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Environment Agency

Dee River Basin Management Plan 2015 – 2021 Summary

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1. Introduction

1.1 The River Basin Management Plan

Under the European Union (EU) Water Framework Directive (WFD) a management plan is required for each River Basin District (RBD). The Dee River Basin Management Plan (RBMP) was first published in 2009. This document is the first update to that plan and will subsequently be reviewed in 2021 when a further update will be published. River basin management is a continuous cycle of planning and delivery.

The purpose of this management plan is to protect and improve the water environment for the wider benefits to people and wildlife. In order to achieve this, the plan includes a summary of the Programme of Measures needed to achieve the objectives of the WFD together with the predicted environmental outcomes over the next six years. Collectively, the approach and actions set out in this plan will have an effect on all types of water across the catchments that make up the management plan, this includes; rivers, lakes, canals, groundwater, wetlands, estuaries and coastal waters. The plan aims to be integrated at the catchment scale ensuring a connection across the wider environment for people and wildlife, from catchment to coast.

The environmental objectives in this plan are legally binding and have been approved by the Welsh Minister for Natural Resources and the Secretary of State for the Environment, Food and Rural Affairs. It fulfils the requirements of the EU WFD and statutory guidance from government. It replaces the plan published in 2009, except in Wales, for the economic analysis of water use (2009 Annex K) and adapting to climate change (2009 Annex H).

The plan includes information on:

- **Classification of water bodies** – The baseline status in each water body. This enables us to understand the current condition of the water bodies including all the quality elements. Preventing deterioration from this baseline is a key objective of this plan, and also one of our greatest challenges in protecting the water environment.
- **Summary of Programme of Measures to achieve statutory objectives** – These include statutory objectives for Protected Areas. The programme sets out the actions over this planning cycle and forward planning towards the third cycle. It includes a framework to review and track delivery of the actions to be taken over the next six years with a focus on collaborative working and the delivery of multiple benefits for people and wildlife.
- **Statutory objectives for water bodies** – Legally binding objectives have been set out. These have been set for each quality element in all water bodies, including an objective for the water body as a whole. The objective is to aim to achieve good status or potential by 2021. In some instances we have extended the deadline to 2027 or set an objective of less than good where this is justified on the basis of natural conditions, ecological recovery time, technical feasibility or disproportionate cost.

Locally, this plan has been influenced by the feedback from the consultations that were held over the last three years. In particular we have taken on board comments made to ensure this plan better reflects;

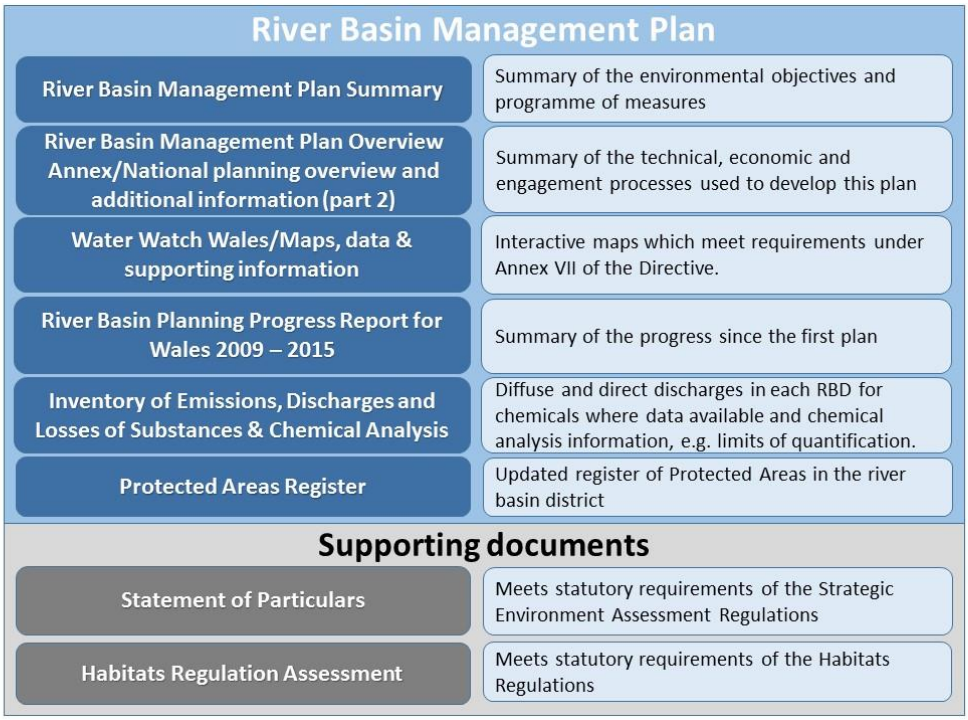
- Clarification on the changes to standards, details on the amended standards are in the **Annex**.
- Planned or underway actions set out in the Prioritised Improvement Plans (PIPs).
- The different types of waters and is less river focused, in particular including more information on our estuarine and coastal waters, and highlighting that all actions in the freshwater environment will lead to reducing input of nutrients and chemicals to the estuarine and coastal environment.
- Sets out what actions will happen where, when, who is/can be involved and maximising wider benefits for society and the environment through partnerships.
- An approach to monitor progress with delivery.
- Support tools bridging the gap between the strategic framework, catchments and delivery to help partners deliver locally. Including opportunities for sharing data and modelling outputs.

1.2 Finding your way around the River Basin Management Plan

RBMPs are strategic documents. They provide both detailed and summary information. Whilst the best intentions have been made to ensure this plan is accessible, the document is presented to meet the statutory requirements of the Directive. A glossary of terms is included in the **Annex**. If you are unable to find the information you require from this plan please contact WFDWales@naturalresourceswales.gov.uk and our WFD Team will help you. In England, a comprehensive 'Guide to accessing river basin management and supporting information' is available on the river basin management web pages (www.gov.uk/government/collections/river-basin-management-plans-2015).

The RBMP is made up of several documents and an interactive web based tool. These are outlined in Figure 1 and described below. The supporting documents which contain the required statutory assessments of the RBMP are also outlined.

Figure 1. Contents of the RBMP and supporting documents



The River Basin Management Plan

'Dee River Basin Management Plan 2015 – 2021, Summary' (this document)
As a cross border RBD, responsibility for planning the future of the Dee RBD is shared jointly between Natural Resources Wales and the Environment Agency. This summary describes the current condition of the RBD and what we have achieved since 2009, the Programme of Measures for improving the water environment by 2021, water body objectives and a forward look to the planned review in 2021.

'River Basin Management Planning Overview Annex' (Annex) and 'National planning overview and additional information' (Part 2)
The **Annex** provides the technical detail for Wales behind the decision making which has shaped the RBMP. It refers to a number of supporting documents for the more technical information and guidance. In England this information is presented in the **Part 2** document.

'Water Watch Wales' and 'Maps, data & supporting information' - supporting local information, data, and maps
Much of the information referred to in this document is best presented in map or spreadsheet format. Information on the current state of the water environment, measures and objectives for improving it can be found on **Water Watch Wales[1].** 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. The **Catchment Data Explorer[2]** is a web application to help explore and obtain detailed information about local catchments and individual

[1] http://waterwatchwales.naturalresourceswales.gov.uk/en/

bodies of water in England. You can find GeoPDF maps, statistics and main findings for England on the Environment Agency's **Sharefile platform** (https://ea.sharefile.com/d-s5a5e886fd664e818).

'River Basin Planning Progress Report for Wales, 2009 – 2015' (Progress Report)
The **Progress Report** sets out the detailed information on the current state of the water environment in Wales and the Dee RBD including analysis of improvements and deterioration since the 2009 plan. It includes a review of the outcomes since 2009 and a look at the lessons learnt which will help us to improve delivery over the next six years. A summary of this is presented in Section 2.0 of this summary.

'Inventory of Emissions, Discharges and Losses of Substances and Chemical Analysis Information' (Inventory of Emissions)
The Environmental Quality Standards Directive (2008/105/EC) (as amended by Directive 2013/39/EU) is a 'daughter directive' of the WFD that have subsequently specified the assessment, reporting, and objectives required for Chemical Status. The inventory of emissions, discharges and losses of priority substances and pollutants is required under The Environmental Quality Standards Directive. It includes diffuse and direct discharges in each RBD for chemicals for which data is available. The inventory will be used to verify that emissions, discharges and losses are making progress towards reduction or cessation objectives for chemicals listed under the Directive. The chemical analysis information is required by the Priority Substances Directive to present the limits of quantification of the methods of analysis applied, and information on the performance of those methods in relation to minimum performance criteria.

Protected Area Register
The register of the Protected Areas lying within the river basin districts has been reviewed and updated. It provides information on each protected area including: bathing (recreational) waters, shellfish waters, drinking water protected areas, Natura 2000, nutrient sensitive areas and Nitrate Vulnerable Zones.

Supporting documents/information
Strategic Environmental Assessment report (SEA)
The Environmental Assessment of Plans and Programmes Regulations 2004 (known as the Strategic Environmental Assessment Regulations) requires that a Statement of Particulars is made available as soon as reasonably practicable after the production of the plan. This document sets out how the wider environment has been taken into account by the plan, the reasons we are adopting the plan as proposed in light of other reasonable alternatives and also how we propose to monitor potential significant effects of the plan when it is implemented.

Habitats Regulations Assessment (HRA)
A Habitats Regulations Assessment of the final updated RBMP has been carried out to consider whether the plan is likely to have a significant effect on any Natura 2000 sites. This concluded that the plan will have no adverse significant effect on European sites, and the delivery of statutory objectives to improve these sites. This has been published alongside the RBMPs.

Catchment Data Explorer

The Catchment Data Explorer[2] is a web application to help explore and obtain detailed information about local catchments and individual bodies of water in England.

1.3 Scope with other plans and programmes

This RBMP complements a range of plans and strategies across Natural Resources Wales, the Environment Agency and Governments to help ensure both the sustainable management of the water environment and to achieve the wider objectives of other EU Directives such as the Habitats Directive and revised Bathing Waters Directive. Some of these have been referenced within this plan and Table 1 summaries some of these.

Table 1. Other plans and strategies related to water management

Issue	Plan/strategy title	Lead body
Flooding and coastal erosion	Flood Risk Management Plans	Natural Resources Wales, Environment Agency
	National Flood and Coastal Erosion Risk Management Strategy	Welsh Government
	Flood and coastal risk management :long term investment scenarios	Environment Agency, Lead Local Flood Authorities
	Shoreline Management Plans	Coastal Groups, which are local authority-led
	Catchment Flood Management Plans	Natural Resources Wales
	Local Flood Risk Management Strategies	Local authorities
	National Habitat Creation Programme	Natural Resources Wales
Climate change adaptation	Climate Change Strategy for Wales (2010)	Welsh Government
	UK National Climate Adaptation Strategy and Adaptation Plan	Government's Committee on Climate Change, Public bodies and utility companies
Water policy	Water Strategy for Wales and associated Action Plan	Welsh Government
Water supply	Water Resource Management Plans	Water Companies

[2] https://ea.sharefile.com/d-s5a5e886fd664e818

	Drought Plans	Water Companies
Biodiversity	Nature Recovery Plan (under development)	Welsh Government
	Special Areas for Conservation/Special Protection Area core management plans	Natural Resources Wales
	Life + Natura 2000 Project Thematic Plans Natura 2000 improvement plans (Priority Implementation Plans and Site Improvement Plans)	Natural Resources Wales/Natural England
	Local Biodiversity Action Plan	Local Authorities/Local partnership
	Biodiversity 2020:A strategy for England's wildlife and ecosystem services	Department for Environment, Food & Rural Affairs (Defra)
Invasive non-native species (INNS)	The INNS framework strategy for Great Britain	Great Britain non-native invasive species programme board
Agriculture	Rural Development Plan	Welsh Government
Forestry	Forest Design Plans	Natural Resources Wales
Recreation	Rights of Way Improvement Plans	Local authority
National Parks & Areas of Outstanding Natural Beauty (AONB)	National Park Management Plans	National Park Authority
	AONB Management Plans	Local authorities
Air quality	Air Quality action plans	Local authorities
Marine	Welsh National Marine Plan (proposed)	Welsh Government
	Bathing Water Priorities	Natural Resources Wales
	Marine Strategy Framework Directive Programme of Measures	Welsh Government,
Chemicals	UK National Action Plan for the Sustainable Use of Pesticides	Defra, Welsh Government, Scottish

	(Plant Protection Products) 2013	Government, DARDNI, HSE
	National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants 2013	Defra, Welsh Government, Scottish Government, DOENI

We are working to better align planning across other areas to enable wider benefits to people and wildlife. These include water resources and water quality, agriculture and rural land management, forestry, biodiversity, natural heritage and recreation.

