bodies and is based on the following quality elements: biological quality, general chemical and physico-chemical quality, water quality with respect to specific pollutants (synthetic and non-synthetic), and hydromorphological quality. There are five classes of ecological status (high, good, moderate, poor or bad). Ecological status and chemical status together define the overall surface water status of a water
Ecosystem	An ecosystem is made up of living organisms (plants, animals and micro-organisms) in conjunction with their non-living environment (air, water, minerals and soil) and all the diverse and complex interactions that take place between them.

Ecosystem Approach	An ecosystem approach focuses on the collective management of all resources – maintaining ecological integrity whilst allowing resource extraction/use – rather than managing multiple resources independently. This approach seeks to ensure the co-existence and development of healthy, fully functioning ecosystems and human communities. The term ecosystem approach originally comes from the Convention on Biological Diversity (CBD), where it is described as “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way
Effluent	A liquid discharged as waste, as from an industrial plant or sewage works.
Environment Agency	Environment Agency of England
Environmental Liability Directive 2004/35/EC	Environmental Liability Directive 2004/35/EC: This Directive deals with the prevention and remedying of environmental damage based on the polluter pays principle.
Estuarine	For our purposes by estuarine we mean transitional (see definition).
Exemptions	The environmental objectives of the WFD are set out in Article 4. These include the general objective of aiming to achieve good status in all water bodies by 2015 and the principle of preventing any further deterioration in status. There are also a number of exemptions to the general objectives that allow for less stringent objectives, extension of deadline beyond 2015 or the implementation of new projects. Common to all these exemptions are strict conditions that must be met and a justification must be included in the RBMP. The conditions and process in which the exemptions can be applied are set out in Article 4.4, 4.5, 4.6 and 4.7.
Eutrophication	The enrichment of waters by inorganic plant nutrients that results in increased production of algae and/or other aquatic plants, which can affect the quality of the water and disturb the balance of organisms present within it.
Favourable Conservation Status	The Conservation Status is the result of influences which include the present state of the habitat, together with current environmental and human influences (both positive and negative), that may influence its long-term survival. Favourable Conservation Status will typically be achieved when populations, ranges, and extents are stable or increasing, and when structures and functions necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future.

Floods Directive	The purpose of the European Union Directive on flooding (2007/60/EC) is to establish a framework for the assessment and management of flood risks aiming at the reduction of the adverse consequences on human health, the environment, cultural heritage and economic activity associated with floods in the Community. It requires member states to undertake flood risk assessments, flood risk mapping and produce flood risk management plans. The Directive was published in November 2007
Good chemical status (surface waters)	Means that concentrations of chemicals in the water body do not exceed the environmental standards specified in the Priority Substances Directive 2013/39/eu. These chemicals include Priority Substances, Priority Hazardous Substances and eight other pollutants carried over from the Dangerous Substance Daughter Directives.
Good chemical status (groundwater)	See chemical status (groundwater). Means the concentrations of pollutants in the groundwater body do not exceed the criteria set out in Article 3 of the Groundwater Daughter Directive (2006/118/EC).
Good ecological potential	Those surface waters which are identified as Heavily Modified Water Bodies and Artificial Water Bodies must achieve 'good ecological potential' (good potential is a recognition that changes to morphology may make good ecological status very difficult to meet). In the first cycle of river basin planning good potential may be defined in relation to the mitigation measures required to achieve it.
Good ecological status	The objective for a surface water body to have biological, structural and chemical characteristics similar to those expected under nearly undisturbed conditions.
Good quantitative status (groundwater)	See quantitative status (groundwater). Means the level of groundwater in the groundwater body meets the criteria set out in Annex V (2.1.2) of the WFD.
Good status	Is a term meaning the status achieved by a surface water body when both the ecological status and its chemical status are at least good or, for groundwater, when both its quantitative status and chemical status are at good status.
Groundwater	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Habitats Directive	Habitats Directive – 92/43/EEC and Birds Directive – 2009/147/EC These Directives form the cornerstone of Europe's nature conservation policy, built around two pillars, the Natura 2000 network of protected sites and species protection. The Habitats directive protects over 1,000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, wetlands, etc.) of European importance.
Hazardous substances	Substances or groups of substances that are toxic, persistent and liable to bioaccumulate, and other substances or groups of substances which give rise to an equivalent level of concern.