1.4 Responsibility for implementing this plan

Natural Resources Wales and the Environment Agency share responsibility for producing the RBMP. There are, however, lots of organisations and individuals who are responsible for managing the RBD. These are often grouped in sectors, Table 2 below summarises the sectors together with the role they play. These include regulators, deliverers, expertise and organisations representing the public in particular the voluntary sectors through the Non-Governmental Organisations. All sectors should consider the general public's interest through their role.

Table 2. Sector groups and roles

Sector	Examples of members	Role: Regulatory	Role: 1. Deliverer (including operator and projects). 2. Knowledge, expertise and influence
Government and agencies (including Natural Resources Wales, the Environment Agency, Natural England and Forestry Commission)	Includes UK and Welsh Government and devolved government bodies	✓	✓
Local government	Includes Councils and National Park Authorities	✓	✓
Mining and Quarrying	Coal mining, non-coal mining and quarrying	✓	✓
Navigation	Includes inland water ways (Canal & River	✓	✓

	Trust), port and harbour authorities		
Water Industry	Water supply, water and sewage treatment	✓	✓
Agriculture and rural land management	Includes arable, intensive livestock, forestry and horticulture.		✓
Industry, Manufacturing and other Business	Includes chemicals, construction, food and drink, paper, textiles and metals also includes commercial fisheries (freshwater and marine)		✓
Non-Governmental Organisations (NGOs)	Includes local wildlife trusts, rivers trusts, coastal partnerships and representatives for the Dee partnerships		✓
Recreation	Includes ramblers, canoeists, fisheries (fresh and marine water) and amenity groups		✓

Managing the water environment is not always best coordinated at the RBD scale. In Wales we are committed to area based natural resource management and the ecosystems approach. Our objectives are:

- To seek to achieve the sustainable management of natural resources.
- To achieve positive and sustained results for the water environment by promoting a better understanding of the environment and its interconnections at a local level.
- To encourage local collaboration and more transparent decision-making when planning and delivering activities to improve the water environment.
- To ensure improvements to the water environment are implemented in ways that optimise other environmental, social and economic benefits.

This approach will help develop more locally-informed RBMPs by providing a platform for engagement, discussion and decisions with much wider benefits.

Natural Resources Wales plays a central role in the effective working of the ecosystem approach by supporting catchment based activities with evidence, expertise, advice and guidance.

The Dee RBD is also overseen by a liaison panel that represents those sectors shown in Table 2. This panel has been in place since the development of the first plan in 2009. Since 2013 the panel includes a representative for the Dee partnerships.

1.5 A catchment based approach

Taking a catchment based approach helps to bridge the gap between strategic management planning at a RBD level and activity at the local water body scale. A catchment based approach aims to encourage groups to work together more effectively to deal with environmental problems locally. As a cross border RBD the Dee benefits from both the natural resource management approach in Wales and the Catchment Based Approach in England.

1.5.1 The natural resources management approach in Wales

Natural resource management is a key element of the Welsh Government's legislative programme. The 2011 Welsh Government *Programme for Government* emphasises the importance of managing our natural resources, on land and sea, in a more integrated way. This is in line with its commitment to sustainable development as its central organising principle as now enshrined in law through the Well-being of Future Generations (Wales) Act. The Environment (Wales) Bill currently being considered by the National Assembly, together with the Planning (Wales) Act, and the Wales National Marine Plan, sets out a new statutory framework for the sustainable management of natural resources.

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

Welsh Government and Natural Resources Wales are committed to working towards the sustainable management of natural resources through embedding the principles of sustainable management (as set out below) in all of our work. This approach is about managing the environment so that its different components are considered together, in particular, the resilience of ecosystems and the benefits that they provide. Most importantly, it emphasises that people themselves are part of ecosystems and so should be involved in decision making. This complements the advice from previous WFD consultations that we should take a catchment based approach which provides a clear understanding of the issues in the catchment and involves local communities in decision-making. We aim to improve the environment as a whole through the RBMP and greater collective action. There are already many good examples of partnership working and we need to build on these.

This starts by identifying the key strategic risks, priorities and opportunities for the sustainable management of natural resources, and then working through those issues and opportunities at a more local level. By recognising the range of tools that can be used to safeguard and deliver environmental benefits (of which RBMPs are one) it will ensure those challenges are tackled in a more integrated way – better reflecting the needs of that place. This approach is being trialled in three areas in Wales, the Dyfi, Tawe and Rhondda, and more information can be found about the trials on our website.
The natural resource management policy framework is still being developed in Wales but the RBMPs reflect the essential principles of the new approach in the following ways:

Manage adaptively, by planning, monitoring and reviewing action
The river basin management process promotes adaptive management. The condition of water bodies 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 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 RBD 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 in Wales 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 this RBMP are 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
Our ecosystems provide us with a wide range of services and benefits. We need to take all of these into account when we make decisions about how we use them, so that they provide multiple benefits for the long term. This includes taking into account their intrinsic value.

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.

1.5.2 Catchment Partnerships in England
In England, catchment partnerships are groups of organisations with an interest in improving the environment in their local area and are led by a catchment host organisation. In the Dee RBD there are two partnerships, the Middle Dee partnership and Tidal Dee partnership. They inform the River Basin Management Planning process and help implement measures by:

- providing local evidence
- targeting and coordinating action
- identifying and accessing funding for improvements in the catchment
- incorporating River Basin Management Planning into the wider environmental management of the catchment

The partnerships work on a wide range of issues including, but not restricted to, the water environment and river basin management. Partnerships include estuaries and coastal waters. This is a Defra led initiative but the partnerships work with Natural Resources Wales across the whole of the Tidal and Middle Dee catchments. Both partnership groups are in the early stages of being set up and have produced a catchment action plan.

You can find more information about the catchment based approach in England in section 3.4 of **Part 2** (https://www.gov.uk/government/collections/river-basin-management-plan-update).

1.6 Monitoring and reporting progress over the next six years
The effectiveness of this plan in delivering the objectives to protect the water environment to aim to achieve good status. This includes the WFD reporting requirements, Natural Resources Wales' and the Environment Agency's reporting and working with the Liaison

Panels to track and report progress at the RBD and catchment scale. Both the Tidal and Middle Dee partnerships will be reporting progress against their catchment action plans, this will be fed into the overall RBD reporting approach via the Dee Liaison Panel which includes representations of the catchment groups. Many of our stakeholders have their own programmes in place and we aim to align these, where possible, through the work of the Liaison Panels. This will collectively be set out in a Delivery Programme for the six year cycle which will direct the approach used; including setting milestones for reporting actions and outcomes, evaluation and review. This work will need to include steps to be taken where actions or outcomes cannot or have not been delivered enabling adjustments to be made across the programme. In some instances changes in the programme will need to be agreed across the sectors to ensure that the overall objectives of this plan are to be met. The delivery and effectiveness of the Programme of Measures (Section 3.0) and achieving the environment outcomes (Section 4.0) will be key indicators for reporting progress.

2. Current status and progress review

This section outlines the current status and review of progress in the RBD. This includes;

- the new baseline which will be used for future progress reporting to 2021. This is based on the standards, methodological changes and water body network introduced for the second cycle of River Basin Management Planning, including some updated standards, and size/length of some water bodies.
- an overview of progress made since 2009 based on the same water body network, classification tools and standards set in first cycle. Additional detail on progress made in the Dee RBD during the first cycle is provided in the **Progress Report.**

For further information on the changes between the methodology in the first and second cycle see the **Annex/Part 2.**

2.1 The Dee River Basin District

The Dee RBD is home to over 500,000 people and covers an area of 2,251 square kilometres of North East Wales, Cheshire, Shropshire and the Wirral. The district consists of a single river basin; the River Dee, its tributaries and estuary. The RBD is characterised by a varied landscape. It ranges from the mountains and lakes of the Snowdonia National Park in the upper part of the basin, through the Vale of Llangollen in the middle reaches, to the open plains of Cheshire and the mudflats of the Dee Estuary in the lower basin.

Chester and Wrexham are the major urban centres, but the land is mainly rural with rough grazing and forestry in the upper catchment and arable and dairy farming on the Cheshire Plain. The Dee and its tributaries are renowned for their excellent fishing and there is an important cockle fishery in the estuary. There is an EU designated bathing water at West Kirby and a number of other non-EU bathing waters managed by Local Authorities around the estuary. The river Dee is popular for canoeing and the National Whitewater Centre is located on the Afon Tryweryn near Bala.

The importance of the landscape of the Dee catchment, its biodiversity, geodiversity, heritage and the importance for recreation, access and culture are recognised through a range of designations. The Dee and its estuary has a high conservation value, it is designated as two Special Areas of Conservation (SAC), and notified as three separate Sites of Special Scientific Interest (SSSIs). Interest features contributing to the SSSI and SAC designations of the freshwater sections of the river include floating water plantain, Atlantic salmon, lamprey, otter, and structural changes in the meandering section of the main river. The intertidal habitats of the Dee Estuary support significant populations of wading birds and is also designated as a Special Protection Area and a Ramsar site.

The Clwydian Range Area of Outstanding Natural Beauty was extended in 2011 to include parts of the Dee Valley, with historical landmarks such as Pontcysyllte Aqueduct which carries the Llangollen canal over the river Dee and is also a UNESCO World heritage Site. Further upstream, the upland landscape to the south of the Dee around Corwen falls into the Berwyn National Nature reserve which together with the South Clwydian mountains are also designated as a SAC.

Nearly three million people get their drinking water from the Dee, including many in North West England. Reservoirs in the upper part of the catchment store water and regulate flow in the Dee. They sustain abstractions for public and industrial water supply and modify flood response in the river, reducing the frequency of flooding in the Dee between Bala and Chester. Parts of the Dee catchment are underlain by a Permo-Triassic Sandstone aquifer. This aquifer is used to support agricultural, industrial and water supply abstractions and contributes to baseflows in the lower Dee and some of the tributaries.

Since the 1st April 2013 Natural Resources Wales and the Environment Agency are jointly responsible for managing the Dee Regulation System under the Dee and Clwyd River Authority Act 1973. Natural Resources Wales has agreed to lead on this under the terms of a “service provision agreement” with the Environment Agency. Natural Resources Wales and the Environment Agency are assisted in the drawing up of operational management rules by the statutory Dee Consultative Committee which comprises two members for Natural Resources Wales, one member for the Environment Agency, one member for the Canal and Rivers Trust, and one representative each from Dee Valley Water, Dŵr Cymru/Welsh Water and United Utilities.

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

The strategic importance of the Dee as a potable water source and the risk posed to it from pollution have led to the Dee becoming one of the most protected rivers in Europe, with a highly developed water quality monitoring regime. The Water Companies (Dŵr Cymru/Welsh Water, Dee Valley Water and United Utilities), co-fund an intensive monitoring programme of river water quality, working closely with Natural Resources Wales and the Environment Agency. This includes continuous on-line analysis for a range of potential pollutants at 3 locations on the main river, supplemented with the analysis of spot samples taken from 8 locations, including the major tributaries, twice a day, 365 days of the year. In 1999, the lower part of the Dee was designated as a Water Protection Zone.

The importance of partnerships in the Dee River Basin District

In 2013 the Environment Agency launched the catchment based approach (CaBa). Both Natural Resource Wales and Environment Agency place value on collaborative decision making and local action to help deliver improvements to water bodies across the Dee RBD.

The Welsh Dee Trust in collaboration with Cheshire Wildlife Trust successfully bid for Environment Agency money to develop catchment partnerships in the Middle Dee and the Tidal Dee in 2013. A cross-border approach was adopted from the outset to enable joint working and with a view to obtaining funding from Wales to support future work. Both partnerships are supported by a steering group.

The Tidal and Middle Dee partnerships aim to maintain, enhance and protect the Dee catchment and estuary by integrating the catchment based approach to promote sustainable use of the environment, enhance wildlife value and provide recreation and access to nature. The Tidal Dee Partnership is hosted by the Cheshire Wildlife Trust and the Middle Dee partnership by the Welsh Dee Trust. Further information on local projects and actions are included in Section 3 and available on **Water Watch Wales** where you can find supporting data and maps.

Figure 2. The Dee River Basin District

2.2 Current status of the River Basin District

The current status of the RBD in 2015 allows us to review progress made during the last six years and set out the foundation for this next cycle of river basin planning. Current status is assessed on the standards, methodologies and waterbody network introduced for the second cycle of River Basin Management Planning. In 2015, 27 water bodies which is equivalent to 28% are in good or better overall status. 70 water bodies which is equivalent to 71% have an objective of good status or better to be achieved by 2021. However, there is a large degree of uncertainty that such a significant increase in achieving good status or better will be observed by 2021 as outlined in section 4.1. In Wales we plan to improve compliance with good status by delivering measures locally in an integrated way to achieve environmental improvements in WFD water bodies and Protected Areas. This will include targeting an improvement to good status in 7 water bodies (equivalent to 7%) in WFD compliance by 2021.

This section sets out the baseline which will be used for future progress reporting to 2021. Table 3 shows the number and type of water bodies in the RBD for 2015 - 2021. This has changed since the first RBMP and will be the new baseline for the next six years. All lengths of rivers, streams or drainage channels are protected by our domestic legislation. WFD requires that we report the status of our water bodies and to do that (for example in the RBMP) we use a river line within that catchment. For the first RBMP, 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 updated RBMP. This revision of the network resulted in the removal of a number of small streams (i.e. those water courses less than 1km in length or with a catchment of less than 10 km^2). The minimum size was in keeping with the original intention of the Directive. Even though these small waters are not reported, the WFD covers all bodies of surface water not just those represented as a blue-line on WFD maps. Where a stretch of water is too small to formally be a water body, or is too small to show up on a map of the water body, it is still protected by law from pollution, modification and abstraction and can still be improved where local actions and assessments deem it to be a priority. The water bodies are the reporting units and are the indicators of the health of the wider water environment. Natural Resources Wales and the Environment Agency assess the condition of these water bodies through monitoring which produces a classification. Further technical details on how this has been undertaken can be found in the **Annex/Part 2**.

Table 3. Numbers of water bodies and type for 2015-2021

Number of water bodies	Natural	Artificial	Heavily Modified	Total
River	50	-	21	**71**
Lake	4	-	17	**21**
Coastal	-	-	-	**-**
Estuarine	-	-	1	**1**
Groundwater	5	-	-	**5**
Total	**59**	**-**	**39**	**98**

The water body types are subdivided into surface waters which includes rivers, lakes, coastal and estuarine water and groundwater. There are 93 surface water bodies, and 5

groundwater bodies within the Dee RBD. This includes the addition of new heavily modified water bodies (HMWBs) that have been designated as part of the first cycle review. The current status of these water body types is shown in Table 4 and Table 5, this forms the baseline for the next six years.

Table 4. Summary of ecological and chemical classification for surface waters 2015. (Note that second cycle chemical standards in biota have been used in classification where data is available).

	Ecological status or potential					Chemical status	
No. of water bodies	Bad	Poor	Mod	Good	High	Fail	Good
93	0	7	61	25	0	10	83

Table 5. Summary of chemical and quantitative classification for groundwater 2015

	Quantitative status		Chemical status	
No. of water bodies	Poor	Good	Poor	Good
5	0	5	1	4

In addition to the defined water bodies there are also a number of Protected Areas which need to meet the objectives and requirements that are relevant to their particular designation and use.

Most recent monitoring data of Natura 2000 water dependant habitats and species shows that 11% were favourable in the Welsh section of the RBD. The reporting approach differs in England where condition is reported on a unit basis. Most recent monitoring data shows that 2,623ha was favourable in the English section of the RBD. Hence the data is presented separately for the two countries as the data is not comparable.

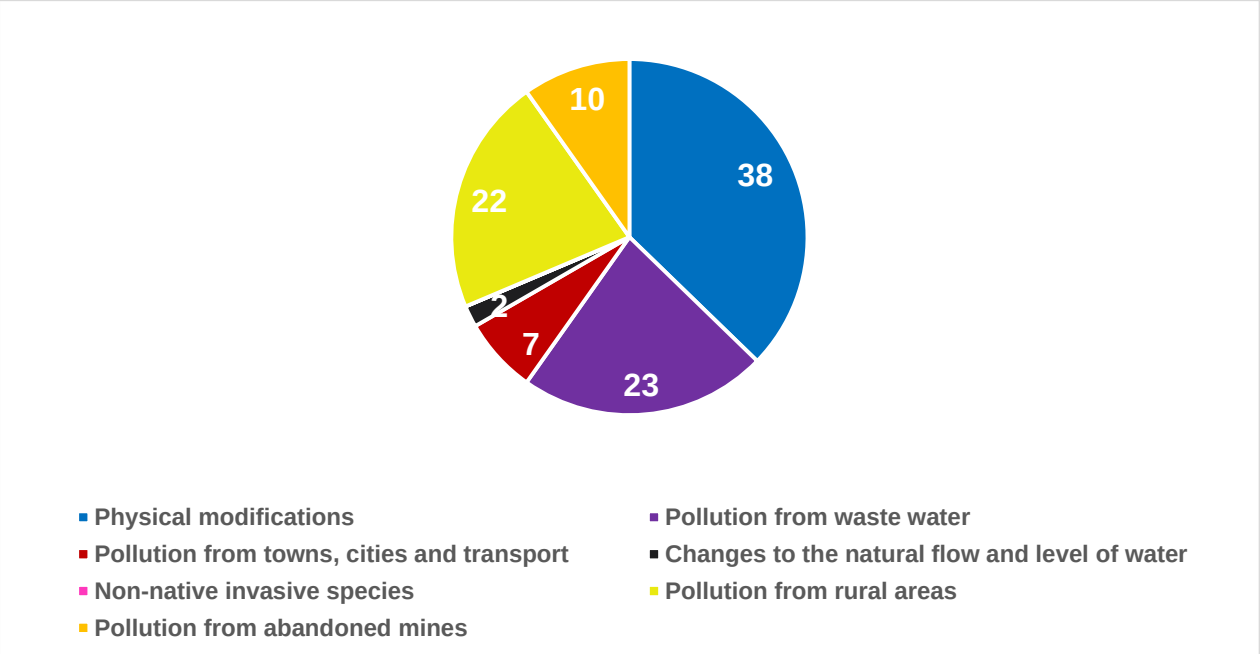
The EU also requires that Member States establish an inventory of emissions, discharges and losses of priority substances for each RBD alongside WFD characterisation analysis. The inventory was compiled using environmental monitoring and point source effluent discharge data. The inventory is intended as a baseline study in the first instance and the methodology and results can be found in the **Inventory of Emissions**.

2.3 Summary of the significant water management issues

The most important issues we believe that threaten the current and potential future uses of the water environment have been grouped into significant water management issues (SMWIs) and are shown in Figure 3. These are based on the standards, methodologies and waterbody network introduced for the second cycle of River Basin Management Planning. These were reviewed in 2014 through public consultation as part of the ongoing river basin planning programme. These are the main issues that the planned Programme of Measures, set out in Section 3, will tackle to ensure protection and improvement of the water environment across the Dee RBD. Section 3 also includes further detail on the main programmes that will be key to achieving the objectives and a summary of local actions. In some instances we will need to tackle some of the SWMIs working across various sectors and with other organisations to be able to achieve our objectives, for example

actions taken where there are failures resulting from nutrient inputs and bacteria from rural diffuse pollution and actions for sewage and waste water treatment.

Figure 3. Reasons for not achieving good in 2015



Physical modifications – affecting 38% of water bodies

These are modifications that society has made and continues to make to rivers, lakes, estuaries and our coastline; the end result being that the size and shape of natural habitats become altered. Physical modifications can include artificially straightening channels to aid navigation or flood risk management, structures designed to reduce flood risk, flow regulation structures to create reservoirs, dams and weirs, or short-term management activities like dredging or vegetation removal.

Physical modifications can cause changes to the natural flow, water levels and can result in the excessive build-up of sediment and the loss of habitat that wildlife needs to survive. Many of our towns and cities have been built around the water environment and we need to find sustainable solutions to ensure these issues do not have a negative impact on the water environment, economy, health and wellbeing. Some historic modifications may have been present for many years, and may serve multiple purposes providing benefits to society. Where these physical modifications lead to a failure of environmental objectives, practical and reasonable mitigation measures are required. The aim of these mitigation measures are to enhance and restore the quality of the existing environment.

As our population grows and the effects of climate change increases, the pressure to physically modify water bodies in the future is likely to increase as we protect ourselves and our homes from increased risk of flooding and droughts. . These modifications need to be undertaken in an environmentally sensitive way within the constraints of technical feasibility and costs and help improve our resilience to other pressures including climate change, recreation and fishing. Naturalising and restoring our waters will help to improve habitats and fish passage throughout the catchments; this may include using natural water

retention measures such as wetland creation or coastal realignment. Addressing these impacts can also have benefits for Protected Areas, in particular Natura 2000 sites.

Changes to natural flow and levels of water – affecting 2% of water bodies

Changing the natural flow and water levels in rivers, estuaries and groundwater through either seasonal climatic variation or abstraction determines the amount of water available for people and wildlife. A reduction in the flow and volume can affect the way we use water in our day to day lives, for drinking water and specific uses such as agriculture, business and industry, even for domestic day to day activities for washing and watering our gardens. Changes in population growth and the increase in the number of one person households all creates greater pressure on water demand. Too little water has detrimental impacts on our habitats and day to day way of life.

Changes to the natural flow and level of water could affect some Natura 2000 sites, particularly water dependent Special Areas of Conservation (SACs). Improving the way water resources are managed will make sure that there is enough good quality water for a healthier water environment and secure supplies of water for people, businesses and agriculture. It will also provide more leisure opportunities and increase the amenity value of natural environments, leading to health benefits for people.

Water use efficiency, sustainable land use patterns in urban and rural areas, regulation through abstraction licences and habitat improvements will all contribute to protecting our waters from the effects of changes in flow and water levels.

Pollution from sewage and waste water – affecting 23% of water bodies

Sewage and waste water can contain large amounts of nutrients (such as phosphorus and nitrates), ammonia, metals and other damaging substances including viruses and bacteria. These can have a detrimental effect on habitats and a significant impact on our use of water, particularly the recreational use of bathing waters and waters supporting shellfish for consumption. All groundwater in this RBD forms part of a Drinking Water Protected Area (DWPA). Unregulated discharges to ground and leaking subsurface sewers can cause point source and diffuse pollution of groundwater resources.

Pollutants enter the water environment through discharges from sewage treatment works, sewage overflows (either treated or untreated) and privately owned septic tanks and treatment plants. During periods of wet weather, storm overflows also contribute to the impact. This can affect the water environment and in particular bathing and shellfish waters. Changes in weather patterns and population distribution, alongside the need for new housing and other premises all contribute to pressure on the infrastructure in place to deal with our sewage and waste water. With ageing networks and future development this can overload works, increase the number of spills from overflows and have an impact on our environment. Consequently one of the key Programme of Measures continues to be those actions taken to tackle these issues.

Improving effluent treatment and regulating unlawful discharges from privately owned septic tanks will have a significant positive affect on the water environment. This will ensure our drinking water supply is protected from the harmful effects of pollution, provide clean water for food production, and provide opportunities for the public to continue to enjoy the outdoors through recreation including fishing which is particularly popular in this RBD. There are also benefits to our habitats and a large number of Protected Areas

including Natura 2000 sites as well as the River Alyn, bathing waters and shellfish waters, which are also designated as sensitive areas under the Urban Waste Water Treatment Directive. It also contributes toward achieving objectives in the estuarine and coastal environment under the Marine Strategy Framework Directive. It will also be important to tackle sewerage misconnections and to increase public awareness to prevent misuse of the sewerage system and avoid the disposal of harmful chemicals, fats, oils and greases.

Pollution from towns, cities and transport – affecting 7% of water bodies

A combination of misconnections of our dirty water (from sewage and washing) at our workplaces (in particular industrial estates) and homes together with rainwater collected from manmade surfaces such as building roofs, roads and pavements collectively contribute to a mixture of water pollution within our towns and cities. This can include dust/grit, oils, detergents, metals, road salt, bacteria from animal faeces and other particulates which becomes collected through surface water drainage systems or directly into local streams and lakes from localised drains. This can have an impact on our rivers, lakes, groundwater, estuaries and coastal waters. In some instances pollutants from historically contaminated land and atmospheric pollution contributes to the problem in surface waters and groundwater.

Tackling this is complex due to the nature and number of small discharges that collectively have a locally significant impact, for example locating the source of pollution from a large industrial estate which may have many different types of businesses from vehicle repair to graphic design and printing, with each business handling different materials and having different infrastructure. This has been recognised by the Welsh Governments Water Strategy, Natural Resources Wales' Diffuse Pollution Plan, Defra's diffuse urban action plan and more locally through the Dee Water Pollution Plan which is jointly owned by Natural England, Natural Resources Wales and the Environment Agency with Natural England being the lead partner which are included in the Programme of Measures to protect and improve our waters. We also have an opportunity to minimise impacts from historic and future developments through better urban design and planning.