Heavily Modified Water Body	A surface water body that does not achieve good ecological status because of substantial changes to its physical character resulting from physical alterations caused by human use, and which has been designated, in accordance with criteria specified in the WFD, as 'heavily modified'.
High ecological status	Is a state, in a surface water body, where the values of the hydromorphological, physico-chemical, and biological quality elements correspond to conditions undisturbed by anthropogenic activities.
Hydromorphology	Describes the hydrological and geomorphological processes and attributes of surface water bodies. For example for rivers, hydromorphology describes the form and function of the channel as well as its connectivity (up and downstream and with groundwater) and flow regime, which defines its ability to allow migration of aquatic organisms and maintain natural continuity of sediment transport through the fluvial system. The WFD requires surface waters to be managed in such a way as to safeguard their hydrology and geomorphology so that ecology is protected.
Impact assessment	A tool to enable the Environment Agency to weigh and present the evidence on the positive and negative effects of a plan. For example information on the estimated cost and benefit of proposing actual measures.
Integrated River Basin and Coastal Management	A process whereby all pressures in a catchment are assessed and action undertaken in an integrated, proportionate and efficient way. A range of stakeholders are involved in the setting of priorities and their ultimate delivery.
Invasive non-native species	Non-native Invasive Species. Many species of plants and animals have been introduced to this country since Roman times. Several of these non-native species are invasive and have been causing serious problems to the aquatic and riverine ecology and environment. Problems include detrimental effects on our native species, deoxygenation of water causing fish mortalities, blocking of rivers and drainage channels, predation and competition with our native species, and in some cases pose health risks to the public or livestock.
Liaison Panels	A panel consisting of around 15 representatives of strategic co-deliverers including bodies with statutory powers and others who will need to put measures into action for the RBD. The panel represents all key interests within the RBD and is the primary focus for engagement at the RBD level.
LIFE Natura 2000 programme	This will set out agreed priorities for the designated species and habitats in Natura 2000 in Wales, both on land and at sea. The programme will identify pressures and plan the actions which are required to significantly improve the condition of these features, safeguarding them for the future. Actions may be changes to policy, small-scale practical improvements, or

	major innovative conservation projects. The programme will also determine sources of funding, so actions can be delivered by 2020.
Management Catchment	The RBDs are divided into a number of management catchments. Across Wales there are 14 management catchments across three Districts.
Marine Strategy Framework Directive	This Directive aims to protect the marine environment across Europe. The Marine Strategy Framework Directive has been brought into UK law under the Marine Strategy Regulations 2010 which came into force on 15 July 2010.
Marine Plan	Marine planning will help us to manage marine activities sustainably. The Welsh Government is responsible for Marine Planning in Wales and the planning process has already begun. Welsh Government are developing a Welsh National Marine Plan that covers Welsh inshore and offshore waters.
UK Marine Monitoring and Assessment Group	Group comprising government departments, agencies and government research institutions. They co-ordinate a United Kingdom programme of estuarine and coastal monitoring designed to satisfy a number of requirements including trend monitoring for the Oslo and Paris Convention, compliance with European Commission Directives and international conventions, local needs and for research and development.
Measure	This term is used in the WFD and domestic legislation. It means an action which will be taken on the ground to help achieve WFD objectives.
Mechanisms	The policy, legal and financial tools which are used to bring about actions (measures). Mechanisms include for example: legislation, economic instruments; codes of good practice; negotiated agreements; promotion of water efficiency; educational projects; research; development and demonstration projects.
Misconnections	Misconnections of foul sewage into surface water drains are a significant source of urban diffuse pollution in those areas where a separate drainage system is used. Misconnections happen when domestic plumbing has been connected into surface water drains instead of the foul sewer. This means untreated dirty water goes directly into rivers/waterways without receiving treatment.
Morphology	Describes the physical form and condition of a surface water body, for example the width, depth and perimeter of a river channel, the structure and condition of the riverbed and bank.
National Assembly for Wales	The National Assembly for Wales consists of 60 Members elected throughout Wales. The Assembly has delegated many of its powers to the First Minister, who leads the Welsh Assembly Government. The Assembly decides on its priorities and allocates the funds made available to it from the Treasury. Within its powers, the Assembly develops and implements policies that reflect the particular needs of the people of Wales.