Pollution from rural areas – affecting 22% of water bodies

Some land management practices by the agriculture and forestry sectors and impacts from other rural uses (for horses/ stables and golf courses) can result in nutrients (such as phosphorus and nitrate), bacteria, pesticides, soils and sediments affecting the water environment. Nutrients can cause excessive algal growth and lead to eutrophication in our surface waters. Groundwater used for drinking water can also be impacted through the long term application of nitrate fertilizers where this can result in nitrate concentrations above the drinking water standard. Groundwater containing elevated levels of nutrients can lead to poor ecological status in wetlands that are groundwater fed.

The loss of soil as a basic resource through some land management practices can mean even more fertilizers are used exacerbating the issue. Agriculture and forestry practices can also contribute to sedimentation of our surface waters and can contribute to soil compaction. This, together with artificial rural drainage systems, can increase surface water run off during periods of wet weather leading to increased flooding.

Preventing and reducing pollution from rural areas will benefit the water environment, both for people and wildlife. From a commercial perspective, land owners can save money through good land management practices, preventing loss of soil and nutrients, the water

industry can make significant savings if there is less need to prioritise investment in the treatment of drinking water for colour, pesticides and nitrate contamination. In Wales, approaches such as general binding rules could assist in tackling diffuse agricultural pollution issues. Locally people benefit through better water quality in our rivers, lakes, groundwater, estuaries and coastal waters especially in areas designated for bathing or shellfish harvesting. There are also benefits to our habitats and a large number of Protected Areas including bathing water, shellfish waters, Drinking Water Protected Areas, Natura 2000 sites and nutrient sensitive areas designated as nitrate vulnerable zones.

There is a need to promote tree planting, new woodland creation and woodland management measures that are consistent with “Woodland for Water: Woodland measures for meeting Water Framework Directive objectives” 2011.

Pollution from mines – affecting 10% of water bodies

Contaminated groundwater can discharge from abandoned mines and is a major problem in Wales. These mine water discharges are often contaminated with dissolved metals such as iron, lead, copper, zinc and cadmium which discharge into adjacent rivers. Rain water run-off from spoil heaps associated with the workings can also discharge into rivers and subsequently to estuarine and coastal waters. These metal rich discharges have a significant detrimental impact on many of our rivers and the fish and ecosystems they support.

Abandoned metal mines are responsible for the majority of this type of pollution although discharges from former coal mines also cause significant, but more localised river pollution. Many groundwater and surface water bodies fail to achieve good status as a result of the discharges from abandoned mines and some estuarine and coastal waters can also be impacted in catchments that have a significant legacy issue.

Dealing with pollution from mine waters will substantially improve water quality and help wildlife, including fish, insects and other aquatic life. It will also protect valuable drinking water supplies. There are wider benefits from mine water remediation for example using wetland reed beds significantly enhances biodiversity and provides a rich habitat for birds. These are often visually attractive and can be used as public amenities. Abandoned mine sites are part of our industrial heritage with many being designated as Scheduled Monuments or Sites of Special Scientific Interest. It is an exciting area of academic research particularly in England and Wales where cost effective, sustainable remediation options are being researched.

Currently there are no schemes planned over the next six years within the Dee RBD however there will be benefits from the minewaters research programme in the development of sustainable minewater remediation options. At a UK scale, the Coal Authority currently operates 70 treatment schemes at abandoned coal mines using funding from the Department of Energy and Climate Change (DECC) across England, Wales and Scotland. 15 are in Wales, 12 in the Western Wales and 3 in the Severn RBDs. These schemes must continue to operate to prevent deterioration in rivers and groundwater. Since 1994, the Coal Authority has cleaned up and protected over 240 km of rivers, protected drinking water supply groundwater, and each year stops over 3,000 tonnes of iron and other contaminants causing pollution.

Invasive Non-Native Species – (Under the WFD, INNS was not a reason for not achieving good in 2015 in water bodies in the Dee RBD)
There is a catchment-wide partnership initiative in the Dee RBD which aims to co-ordinate the control and monitoring of INNS to ensure a joined up approach to INNS management. The presence of invasive non-native plants and animals in our watercourses poses a threat to biodiversity, increases flood risk, affects the condition of our water environment and has a significant economic impact through the costs of managing invasions and preventing further spread and maintaining flood defences. Signal crayfish are widespread and affect animals such as fish and invertebrates. Other species such as mitten crabs can destroy reed beds and intertidal habitats and can cause banks to collapse by burrowing into them. This affects all water body categories, including estuaries and coastal waters. Climate change is thought to drive certain species northwards, increasing their frequency and variety in the future and affecting the condition of water bodies.

Non-native invasive species can have significant economic impacts, once they are established control is often prohibitively expensive or technically infeasible and ultimately unsuccessful. The cost of controlling invasive species to make sure that flood defences, navigation and the natural environment are not compromised is rising. Some plants such as floating pennywort and creeping water primrose increase the risk of flooding. Others like signal crayfish can decrease river bank stability and most have negative impacts on ecology and leisure activities such as angling and water sports. There are also significant costs in controlling and safely disposing of invasive species such as Japanese knotweed on development sites and managing species such as zebra mussels, which can block pipes, intakes and other structures.

The most effective and least expensive measure is to reduce the number of new species introduced and slow the spread of those that are already present by applying good biosecurity (measures which reduce the risk of spreading diseases and invasive non-native plants and animals) and promoting the 'Check, Clean Dry' and ‘Be Plantwise’ campaigns.

Natura 2000 Protected Areas can be vulnerable to certain invasive non-native species. Intensive and often expensive control measures may be required to actively manage or eradicate them in specific circumstances. For example, at sites designated for their habitat interest, Himalayan balsam can dominate and reduce the habitat space available for native plant species. Controlling the Himalayan balsam by targeted and intensive hand pulling or cutting over a number of years can reduce the pressure from this species and prevent further deterioration of the habitat. Within Marine Natura 2000 sites the slipper limpet has the potential to smother protected habitat features reducing their biodiversity and affecting their condition. Careful biosecurity will reduce the risk of this happening however control measures such as dredging and smothering can also be used to remove the species should it be found.

2.4 Delivery of actions

The actions taken during the first cycle have been divided into the categories set out below. The combination of all these actions collectively contribute to the protection and improvement of the water environment. The actions relate to all types of water bodies, rivers, lakes, canals, wetland, groundwater, estuaries and coastal waters including those in Protected Areas. These include the Programme of Measures which were set out to achieve the statutory objectives, including existing mechanisms, statutory and voluntary

actions. Further detail on the actions taken in the first cycle is included in the **Progress Report**. A summary of the updated Programme of Measures for 2015 -2021 is set out in Section 3 together with further detail provided in **Water Watch Wales**.

Preventing deterioration
All measures and many of the day to day activities of Natural Resources Wales, the Environment Agency and many of our partners contribute to preventing deterioration of the water environment. Through our collective knowledge we are able to identify which water bodies are specifically at risk of deterioration and set out the measures, where possible, to prevent or mitigate those risks.

The Programme of Measures
In the 2009 RBMP the Programme of Measures were set out in Annex C and D (for the Protected Area actions). They included national and local measures, across sectors and all water body types. This was the first programme of statutory measures specifically developed to meet the requirements of the WFD. They include actions to prevent deterioration and improvements in water body status.

Data for the first cycle shows that 81% of measures in the 2009 RBMP have been completed in the Dee RBD. Further detail is included in the **Progress Report**.

Investigations
Since the 2009 plans were published, Natural Resources Wales and the Environment Agency have carried out an extensive investigations programme in the Dee RBD to find out why many water bodies are not in good condition. This has included over 150 investigations not including those to ensure 'no deterioration'. Our knowledge and understanding of the issues affecting water bodies has increased significantly. As a result, we are now in a better position to work with our partners to identify where the greatest environmental improvements can be made, which will provide the most benefit to everyone. Our investigations confirmed that the main reasons why water bodies are not in a good condition relate to issues such as, physical modifications and diffuse pollution from rural areas.

Additional new measures
The Programme of Measures requires regular review to ensure the right actions are being delivered in the right place. During the first cycle new priorities and/or opportunities meant that some actions were reviewed to reflect the current need of the environment. This included applying existing measures in new places and partnership funding (e.g. Catchment Based Approach, Welsh Government and Dŵr Cymru/Welsh Water funds). Further information on additional new measures in the first cycle are included in the **Progress Report.**

Alternative objectives
In some instances there are known reasons as to why water bodies could not achieve good status by 2015. For the first cycle there were 71 water bodies that fell into this category where an alternative objective was set to meet good status by 2027. Many (65 water bodies) of these were included as the cause of the adverse effect was unknown. Investigations carried out during the first cycle have increased our understanding. Details of the alternative objectives for the next six years are set out in Section 4.

2.5 Deterioration

One of the main objectives of the WFD is to prevent deterioration of a water body from the 2009 baseline. Where there is shown to be a deterioration in status from 2009 to 2015 these the reasons for this must be assessed and explained.

Some deterioration may not actually mean that the quality of the environment is worse, it is just that we have monitored elements in that water body in the first cycle which were not previously monitored. It is important that all the relevant data is reviewed to determine what actions need to be taken where and in some cases no follow up action will be required.

To assess compliance with the WFD objective of preventing deterioration, the 2015 classifications results (based on data up to the end of 2014 and the same standards and classification tools used in 2009), were compared with the 2009 classification baseline. The assessment considered whether the water body had deteriorated from one status class in 2009 to a lower one in 2015. This includes sites where an element has deteriorated but it hasn't caused a deterioration in the overall classification due to the classification of the other elements. Confidence has been measured in terms of certainty. Natural Resources Wales has included those sites where we are 'quite certain' to 'highly certain' that the element has failed. The results of this assessment are summarised in table 6.

Table 6: Water bodies that have element level deteriorations (at >75% confidence)

Water bodies	Number of water bodies	% of water bodies
Surface water ecological status	2	2%
Surface water chemical status	1	1%
Groundwater quantitative status	0	0
Groundwater chemical status	0	0

In the Dee RBD; there are no water bodies that have deteriorated in overall water body classification from the 2009 baseline. The reasons for the deteriorations are summarised in Section 3.3 of the **Progress Report.**

2.6 Progress in achieving first cycle objectives

The collective actions set out above have been reviewed. From this we can update the statutory Programme of Measures and investigations to ensure that the updated RBMPs are effective tools for protecting and improving our water environment. Table 7 shows a summary of the progress towards good or better status between 2009 and 2015. Data from the 2015 classification (which includes data up to the end of 2014) has been compared with the same standards and classification tools used in 2009.

Although many of the measures completed over the last 6 years are providing benefits for the local environment, there has been little improvement in the number of water bodies at

good status. However, during that period 90 water body elements[3] improved by one or more class.

Table 7. Comparison of 2009 baseline with 2015 predicted and actual results

Percentage. of water bodies at good or better status	2009	2015 predicted	2015 actual
Surface water ecological status	28%	38%	29%
Surface water chemical status	8%	8%	17%*
Groundwater quantitative status	83%	83%	100%
Groundwater chemical status	83%	83%	83%
Overall status	**30%**	**38%**	**31%**

*This figure reflects an increased number of water bodies monitored for chemical status

In 2009 30% of water bodies in the Dee RBD achieved good or better status. We predicted that this would rise to 38% by 2015. This was supplemented by an internal target of achieving 50% good or better status across Wales. The 2015 classification results indicate that 31% of all water bodies now achieved good or better status.

While there has been a net improvement of 5 river water bodies and 1 groundwater body that achieved good status in 2015; this has largely been offset by more detailed monitoring of lakes. These lakes are now classified by more elements, and some of these elements have been classified as moderate. This additional more detailed monitoring resulted in 5 additional lakes being classified as moderate in 2015 compared with 2009, although in reality there is unlikely to have been any environmental change.

Improvement in status is limited by the current understanding of pressures on the water environment, their sources, the action required to tackle them together with the resources to deliver the programme (both people and budget). In addition the one out all out rules of WFD classification can result in a failure of one element monitored to drive the overall status. However, during this period 90 water body elements improved by one or more class.

Some of this change reflects the number of sites monitored by the WFD monitoring programme. Since 2009, to fill gaps in our understanding, we have increased our monitoring to better understand the pressures on the water environment, especially in some estuarine and coastal water bodies. For example, in 2009 across Wales we monitored seven lakes for macrophytes, in 2015 that increased to 41, of which 23 met the required standard. Therefore much of the change in the data indicates a better understanding of the pressures affecting the environment rather than an actual change in quality. Apparent deterioration will continue to be investigated to understand if it is due to a real change in quality of the environment or the reasons explained above. Further detail on these outcomes is included in the **Progress Report**.

[3] Note 'Water body elements' includes ecological (biological, physio-chemical, other substances and specific pollutant elements excluding BOD and Dissolved Oxygen in canals) and chemical elements (Other Pollutants, Priority Substances and Priority Hazardous Substances) only in surface waters and quantitative and chemical (GW) elements only for groundwater bodies. Excludes supporting elements. Assessed elements only.

2.7Review of first cycle progress

In Wales, having reviewed the outcomes over the last six years the lessons learnt have been applied to the updated plans, these are set out in the **Progress Report**.

The updated 2015 plan enables us to put in place a more robust Programme of Measures learning from progress made over the last six years. This Programme of Measures are set out in Section 3 and the objectives that we aim to achieve as a consequence of this programme are set out in Section 4. Progress towards these objectives will be monitored and reviewed as set out in Section 1.7.

For England table 8 contains a summary of how effective the measures implemented since 2009 were at achieving WFD environmental objectives. Measures are grouped by each significant water management issue. The assessment is based on the measures implemented across England as a whole, not just in the English part of the Dee RBD.

Table 8. Summary assessment of the effectiveness of measures for each significant water management issue (Whole of England level assessment)

SWMI	Effectiveness of Measure
Physical modifications	Obstructions Removing or lowering weirs and building fish passes has generally been effective. In some cases, it has not been possible to fully remove the pressure because of the obstruction's historic value or the need to prevent erosion or mobilisation of contaminated sediments. In some cases full compliance with WFD environmental objectives has not yet been achieved because other barriers elsewhere in the catchment are still present.
Physical modifications	Habitat improvement Habitat improvements, from large-scale river restoration to relatively minor schemes on small watercourses, have generally been effective. They have led to improvements in fish populations and other wildlife. The effectiveness of these schemes at achieving compliance with WFD environmental objectives will only become apparent once the new habitat and associated wildlife has matured. In some cases, it is expected that additional restoration elsewhere in the catchment will be required to support a fully functioning ecosystem.
Pollution from waste water	There were over 300 improvement schemes implemented at sewage treatment works since 2009. These have been effective at helping to achieve compliance with WFD environmental objectives.
Pollution from rural areas	Government advice Catchment Sensitive Farming was effective at encouraging farmers to adopt measures to help achieve WFD environmental objectives (mainly for protected areas). In

	areas where Catchment Sensitive Farming was targeted, between 2006 and 2013, the estimated quantity of pollutant (including phosphorus, nitrate, sediment and faecal indicator organisms) released from agricultural sources reduced by between 4% and 12% (on average).
Pollution from rural areas	Regulation Regulation has reduced the impact of pollution incidents and helped to prevent deterioration. There is some evidence that action plans for nitrate vulnerable zones helped to reduce pollution from nutrients. The overall effectiveness can only be assessed over a longer period.
Pollution from rural areas	Industry initiatives A number of schemes have promoted voluntary action including, advice and grants through local catchment groups, advice through the Campaign for the Farmed Environment, and work lead by water companies to improve the quality of water they abstract for public water supply. Advice is effective at promoting the adoption of good farming practice. Measures that go beyond good practice greatly increase where grants have been provided. Many of these schemes resulted in improvements to the local water environment.
Pollution from rural areas	Environmental stewardship (2006 to 2014) There was good uptake of measures to protect the water environment. Measures were not always placed where most benefit could be gained or the uptake sufficiently concentrated within a catchment to reduce pressures enough to achieve compliance with WFD environmental objectives.
Pollution from rural areas	Cross compliance Compliance with environmental conditions attached to the Single Farm Payment was high. The environmental conditions were strengthened in 2010 and 2015. The associated measures had a small impact on the quality of the water environment
Changes to the natural flow and level of water	Changes in abstraction licences The national Restoring Sustainable Abstraction programme has been effective at improving habitat for fish and other wildlife. Voluntary and compulsory action has resulted in changes to over 200 abstraction licences (by the Environment Agency and government. As a result of this, 27 billion litres of water has been returned to the environment. Nationally this programme has been effective at helping to achieve compliance with WFD environmental objectives, in particular those for Natura 2000 protected areas
Changes to the natural flow and level of water	Demand management

	Demand management and water efficiency techniques have been implemented by many sectors including government, water industry, independent bodies and trade associations. Local Development Plans/Frameworks have been introduced which set out local plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of Schedule 1 to the Building Regulations 2010. Water companies have reduced leakage from their supply networks and increased the number of homes with meters across water stressed areas. Most of these have been effective at a local scale.
Pollution from towns, cities and transport	A variety of measures have been implemented to reduce pollution from urban areas. These include contaminated land restoration; installation of sustainable drainage systems for new and existing developments; treatments to remediate road run-off; regulatory action following pollution incidents; initiatives to resolve misconnected foul drainage systems; and pollution prevention advice to occupiers of industrial estates. Most of these measures have been effective at the local scale. However, in some cases the effectiveness is low, as there needs to be more measures within an area if improvements are to be sustained over the long term. Given the scale, cost and complexity of this issue, the measures have not been effective at reducing the pressure enough to achieve compliance with WFD environmental objectives.
Invasive non-native species	A variety of measures have been implemented to prevent the introduction and spread of invasive non-native species. These have been moderately effective and have slowed the deterioration in the biodiversity of affected waters and the spread to unaffected waters. Measures to remove invasive non-native species from affected waters are only effective for a minority of species where a rapid response to their presence is possible. Evidence gathered in cycle 1 has confirmed that it is technically infeasible to remove most species once they are established. At locations such as Natura 2000 sites, intensive (and ongoing) action can mitigate the pressure, but not remove it.

3. Programme of Measures

3.1 Overview of the Programme of Measures

The challenges that threaten current and future uses of the water environment are managed by collective actions which include statutory measures to maintain and enhance the water environment. This section summaries the main supplementary programmes and statutory measures to achieve the objectives within this plan the objectives are set out in Section 4.0. Measures range in type from those that are statutory legal requirements or economic incentives, to others that are voluntary codes of good practice or locally negotiated agreements. All measures will be tracked and progress reported in line with agreed WFD reporting requirements (Section 1.6).

Measures are divided into two groups. National measures apply to the whole of England and / or Wales, or the United Kingdom. In general these set the legislative, policy or strategic approaches and in many instances use existing mechanisms. Examples include a national ban on using a particular chemical or a national strategy for prioritising and funding the remediation of abandoned mines. Local measures are specific to the RBD or a part of it. For example, the removal of invasive plants along a length of designated river or a local campaign targeting misconnections across an industrial estate. Many of the actions listed will also have multiple benefits. For example, sustainable drainage systems can help to reduce diffuse pollution, reduce surface run-off and flood risk, and deliver biodiversity and green infrastructure benefits.

The national measures are grouped into their significant water management issues which are discussed in Section 2.3 and an overview of the local measures is included. A list of the national measures, and the local measures are available on **Water Watch Wales**.

3.2 Delivery programmes

The Programme of Measures and environmental outcomes they aim to achieve will be delivered through a number of existing programmes. The following sections describe the main programmes.

- **Natural Resources Wales programme**

Natural Resources Wales is committed to delivering WFD objectives through an integrated approach to natural resources and catchment management across its functions:

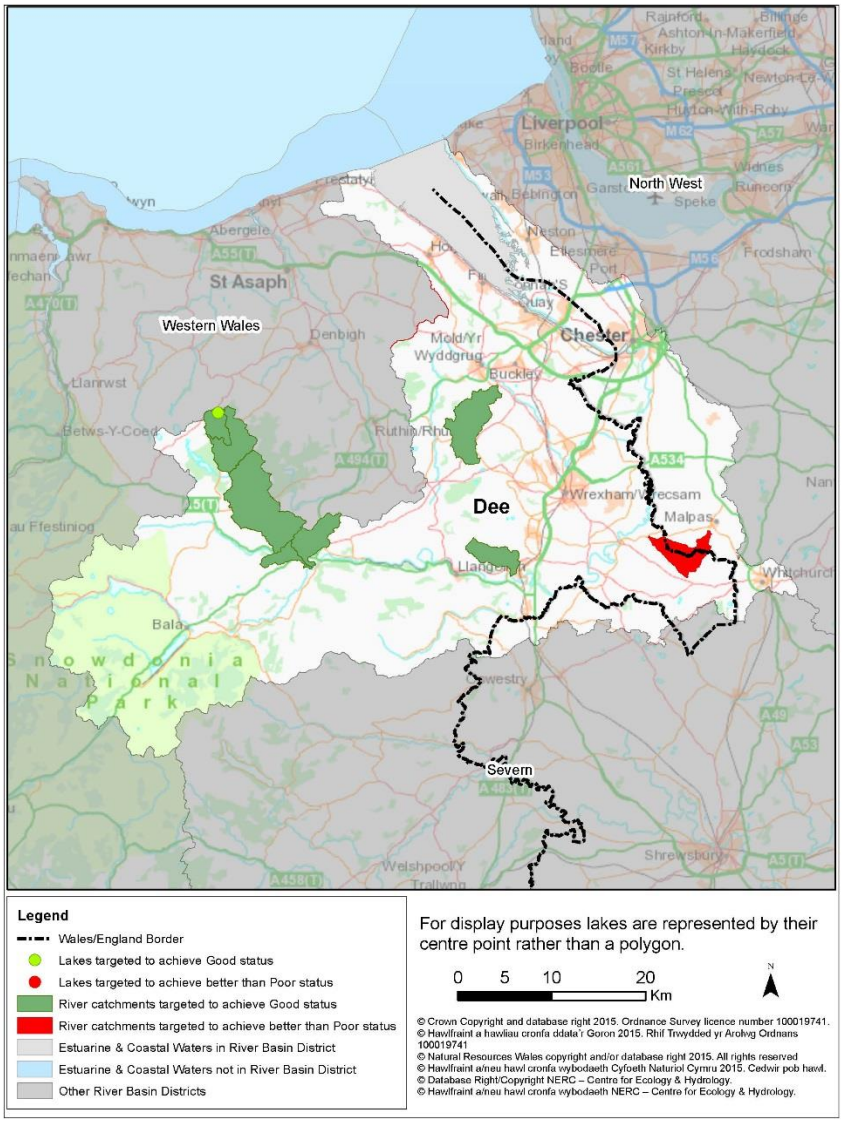
Water Framework Directive

We have worked across Natural Resources Wales to develop an affordable programme of local and national measures, based upon our current understanding of existing resources. Our focus is:

- Preventing deterioration in all water bodies
- Improving compliance with good overall status in 7 water bodies that are currently moderate/poor, and also improving 1 poor water body to moderate. These are shown in Figure 4 below.
- Targeting measures locally in an integrated way to deliver environmental improvements in WFD water bodies and Protected Areas, including areas protected for water habitats and species.

- Identifying where element level improvements will be achieved during the second cycle, but where further measures will be required to deliver an overall ecological status change.
- Developing our approach to natural resource management by working at a local catchment level and capturing the wider benefits delivered through WFD.

Figure 4. Water bodies predicted to achieve good status or improve from poor status by 2021



Natura 2000

A fundamental and new approach to capturing the prioritised, costed measures for water dependent Natura 2000 sites in Wales is through the development and publication of Prioritised Improvement Plans (PIPs), to contribute to maintenance and restoration of favourable condition.

During 2015, we have integrated evidence and information from the LIFE Natura 2000 Programme and RBMPs, in order that the updated RBMPs are based on our most current evidence base. We have worked across Natural Resources Wales to develop an affordable programme of local and national measures, based upon our current

understanding of existing resources. This is available on **Water Watch Wales**. We will review this programme and envisage it will develop as opportunities/resources become available.

Flood and coastal risk management

Natural Resources Wales' Flood and Coastal Erosion Risk Management capital investment programme aims to reduce the risks of flooding to people's homes and the economy, via improvements and maintenance to flood defence schemes and improving the understanding of flood risk through mapping and modelling. Most projects will focus on protecting people and avoiding other economic damages. Many may also contribute towards improving the status of water bodies, protecting valuable wildlife sites and creating new habitats.

Flood and coastal erosion risk management is a legitimate use of many water bodies but has in some cases resulted in significant modification to the shape and size of water bodies and led to alterations to their natural flows. Historic activities to improve water body conveyance and reduce flood risk, such as construction and reinforcement of banks, channel re-sectioning and vegetation management often had a negative impact on the condition of water bodies.

The capital investment programme aims to reduce the impact of these activities by working with natural processes and, where possible, using natural flood management measures to slow, store and filter floodwater. This will achieve more sustainable flood risk management schemes, often with significant additional environmental and social benefits. This approach is used together with traditionally constructed hard defences to increase the resilience of communities to extreme events, both floods and drought.