Natura 2000 sites	Protected Areas established for the protection of habitats or species under the Birds Directive (79/409/EEC) (Special Protection Areas) and the Habitats Directive (92/43/EEC) (Special Areas of Conservation).
Natural England	The government-funded body whose purpose is to promote the conservation of England's wildlife and natural features. The previously existing organisations English Nature, the Countryside Agency and Rural Development Service were merged to form Natural England.
Natural Resource Management	The aim is to sustainably manage our natural resources in a way and at a rate that can maintain and enhance the resilience of our ecosystems whilst meeting the needs of present generations without compromising the ability of future generations to meet their needs. Also to ensure that Wales has increasingly resilient and diverse ecosystems that deliver economic, environmental and social benefits.
Natural Resources Wales	Natural Resources Wales is the Competent Authority for implementing WFD in Wales
Nitrate Vulnerable Zone	The land draining to waters that contain, or are likely to contain, 50 mg/l of nitrate, or waters that are eutrophic or likely to become so. Within these zones an action programme under the Nitrates Directive is put in place which farmers have to observe to reduce nitrate pollution.
No deterioration (in water body status)	None of the quality elements used in the classification of water body status deteriorates to the extent that the overall status is reduced.
Objective (surface waters)	Three different status objectives for each water body. These are: • Overall status objective • Ecological status or potential objective; and • Chemical status objective These are always accompanied by a date by when the objective will be achieved. Ecological status (or potential) objectives will be derived from the predicted outcomes for the biological elements and physico-chemical elements, plus any reasons for not achieving good ecological status (or potential) by 2015. Chemical status objectives will be derived from the predicted outcomes for the chemical elements plus any reasons for not achieving good chemical status by 2015. Overall status objectives will be derived from the ecological status and chemical status objectives.
Objective (groundwater)	There are three status objectives for each groundwater body: • Overall status objective; • Quantitative status objective; and • Chemical status objective.

	These are always accompanied by a date by when the objective will be achieved. Overall status objectives will be derived from the quantitative status and chemical status objectives In addition to status objectives there are also additional environmental objectives: to prevent deterioration of status, to prevent or limit the inputs of pollutants to groundwater and to reverse any significant and sustained upward trends in pollutant concentrations.
Periodic Review	This is the process, carried out every five years by the Water Services Regulation Authority, to assess the strategic plans for water company spending and investment. The plans include environmental improvements. The investment will often affect water customer charges and incorporates company business plans (called Asset Management Plans).
Phytobenthos	Bottom-dwelling multi-cellular and unicellular aquatic plants such as some species of diatom.
Phytoplankton	Unicellular algae and cyanobacteria, both solitary and colonial that live, at least for part of their lifecycle, in the water column.
Point source pollution	Pollution arising from an identifiable and localised area, structure or facility, such as a discharge pipe or landfill.
Pollutant	Any substance liable to cause pollution.
Pollution	The direct or indirect introduction, as a result of human activity, of substances or heat into the air, water or land which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) result in damage to material property; or (iii) impair or interfere with amenities and other legitimate uses of the environment.
Predicted outcome	The future status of a quality element or water body based on groups of practical and justified measures and the date when this status will be achieved.
Pressures	Human activities such as abstraction, effluent discharges or engineering works that have the potential to have adverse effects on the water environment.
Priority substances	A pollutant, or group of pollutants, presenting a significant risk to or via the aquatic (surface water) environment that has been identified at Community level under Article 16 of the WFD. They include ‘priority hazardous substances’.
Programme of Measures	A Programme of Measures, as used in the WFD, is a group of actions designed to improve the environment in a RBD and meet the objectives of the Directive. For the purpose of the second cycle RBMPs this will include new and existing measures.

Protected Areas	Areas that have been designated as requiring special protection under European Community legislation for the protection of their surface water and groundwater or for the protection of habitats and species. In this plan, only water-dependant habitats and species are considered.
Quality element	A feature of an aquatic (surface water) ecosystem that can be described as a number for the purposes of calculating an ecological quality ratio, such as the concentration of a pollutant; the number of species of a type of plant.
Quantitative status (groundwater)	An expression of the degree to which a body of groundwater is affected by direct and indirect abstractions. The classification status for a groundwater body against the environmental criteria set out in the WFD and as set out in Common Implementation Strategy Guidance Document No 18. All four of the component tests for quantitative status must be assessed as good or poor and the overall quantitative status and the confidence in this (high or low) is determined by the worst test result.
Ramsar site	A wetland area designated for its conservation value under The 1971 Convention on Wetlands of International Importance, especially as Waterfowl Habitat. The Ramsar Convention seeks to promote the conservation of listed wetlands and their wise use.
Reference conditions	The benchmark against which the condition can be measured and reported in the relevant classification scheme. For waters not designated as heavily modified or artificial, the reference conditions are synonymous with the high ecological status class. For waters designated as heavily modified or artificial, they are synonymous with the maximum ecological potential class, unless the site is designated as a Natura 2000 site.
Risk	The likelihood of an outcome (usually negative) to a water body or the environment, or the potential impact of a pressure on a water body.
Risk assessment	The analysis that predicts the likelihood that a water body is at significant risk of failing to achieve one or more of the WFD objectives.
Risk category	The numerical or descriptive category assigned to water bodies that have been risk assessed, in order to make the risk-based prioritisation of water bodies for action under the WFD more manageable.
River basin	A river basin is the area of land from which all surface run-off and spring water flows through a sequence of streams, lakes and rivers into the sea at a single river mouth, estuary or delta. It comprises one or more individual catchments.
River Basin District	A river basin or several river basins, together with associated coastal waters. Each basin is divided into a number of management catchments.