In identifying and designing schemes, the impacts of climate change, such as more winter rainfall, more intense rainstorms and sea level rise are taken into account.

Meeting statutory obligations, improving the natural environment and mitigating climate change will be achieved through 'win-wins' at the same time as reducing flood and coastal erosion risk (for example, through natural flood management where appropriate). Achieving environmental outcomes is integral to flood and coastal risk management, for example, where possible when improving defences opportunities to reduce any barriers to eel passage will also be sought.

The flood risk management investment programme is expected to deliver additional environmental outcomes for 2021 such as habitat improvement or creation through capital maintenance and flood defence expenditure. Improvements to the environment arising from the capital investment programme are not linked to predicted improvements in status by 2021 for specific elements in specific water bodies due to insufficient confidence about the scale of improvement or exact location of investment, additionally flood risk funding in Wales in predominantly set on an annualised basis hence future years plans are often indicative and dependant on funding.

Woodland and forestry

Natural Resources Wales are committed to improving the environmental quality of Welsh Government's Woodland Estate (WGWE). We are addressing WFD failures by implementing the UK Forest and Water Guidelines 5th edition (UKFWG) published in November 2011. Well maintained culverts, effective silt traps, roadside drains separate from any natural watercourses, riparian zones and appropriate water management within

the forest are essential for maintaining good ecological status across the WGWE. Pollution safeguards are in place when forest operations are carried out.

We have identified water bodies predicted to achieve good where we will:

- Review the forest riparian management and drainage systems and ensure they meet the UKFWG standards by 2021.
- Prepare forest resource plans and identify potential risks, such as civil engineering, clear-felling and restocking and implement ways to mitigate them, considering Low Impact Silvicultural Systems (LISS) where applicable.
- Where unavoidable forest operations, such as felling to comply with a plant health order, could have a significant water quality impact we will take all steps to mitigate them.

- **Flood risk management investment programme in England**

The Environment Agency's Flood and Coastal Erosion Risk Management capital investment programmes aim to reduce the risks of flooding and erosion to people's homes and the economy over the next 6 years to 2021. Projects will focus on protecting people and avoiding other economic damages (including farming business). Some may also contribute towards improving the status of water bodies, protecting valuable wildlife sites and creating new habitats.

Flood and coastal erosion risk management is a legitimate use of many water bodies but has in some cases resulted in significant modification to the shape and size of water bodies and led to alterations to their natural flows. Historic activities to improve water body conveyance and reduce flood risk, such as construction and reinforcement of banks, channel re-sectioning and vegetation management often had a negative impact on the condition of water bodies.

The capital investment programme aims to reduce the impact of these activities by working with natural processes and, where possible, using natural flood management measures to slow, store and filter floodwater. This will achieve more sustainable flood risk management schemes, often with significant additional environmental and social benefits. This approach is used together with traditionally constructed hard defences to increase the resilience of communities to extreme events, both floods and drought.

In identifying and designing schemes, the impacts of climate change, such as more winter rainfall, more intense rainstorms and sea level rise are taken into account.

Meeting statutory obligations, improving the natural environment and mitigating climate change will be achieved through 'win-wins' at the same time as reducing flood and coastal erosion risk (for example, through natural flood management where appropriate). Achieving environmental outcomes is integral to flood and coastal risk management, for example, where possible when improving defences opportunities to reduce any barriers to eel passage will also be sought.

Improvements to the environment arising from the capital investment programme are not linked to predicted improvements in status by 2021 for specific elements in specific water bodies due to insufficient confidence about the scale of improvement or exact location of investment.

- **Welsh Government**

The Water Strategy for Wales was launched by the Minister for Natural Resources on 19th May 2015. The vision 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 sets out the direction for water policy over the next 20 years in the context of the Environment (Wales) Bill and Well-being of Future Generations (Wales) Act 2015.

The strategy is accompanied by an action plan with milestones up to 2025 (and beyond). There are six policy priorities for 2015-18:

- supporting the development of the area based approach to natural resource management.
- ensuring access to fair and affordable water and sewerage services.
- devolution of all matters relating to water and sewerage and the removal of the
- unilateral power of the UK Government to intervene in respect of water resources in Wales.
- a more focused approach to sewerage and drainage management and development and implementation of legislation to support sustainable drainage solutions.
- reform of the abstraction licence system in Wales to ensure sustainable management of our water resources now and in the future.
- review and where appropriate change current practices and regulatory approaches to tackle diffuse pollution.

- **Water industry investment programme**

Ofwat, the economic regulator of the water companies reviews water industry investment, plans every five years. As part of this process, known as the price review, Natural Resources Wales and the Environment Agency work with water companies, Ofwat and others to make sure that investment protects and improves the water environment, increases resilience and secures long-term benefits for society and the economy. Natural Resources Wales and the Environment Agency set out the environmental obligations, including work required to prevent deterioration and achieve Protected Area and water body status objectives.

Significant investment will go into addressing point source impacts from sewage treatment works and discharges from the sewer network. This will reduce pollutants such as ammonia and nutrients that disturb the natural ecological balance of water bodies and cause excessive growth of vegetation and algae.

Habitat improvement schemes are planned to reduce the impact of physical modifications caused by water company operations and action is planned to deal with invasive non-native species on water company land. Further measures will ensure compliance with the Eels Regulations, which require water intakes to be screened to prevent eels from being drawn out of the river into drinking water treatment works.

Climate change adaptation and mitigation is an integral part of water company planning and is an essential part of assessing scheme options. This is particularly important for water resources planning, where water companies must plan up to 25 years in advance to make sure that there is enough water to meet future demands.

Most of the measures are well-established engineering solutions that are proven to be effective. Changes are secured through amendments to environmental permits.

There are some catchment and habitat improvement schemes that are less well established, including measures to reduce pesticide pollution. Some of these schemes rely on voluntary behavioural change affecting agricultural practice. These can be less effective when compared to engineering solutions.

In England, a “fair share approach” is applied to the selection of measures, which assumes there is a proportional reduction in polluting load from each of the contributing sectors. For example, when identifying measures for phosphorus in a catchment, the amount coming from sewage treatment works and the amount from other sources, such as rural diffuse pollution was calculated. If the sewage works was responsible for 70% of the phosphorus load, then the measure identified is to achieve 70% of the required phosphorus reduction. In this situation achieving an improvement in status is reliant on other sectors putting additional measures in place.

Water company investment will directly contribute to predicted improvements in status by 2021 for specific elements in specific water bodies. We will include measures where there is a proven link shown by data (and supported by modelling), between a water company’s activity and a failure to meet required standards. This will include installing phosphate-stripping equipment at sewage treatment works. Measures are also being carried out to ensure that the receiving environment does not deteriorate due to development resulting in increased discharges from wastewater treatment works.

A wide range of measures will secure additional outcomes for the environment, but are not linked to specific improvements in element status by 2021 because there is insufficient confidence about the scale of improvement. This includes measures for eel passage, measures to protect drinking waters and improve bathing waters and measures to modify the flow and sediment regime where it is affected by impoundment for regulating the Dee and can be demonstrated to be beneficial for key features.

In Wales, we will publish the water company programme on **Water Watch Wales**.

- **Rural land management**

In Wales, Glastir is the Welsh Government’s sustainable land management scheme comprising of the basic-level Entry, the higher-level Advanced, Commons and Organic. It also includes the restoration, creation and management of woodlands. They are entirely voluntary schemes and form a large part of a wider investment in Wales under the Welsh Government’s Rural Communities – Rural Development Plan 2014 to 2020. The objectives of Glastir are to bring about beneficial environmental outcomes by:

- managing soils to help conserve carbon stocks and reduce soil erosion;
- improving water quality and reducing surface run-off;
- managing water to help reduce flood risks;
- conserving and enhancing wildlife and biodiversity;
- managing and protecting landscapes and the historic environment;
- creating new opportunities to improve access and understanding of the countryside

Glastir supports the implementation of measures over and above legal requirements, cross compliance and usual farming practice.

Glastir Advanced supports environmental work targeted at specific locations that are best placed to deliver the aims of the scheme. Expressions of Interest for a Glastir Advanced contract, submitted by applicants, are scored on the ability of that particular holding to deliver against the objectives the Welsh Government is seeking to address. This is identified by measuring the intersection of the area of land included in the Expression of Interest with a series of Geographical Information System (GIS) layers, wherever they occur throughout Wales. These GIS layers inform where specific objectives of Glastir can best be delivered. The specific objectives are prioritised within each GIS layer, but the relative importance of each layer can be adjusted, by using weighting factors, to ensure the greatest priorities are addressed first.

For water quality, the relevant GIS layer identifies those areas where Natural Resources Wales was confident in its evidence that land management practices are contributing factors to failing water quality standards defined under the WFD.

Within these priority areas, Glastir Advanced is used to address soil management and ways to reduce the effect of nutrient, sediment and faecal bacteria pollution through the provision of water management plans for each holding. The plans are also used to assist the delivery of the most appropriate management options and capital works so as to gain the best outcome for water quality priorities through Glastir.

To date, Glastir Advanced has 11,000 ha of targeted management to deliver beneficial outcomes for water quality objectives across the whole of Wales.

Glastir Woodlands is underpinned by a management plan, drawn up in line with the UK Forestry Standard, which is the reference standard for sustainable forest management in the UK. The sustainable management and restoration of forested and wooded land, along with the creation of well-designed new woodlands and forests, is essential to ensure the supply of good-quality fresh water, provide protection from natural hazards such as flooding or soil erosion and to protect the needs of aquatic species.

In England, Countryside Stewardship is a new scheme that is open to all eligible farmers, woodland owners, foresters and other land managers through a competitive application process. It is entirely voluntary and is part of a wider investment of £3.5 billion in England under the Common Agricultural Policy for 2016 to 2020. It will contribute £900 million of new funds to enhance the natural environment, particularly the diversity of wildlife and water quality. About £400 million of this new funding will be used to improve water quality and increase resilience against flooding.

By 2020, it is expected that 30% to 40% of rural England could be part of a Countryside Stewardship agreement. Countryside Stewardship supports the implementation of measures over and above legal requirements and good practice. It will address soil management and reduce the effect of nutrients, sediment and faecal contamination. This will reduce the impact of eutrophication and benefit bathing waters, shellfish waters and drinking water. This is achieved through measures categorised by the following groups:

- enhanced field management, including seasonal livestock exclusion, winter cover crops, buffer and riparian management strips next to watercourses and reduced nutrient applications from fertilisers
- land use change, including woodland and wetland creation or converting arable land to grassland which requires less fertiliser

- water and woodland capital grants, including sediment traps, fencing of watercourses and tree planting
- re-naturalising rivers and coast defences, including making space for water and coastal realignment

Countryside Stewardship will support climate change resilience, for example, by planting trees next to rivers and streams, which can reduce river temperature and the risk to salmonid fisheries. It will also reduce sedimentation of rivers, making rivers better able to store more flood water.

Individually these measures can be effective at a field scale but a number of land managers need to take up measures across the whole catchment for the measures to be really effective. As a result, improvements to the environment from Countryside Stewardship are not linked to specific improvements in water body element status by 2021. The uptake of measures is voluntary, with the first agreements commencing in January 2016.

The individual nature of catchments including soils, topography and rainfall make it difficult to quantify the benefits of these measures.

Countryside Stewardship is expected to achieve additional environmental outcomes for 2021. Preliminary research suggests that for nutrients and sediment it may provide elemental improvements of approximately 2% - 10% from the current position where supported with advice. In some discreet locations an improvement of up to 18% may be achieved, but the precise locations will depend on the level of uptake of measures by farmers and the supporting advice provided. Further research is planned that will help to evaluate the likely benefits of Countryside Stewardship for water.

It is not yet possible to describe the detail of schemes or exact location of investment, however improvements are anticipated within the English part of the Dee RBD.

- **Water resources sustainability measures**

Abstraction and other changes to river flows and groundwater levels are putting pressure on the water environment, and, in some cases, are causing environmental damage. Dealing with abstraction and flow pressures now will address damage that is already occurring and also help support sustainable supplies of water for the future.

Measures grouped within this programme are based on applying existing provisions under the Water Resources Act 1991. Current tools will be fully used to achieve environmental objectives ahead of Defra and Welsh Government's plans for reform of the abstraction licensing system in England and Wales, which will create a system that has built in long-term flexibility to help deal with future challenges of changing climate, population and economic growth whilst protecting the environment and trying to ensure water is used efficiently. Following public consultation Government also plan to bring some exempt abstractions into the licensing system. This will give greater ability to control the environment and prevent damage.