River Basin Management	The management and associated planning process that underpins implementation and operation of the WFD. It is both an overarching process in terms of existing processes and also defines new sub-processes such as those for hydromorphology. The RBMPs are plans for river basin management.
River Basin Management Plan	For each RBD, the WFD requires a RBMP to be published. These are plans that set out the environmental objectives for all the water bodies within the RBD and how they will be achieved. The plans will be based upon a detailed analysis of the pressures on the water bodies and an assessment of their impacts. The plans must be reviewed and updated every six years.
Safeguard zone	A catchment or other defined zone around a point where the water is abstracted for potable use and where actions may be taken to protect raw water quality and prevent deterioration, so minimising the need for purification treatment. For groundwater they are likely to be based on source protection zones under the Groundwater Protection Policy.
Saturation zone	Subsurface rock or other geological strata within which the pore spaces between the particles of rock or other strata, and the cracks in those strata are filled with water and for which a water table may be determined.
Septic Tank	These provide only primary treatment of sewage, retaining solids and allowing an overflow of partially treated sewage to discharge into land, where further treatment occurs in the soakaway system. The effluent from such systems may not be discharged into watercourses. As with sewage treatment plants, the discharge will require a registered exemption from Natural Resources Wales, for which there is no charge. Where the discharge could affect a sensitive site (such as an abstraction borehole or a Site of Special Scientific Interest), an environmental permit may be required, for which there is a one-off charge.
Shellfish Water Protected Area	An area of estuarine or coastal water designated under Annex IV of the WFD for the protection of significant aquatic species.
Significant and sustained upward trend	A statistically significant trend in pollutant concentrations in groundwater that could lead to a future failure of one or more of the environmental objectives for groundwater unless it is reversed.
Site of Special Scientific Interest	An area of land notified under the Wildlife and Countryside Act 1981 by the appropriate nature conservation body (Natural Resources Wales in Wales) as being of special interest by virtue of its flora and fauna, geological or physiogeographical features.
Source Protection Zone	A zone around a well, borehole or spring where groundwater is abstracted for human consumption (for example drinking water or food production).
Special Area of Conservation	Natura 2000 sites that are designated under the Habitats Directive.

Special Protection Area	Natura 2000 sites that are designated under the Birds Directive.
Specific Pollutant	A substance considered as being discharged to the aquatic environment in significant quantities at the national level and for which Environmental Quality Standards have been established. As part of the ecological classification criteria, and in places where these pollutants are monitored, these standards must be met, in order for a surface water body to be classified as good ecological status.
Stakeholder	Individuals or groups that are or could become interested in, involved in or affected by our policies and activities. Our stakeholders include regulators, statutory bodies, professional organisations, local organisations and members of the public.
Stakeholder forum	A group of interested parties to guide and advice on river basin planning and management. This forum is led by Welsh Government.
Strategic Environmental Assessment Directive (2001/42/EC)	European environmental legislation which requires an 'environmental assessment' to be carried out for certain plans and programmes whose formal preparation began after 21 July 2004 (or are prepared but not adopted or submitted by a legislative procedure by 21 July 2006), and which are considered likely to have significant effects on the environment. The term "Strategic Environmental Assessment" is used in United Kingdom guidance to mean an environmental assessment under this Directive.
Summary of Significant Water Management Issues	This is a report referred to as 'Challenges and Choices' on each RBD that highlights significant water management issues in that RBD which will need to be addressed to achieve environmental objectives under the WFD.
Sustainable Drainage Systems (SuDS)	A system of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
Technical feasibility	Is determined through the assessment of whether the implementation of a measure or Programme of Measures, designed to achieve the WFD objectives, is technically possible either at the national and local level and includes the consideration of uncertainty as well as environmental and socio economic feasibility. Technical feasibility depends upon the availability of a technical solution and information on the cause of the problem and hence the identification of the solution.
Transitional water	A WFD term for waters that are intermediate between fresh and marine water. Transitional waters include estuaries and saline lagoons.
Typology	The means by which the WFD requires surface water bodies to be differentiated according to their physical and physico-chemical characteristics.

Water body	A manageable unit of surface water, being the whole (or part) of a stream, river or canal, lake or reservoir, transitional water (estuary) or stretch of coastal water. A 'body of groundwater' is a distinct volume of groundwater within an aquifer or aquifers.
WFD	European Union legislation – WFD (2000/60/EC) – establishing a framework for European Community action in the field of water policy.
WFD objectives	The objectives set out in Article 4 of the WFD together with objectives set out in paragraphs 2 and 3 of Article 7 of the Directive and which are required to be met.
Water Services	All services which provide, for households, public institutions or any economic activity: (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater; and (b) waste water collection and treatment facilities which subsequently discharge into surface water.
Water Sensitive Urban Design (WSUD)	Water Sensitive Urban Design is a land planning and engineering design approach which integrates the urban water cycle, including storm water, groundwater and waste water management and water supply into urban design to minimise environmental degradation and improve aesthetic and recreational appeal.
Water table	The upper limit of the saturation zone.
Water use	Water Services together with any other human activity identified as having a significant impact upon the status of water.
Water Watch Wales	An interactive spatial web-based tool that provides supporting information and data layers which can assist partners to deliver actions.
Weight of evidence	A weight of evidence approach integrates results or evidence from several data sources, weighted appropriately, to make risk based decisions.
Welsh Assembly Government	The devolved government in Wales.
Welsh Technical Advice Notes	*Planning Policy Wales* (2002) sets out the land use planning policies of the Welsh Assembly Government (the Assembly Government). It is supplemented by a series of topic based Technical Advice Notes (Wales). Technical Advice Notes may be material to decisions on individual planning applications and will be taken into account by the National Assembly for Wales and planning inspectors in the determination of called-in planning applications and appeals.

Abbreviations

AMP	Asset Management Plan
AWB	Artificial Water Bodies
BGS	British Geological Survey
BOD	Biological outcomes database
BPA	British Ports Association

CEA	Cost Effective Analysis
CEFAS	Centre for the Environment, Fisheries and Aquaculture Science
CIS	Common Implementation Strategy
CO	Conservation Objective
DCLG	Department of Communities and Local Government
DrWPA	Drinking Water Protected Area
DWI	Drinking Water Inspectorate
EC	European Community/Commission
ELD	Environmental Liability Directive
EU	European Union
FCRM	Flood and Coastal Risk Management
FCS	Favourable Conservation Status
FRS	Fisheries Research Services
GAEC	Good Agricultural and Environmental Conditions
GEP	Good Ecological Potential
GES	Good Ecological Status
GQA	General Quality Assessment
GWD	Groundwater Directive (2006/118/EC).
HMWB	Heavily Modified Water Bodies
IA	Impact assessment (formerly regulatory impact assessment)
INNS	Invasive Non-native Species
JNCC	Joint Nature Conservation Committee
MMO	Marine Management Organisation
MSFD	Marine Strategy Framework Directive
NAW	National Assembly for Wales
NGO	Non-governmental organisation
NRM	Natural Resource Management
NRW	Natural Resources Wales
NVZ	Nitrate Vulnerable Zone
ODPM	Office of the Deputy Prime Minister
Ofwat	Water Services Regulation Authority
PiPs	Priority Improvement Plans
PoMs	Programme of Measures
PR09	Periodic Review in 2009
PR14	Periodic Review in 2014
PSA	Public Service Agreement
RBC	River Basin Characterisation
RBD	River Basin District
RBMP	River Basin Management Plan
RIA	Regulatory Impact Assessment
SAC	Special Area of Conservation
SAPs	Salmon Action Plans
SEAD	Strategic Environmental Assessment Directive
SMP	Shoreline Management Plan
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest

SSWMI	Summary of Significant Water Management Issues
SWPA	Shellfish Water Protected Area
SUDS	Sustainable Drainage Systems
TRaC	Transitional and Coastal
UKCIP	United Kingdom Climate Impacts Programme
UKMPG	United Kingdom Major Ports Group
UKTAG	United Kingdom Technical Advisory Group
UKWIR	United Kingdom Water Industry Research
WFD	Water Framework Directive
WSUD	Water Sensitive Urban Design

Published by:
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