Most measures will be applied through the current abstraction licensing system and involve the following types of action:

- constraint or refusal of applications to renew time limited licences
- changes or revocation of licences necessary to protect water bodies from serious damage - Natural Resources Wales and the Environment Agency are using

government guidance and evidence to take a prioritised approach to assessing whether licence changes are needed to protect water bodies from serious damage. All abstractors should anticipate changes to their abstraction licences in water bodies affected by serious damage.

- working with licence holders to voluntarily apply to change licences to make them sustainable
- implementing the Restoring Sustainable Abstraction programme, through which Natural Resources Wales and the Environment Agency will take action to amend or revoke abstraction licences that have already been identified as causing an environmental problem.
- revoking unused licences

The existing abstraction licence charge schemes fund these measures. (Note water company actions are included in the section titled “Water company investment programme”).

Licence change measures are well established and proven to result in environmental benefits once the change becomes effective, and will achieve environmental outcomes. Some water bodies will respond quickly to changes in timing and volume of water abstracted. Surface water bodies suffering from serious damage will see flows increased, and the damage being caused will be stopped. However, for licence changes made to groundwater abstractions, benefits may take longer to take effect, and can be over many years. This is particularly true when considering groundwater recovery times within some major aquifers.

Climate change will affect the future demand for water as well as its availability and quality. Rivers and groundwater water bodies are already under pressure. Demand for water is increasing due to population growth, urban development and land-use change. Climate change is expected to alter the frequency and distribution of rainfall, increasing temperatures and increasing the frequency and severity of extreme weather events. Dealing with unsustainable abstraction and implementing water efficiency measures is essential to prepare and be able to adapt to climate change and increased water demand in future.

Not all of the measures can be linked to predicted outcomes in specific water bodies by 2021 because there is insufficient confidence in the exact scale and timing of improvement. However, classification change may be seen in some, as yet unspecified, water bodies.

- **Catchment level funded improvements**

In Wales, Natural Resources Wales has made available £4.2 million for 2015-2018 to fund projects that benefit the wildlife, people and economy of Wales. The Competitive Fund is based around the aim of Natural Resource Management, namely, 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. There will be a focus on the Natura 2000 network of designated sites in Wales (Special Areas of Conservation and Special Protection Areas). This is to help achieve Wales’ legal obligations under the European Birds Directive and Habitats Directive (Aim A). At the same time, it seeks to integrate this conservation work with other social and economic benefits highlighted as important in Natural Resources Wales’s Corporate Plan.

This has provided funding to partners across Wales. In the Dee RBD this includes work reduce diffuse pollution, improve in-river and riparian habitat, tackle non-native invasive species and provide education and community engagement. This is through a joint working partnership with Welsh Dee Trust as hosts of the Middle Dee Catchment Partnership and competitive funding awarded to the Dee Invasive Non-Native Project (North Wales Wildlife Trust).

Natural Resources Wales also manages projects partially funded by others, such as the European Union and Big Lottery Fund (BIG). For example the LIFE Natura 2000 Programme for Wales was a project to develop Prioritised Improvement Plans (PIPs) which sets out prioritised, costed actions for every Natura 2000 site in Wales with the aim of restoring these prime wildlife sites and safeguarding them for the future.

The Welsh Governments' Nature Fund of £5 Million is supporting 20 projects that through collaborative action tackle declining biodiversity and deliver benefits to communities across Wales by the end of 2015. The focus of investment is on delivering 5 key priorities in 7 Nature Action Zones. The 5 key activities are:

- action to improve river catchments
- action on marine ecosystems
- action for local environment
- action to realise the potential in our upland areas
- action to stimulate innovation

For the Dee RBD the relevant Nature Action Zones are the Berwyns and Migneint. The projects here include landscape-scale conservation and sustainable land management, including peatland restoration. This work will deliver a range of benefits including water retention and carbon sequestration.

Other partners such as the Wales Biodiversity Partnership (WBP) also bring together key players from the public, private and voluntary sectors to promote and monitor biodiversity and ecosystem action in Wales. The work of WBP is actioned through the wider partnership and the support team.

In England, as part of the commitment to the catchment based approach, Defra has made £10.1 million available during 2015 to 2016 to deliver voluntary outcomes for the water environment through the Catchment Partnership Action Fund (CPAF) and the Environment Agency's Environment Programme. The Environment Agency will invest £4.64 million through its Environment Programme, with more than 50% of this being specifically for partner-led projects.

CPAF will invest £5.1 million in 2015 to 2016. £1.3 million of this supports the role of catchment hosts with the remainder going to projects carried out by voluntary groups. Of the CPAF and Environment Programme funding, at least £2 million will be used for dealing with urban pollution issues.

A wide variety of measures are funded at a catchment level. This includes advisory and action based schemes to reduce the impact of pollution from rural and urban areas along with habitat improvement measures to increase biodiversity.

Natural England will invest £2 million on protected areas measures during 2015 to 2016. This will focus on safeguarding and where necessary improving the condition of Natura 2000 sites using measures such as river restoration, lake restoration, diffuse pollution, freshwater invasive species and habitat restoration on wetland sites.

The effectiveness of measures within this programme is variable. Measures such as removing barriers to fish migration are well established engineering solutions and are effective. However, there are some catchment and habitat improvement schemes that are less well established, including measures to reduce pesticide pollution or undertake wider river habitat enhancements. Some measures rely on behavioural change in agricultural practice, so are less reliable compared to engineering solutions.

Projects need to be resilient to a changing climate, performing under a variety of conditions and supporting the long term health of the catchment. When developing its investment programme, the Environment Agency considers the contribution each action will make to reduce climate change risks and works with partners to manage these risks and help catchments adapt.

The outcomes of a number of projects will directly contribute to predicted improvements in status by 2021 for specific elements in specific water bodies. This includes action to tackle rural diffuse pollution in this river basin district.

Other catchment level government funded improvements address a range of pressures and will secure a variety of improvements to the environment, but are not linked to outcomes for 2021 because of insufficient confidence about the scale of improvement.

- **Wider measures**

There are a number of measures which do not align with a single SWMI.

Theme	Measure
Investigations	The programme of investigations for waterbodies where there are; • Known failures including those water bodies with alternative objectives • Risk of deterioration
Flood Risk Management	In Wales, measures delivered under RBMPs should consider how to maximise benefits to Flood Risk Management. For example, advice to land owners on the management of surface water should include how to reduce or slow down run-off as well as pollution prevention advice.
Climate Change	In Wales, river basin management planning is a long-term process and addressing climate change risk needs to be incorporated throughout. European Common Implementation Strategy guidance on 'river basin management in a changing climate' guides member states to integrate climate change adaptation into each of the steps of river basin management planning, in particular in the assessment of pressures and selection of measures.

Theme	Measure
Drinking Water Protected Areas - surface water and groundwater	At risk DrWPAs (and all upstream water bodies) have been taken forward as 'candidate' Safeguard Zones for funded Asset Management Plan (AMP) Investigations to assess the sources of the raw water failure and to identify viable catchment solutions. Where catchment solutions are found to be possible, and stakeholder agreement can be assured, Safeguard Zones will be formally established for funded improvement measures. In England, the Environment Agency has established that in certain areas there is already sufficient evidence of environmental impact and has agreed the formal designation of Safeguard Zones. Consequently, in the Dee RBD, a combination of investigations and actions by the water companies will aim to identify the source of problems and also devise and implement actions to improve water quality.
Economically significant species (Shellfish Waters)	A range of measures are planned to endeavour to achieve the microbial standard in shellfish flesh as summarised in section 3.3. Plans are in place to deliver a better understanding of improvements required to achieve Shellfish Water Protected Area objectives and information to support cost benefits analysis. This will lead to updated plans to propose measures to achieve compliance with relevant objectives.
Recreational Waters (Bathing Waters)	Bathing Water profiles have been produced for all designated sites. They include details of the measures needed to achieve compliance with the revised standards that came into force in 2015.
Nutrient Sensitive Areas (Urban Waste Water Treatment Directive)	Measures have been identified to ensure that all relevant discharges from waste water treatment plants within the sensitive area have appropriate phosphorus or nitrogen emission standards.
Nutrient Sensitive Areas (Nitrate Vulnerable Zones)	Nitrate Vulnerable Zones (NVZs) have been designated and can be designated in areas where water quality is affected by nitrates from agricultural sources. Measures to reduce nitrate concentrations within NVZs include establishing a voluntary code of good agricultural practice and developing action programmes to reduce agricultural nitrate losses.
Natura 2000: Water dependent Special Areas of Conservation (SACs) and Special Protection Areas for Wild Birds (SPAs)	As part of the LIFE Natura 2000 Programme for Wales Natural Resources Wales developed Prioritised Improvement Plans (PIPs) for all Natura 2000 sites that are not currently in favourable condition (including water dependant sites/features). Thematic Action Plans have also been developed as part of the programme to address key strategic issues to Natura 2000 sites. Some of the measures from both PIPs and the Thematic Plans will take place during this cycle and will contribute to achieving objectives under the WFD.

Theme	Measure
	On cross-border sites with England, a single cross-border plan (Site Improvement Plan or SIP) has been produced in collaboration with its sister project the Improvement Programme for England's Natura 2000 Sites (IPENS).
Freshwater Special Areas of Conservation Common Standards Monitoring Guidance	In collaboration with other UK Agencies, we are updating existing guidance to ensure that this is based on the latest evidence base and improve consistency.
Natura 2000: Water dependent Special Areas of Conservation (SACs) and Special Protection Areas for Wild Birds (SPAs)	Natural Resources Wales is reviewing its Core Management Plans for Natura 2000 sites to ensure that the targets reflect the latest knowledge.
Acidification	In Wales, continue to improve awareness and implementation of the UK Forestry Standard Guidelines (including "Forests and Water" Guidelines), and Practice Guides (including "Managing forests in acid sensitive water catchments"), across the forest sector.
Acidification	In Wales, Natural Resources Wales delivers a prioritised Programme of Measures on the Welsh Government Woodland Estate to support delivery of WFD and protected area objectives.

3.3 Summary programme of national measures for significant water management issues

Section 2.3 summarised the most important issues we believe that threaten the current and potential future uses of the water environment. These have been grouped into significant water management issues for the planned Programme of Measures which are set out below however, there are significant relationships between the groups which will act to address particular pressures collectively. This is particularly relevant for the Dee Estuary and wider marine waters where nutrients and chemicals are the most significant pressures that require to be addressed. All measures in the terrestrial and freshwater environment that will lead to a reduction in nutrients and chemicals discharges, will lead to a reduction of those pressures in estuarine, coastal and marine waters. Furthermore, measures to reduce pollution from urban areas, rural areas, mines and sewage and waste water in combination with legislative measures taken for individual (e.g. tributyltin) or groups (e.g. Persistent Organic Pollutants) of chemicals will lead to a reduction in specific pollutants and priority substances to meet relevant objectives.

These are the significant statutory actions to ensure protection and improvement of the water environment across the RBD. A list of national and local measures are included on **Water Watch Wales.**

3.3.1 Physical Modifications

Who needs to be involved

Welsh Government, Defra, Natural Resources Wales, Environment Agency, Owners of the barriers to fish passage and coastal and flood defences, Local Authorities, NGOs – through partnerships and campaigns, River Restoration Centre, Wales Biodiversity Partnership, UK Technical Advisory Group (UKTAG).

By 2021

- Where modifications to the water environment are essential to society, for example navigation, public water supply, coastal defence or flood management, we want to mitigate harmful impacts as far as possible.
- We want to provide more coastal habitat by managed realignment to compensate for the impact of coastal squeeze.
- We want to ensure future modifications do not cause deterioration.
- We want to increase the extent of buffer zones and river side corridors alongside inland waters in order to make them more resilient to other pressures, including climate change.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Continue to implement the Hydropower guidelines including the production of a design and siting guide for developers of hydropower schemes	Natural Resources Wales	Natural Resources Wales
Deliver our statutory duties to maintain, improve and develop salmon, trout, freshwater and eel fisheries	Natural Resources Wales	Natural Resources Wales
Give strategic direction for fisheries work in Wales as set out in The Agenda For Change for Fisheries	Natural Resources Wales	Natural Resources Wales
Deliver the sustainable fisheries programme in Wales to secure improvements to fish habitat and migration	Natural Resources Wales	Natural Resources Wales
Revise Clearing the Waters guidance for dredging and disposal activities in coastal and estuarine waters	Natural Resources Wales	Natural Resources Wales
Identify opportunities to improve the water environment through existing programmes of work and scheme designs for Flood Risk Management	Natural Resources Wales	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Natural Resources Wales will seek opportunities and influence others to utilise natural flood risk management measures where appropriate.	Natural Resources Wales	Natural Resources Wales
Promote managed realignment and intertidal habitat creation through the National Habitat Creation Programme (NHCP).	Welsh Government, Natural Resources Wales	Natural Resources Wales
In water bodies designated as heavily modified due to flood and coastal protection, mitigation for Natural Resources Wales owned assets and activities will be reviewed and delivered on a prioritised basis.	Natural Resources Wales	Natural Resources Wales
Contribute to the delivery of priority Water Level Management Plans.	Natural Resources Wales	Natural Resources Wales
Contribute to research and development to identify best practice for managing hydromorphological pressures in the water environment.	Natural Resources Wales	Natural Resources Wales
Across Wales review of the impacts of unregulated activities targeting sea fisheries resources. This should consider the extent of activities, impacts of extractions and associated activities (e.g. access) on European Marine Site (EMS) features, and the recoverability of EMS features.	Natural Resources Wales	Natural Resources Wales
Grant flood defence consents under the Water Resources Act 1991 (some of which are soon to come under Environmental Permitting (England and Wales) Regulations 2010), having assessed new schemes or activities for impact on hydrology and morphology.	Government and agencies (Environment Agency, Natural Resources Wales), local government and internal drainage	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Make sure new abstraction and impoundment licences and environmental permits include protection for freshwater and migratory fish where relevant and use powers to ensure fish passes and screens are in place where appropriate.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Use marine licensing controls under the Marine and Coastal Access Act 2009 for activities including construction, alteration or improvement works, dredging and removing substances or objects from the sea or sea bed.	Government and agencies (Marine Management Organisation, Natural Resources Wales)	Environment Agency
Consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.	All sectors	Environment Agency
Licence dredging and works within harbour limits.	Navigation (harbour authorities)	Environment Agency
Work with partners and interested groups to identify appropriate mitigation measures to achieve WFD objectives in artificial and heavily modified water bodies. Mitigation measures are practicable steps that can be taken to mitigate adverse impacts from beneficial human activities such as impoundments for water resources, or structures that provide flood defence.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Consider the impact on hydromorphology when preparing spatial plans and local flood risk management plans, decisions on development management, new buildings and infrastructure.	Local government	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Use the e-learning site for flood risk management to access expert information on mitigation measures.	Navigation (ports and harbours), industry, manufacturing and other business, non-governmental organisations and central government	Environment Agency
Apply relevant Environment Agency and Natural Resources Wales' WFD compliance guidance, which covers a range of activities in estuaries and coasts.	All sectors	Environment Agency
Manufacturing and other business use the Environment Agency's or Natural Resources Wales' 'Hydropower development: guidance for run-of-river hydropower' or the 'Hydropower Guidance Note' in Wales.	Industry	Environment Agency
Use industry developed best practice guidance.	Navigation (ports and harbours), government and agencies (Environment Agency, Natural Resources Wales) and local government	Environment Agency
In England refresh the strategic overview of sea flooding and coastal erosion to better manage environmental risk in the long term using shoreline management plans.	Local government, central government (Environment Agency)	Environment Agency
In England explore effectiveness of existing approach to planning guidance on development in flood plains and coastal erosion risk areas.	Government and agencies (Environment Agency)	Environment Agency
In England review flood defence design standards for WFD and Natura 2000 sites.	Government and agencies (Environment Agency)	Environment Agency
In England carry out feasibility studies and designs for flood storage areas for environmental benefits	Government and agencies (Environment Agency)	Environment Agency

3.3.2 Managing pollution from sewage and waste water

Who needs to be involved

Welsh Government, Defra, Natural Resources Wales, Environment Agency, Water Industry, Local Authorities, Shellfish Industry, General public.

By 2021

- All sewerage systems are maintained and, where necessary, improved so they operate effectively and their impacts on the water environment, from catchment to coast are minimised.
- Solutions to combined sewage overflow problems that deliver multiple benefits are embedded in planning and development across Wales (e.g. water sensitive urban design, sustainable drainage schemes).
- Increase public awareness of the impacts of misconnections and disposal of harmful substances into sewerage systems (e.g. paint, oil, fats and garden chemicals).
- Maintain and improve Bathing and Shellfish Waters to promote a thriving tourism and shellfish aquaculture industry.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Natural Resources Wales have worked with water companies to develop a programme of investigations and improvements to sewage discharges in order to support delivery of WFD and Protected Area objectives in AMP6 (2015-20)	Natural Resources Wales, Water Industry	Natural Resources Wales
Work strategically with UK administrations to share best practice on preventing and resolving misconnections	Natural Resources Wales, Water Industry	Natural Resources Wales
National trials at sewage treatment works for removal of Phosphorus towards 0.1mg/l P to achieve WFD and Natura 2000 objectives	Water Industry	Natural Resources Wales
Welsh Government to develop a regulatory framework that encourages sustainable, innovative solutions to waste water management	Welsh Government	Natural Resources Wales
Water companies develop and deliver catchment management options that improve water quality and deliver additional ecosystem services	Water Industry	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Raise awareness of correct installation and operation of private sewage treatment systems	Natural Resources Wales	Natural Resources Wales
Reducing disposal of fat, oil and grease to sewers – awareness campaign to influence behaviour with leaflets, information packs	Water Industry	Natural Resources Wales
Implement revised methodology for assessment of hazardous pollutants within surface water discharges	Natural Resources Wales, Water Industry	Natural Resources Wales
Promote the use of sustainable drainage systems (SuDS) and provide guidance for integrating development and water planning	Natural Resources Wales	Natural Resources Wales
Develop and deliver a more focused approach to sewerage and drainage management.	Welsh Government	Natural Resources Wales
Grant and review environmental permits under the Environmental Permitting Regulations (England and Wales) 2010 to the water industry, manufacturing and other business and other sectors to protect the environment from pollutants such as chemicals, nutrients, bacteria, viruses, ammonia and organic material in discharged effluent	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Work with the water industry to develop a long-term strategy for sewerage to prevent deterioration of permitted discharges (for example, combined sewer overflows), resulting from pressures such as climate change, growth and ageing infrastructure; and to develop a long term strategy to reduce and minimise risks to the water environment from misconnected sewerage (foul sewage wrongly connected to surface water).	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Grant environmental permits for small sewage discharges in designated sensitive areas. In other areas, small sewage discharges (including septic tanks) are exempt from the need for a permit if they can meet a number of criteria.	Government and agencies (Environment Agency)	Environment Agency
Carry out a review of areas sensitive to eutrophication, in relation to the Urban Waste Water Treatment Directive (UWWTD) and make recommendations to Defra.	Government and agencies (Environment Agency)	Environment Agency
Enforce restrictions and bans on the use of certain chemicals	Government and agencies (Environment Agency and Health and Safety Inspectorate)	Environment Agency
Consider the impact on water quality in their preparation of spatial plans, decisions on spatial planning, development management, new buildings and infrastructure.	Local government	Environment Agency
Consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.	All sectors	Environment Agency

3.3.3 Manage pollution from towns, cities and transport

Who needs to be involved

Welsh Government, Defra, Natural Resources Wales, Environment Agency, Water Industry, Local Authorities, SuDs Approving Bodies, Industry, Manufacturing and other Business, NGOs through partnerships and campaigns, Maritime and Coastguard Agency relevant Authority Groups for European Marine sites, Ports and Harbours Sector, General public.

By 2021

- We want to minimise the negative impact of historic and future development on the water environment via our role as a land quality consultee in the planning process or, where the planning process is not applicable, by providing advice and assistance to local authorities with their contaminated land inspection strategy.
- We want to put the ecosystem approach at the centre of urban design and planning. By using sustainable drainage systems (SuDS), restoring the areas around rivers and coasts including the river banks, and the intertidal area, providing public green spaces, raising awareness and changing behaviour to improve the quality of life in the urban areas of Wales.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Welsh Government to introduce Fuel and Oil Regulations in Wales	Welsh Government	Natural Resources Wales
Natural Resources Wales working with Welsh Government and others to promote and embed the use of Water Sensitive Urban Design (WSUD) into planning policy and devolved building regulations	Welsh Government, Natural Resources Wales	Natural Resources Wales
The development of SuDS Approval Bodies to provide consistent advice for planning activities and maintenance of schemes	Welsh Government	Natural Resources Wales
Welsh Government to review legislative framework surrounding urban diffuse pollution	Welsh Government	Natural Resources Wales
Promote the implementation of SuDS (sustainable drainage systems) in new and existing developments, in both urban and rural areas to gain environmental, water quality, social and flood risk benefits	Natural Resources Wales	Natural Resources Wales
Influence planning authorities to require the use of SuDS and contribute to the implementation of appropriate SuDS technology.	Natural Resources Wales	Natural Resources Wales
Deliver priority actions set out in Natural Resources Wales' Diffuse Water Pollution Plan	Natural Resources Wales	Natural Resources Wales
Work in partnership to investigate misconnections including the targeting of hotspots. Include outreach work to increase public and community awareness and engagement	Natural Resources Wales, Water Industry	Natural Resources Wales
Use UK Government's ePIMS (Electronic property information system) to identify publicly owned industrial estates and depots within failing WFD water-bodies and work with Welsh Government and Local Authorities to resolve issues such that these sites aim to achieve best practice	Natural Resources Wales, Welsh Government, Local Authorities	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Assess the environmental impacts and reduce contamination from historic industrial and waste sites	Natural Resources Wales, Local Authorities	Natural Resources Wales
Use pollution incident data to target pollution prevention advice and activities.	Natural Resources Wales, Water Industry	Natural Resources Wales
Raise awareness of the benefits and successes of managing surface water run-off through SuDs (sustainable drainage systems) and rainwater harvesting in order to mitigate flooding and pollution.	Natural Resources Wales, Water Industry	Natural Resources Wales
Implementation of SuDS (sustainable drainage systems) Code of Practice. Comply with published advice for operators on sustainable drainage systems	Natural Resources Wales	Natural Resources Wales
Advise small and medium sized businesses on pollution prevention	Natural Resources Wales, Water Industry	Natural Resources Wales
Improve understanding of the origins and solutions to diffuse pollution by carrying out local investigations (e.g. Clear Streams)	Natural Resources Wales, Water Industry	Natural Resources Wales
Develop evidence base to support management of marine litter and marine litter strategy.	Natural Resources Wales & Welsh Government	Natural Resources Wales
Develop and implement legislation to support sustainable drainage solutions.	Welsh Government	Natural Resources Wales
We will publish interim national standards on an advisory basis until we commence Schedule 3 of the Flood and Water Management Act 2010.	Welsh Government	Natural Resources Wales
We will look at options to implement Schedule 3 of the Flood and Water Management Act 2010, which requires new developments to include SuDS features that comply with national standards.	Welsh Government	Natural Resources Wales
We will undertake a review of current drainage ownership and related legislation, with a particular emphasis on surface water and orphan assets and on drainage misconnections.	Welsh Government	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
We will support owners of private sewerage systems by working with Natural Resources Wales and other partners to provide guidance on septic tank maintenance. We will also engage with local authorities who have a duty to ensure that owners of private sewerage systems maintain them to prevent a threat to public or environmental health.	Welsh Government	Natural Resources Wales
We will consult on and implement revised guidance for sewerage schemes for rural communities under Section 101A of the Water Industry Act 1991 and consider legislating to simplify the process.	Welsh Government	Natural Resources Wales
Control the release of chemicals, to the water environment, at source i.e. production and use, through the implementation of European legislation, including the Registration, Evaluation, Authorisation & restriction of Chemicals Regulations (REACH), Persistent Organic Pollutants regulation and Sustainable Use of Pesticides Directive.	Welsh Government, Health & Safety Executive, Natural Resources Wales	Natural Resources Wales
Use anti-pollution works powers (including service of notices) under the Water Resources Act 1991 to prevent or clean up small scale pollution, for example, ensuring storage tanks are bunded or repairing misconnections.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Comply with existing regulations (for example, the Environmental Permitting (England and Wales) Regulations 2010) to make sure that chemicals are properly managed and surface water drainage is appropriately used and maintained.	Industry, manufacturing and other business	Environment Agency
Use sustainable drainage systems to remove silt and minimise other chemicals to prevent polluting run-off.	Industry, manufacturing and other business (construction industry)	Environment Agency
Consider urban diffuse pollution pressures when developing spatial plans, determining planning	Local government	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
applications and designing and constructing local authority owned buildings, infrastructure and grounds. These should incorporate sustainable drainage schemes and water efficiency measures where practical and affordable.		
Incorporate green and blue infrastructure into regeneration schemes where possible.	Local government	Environment Agency
Reduce the impact of pesticides by using Amenity Assured registered weed control contractors under the Voluntary Initiative.	Local government and industry, manufacturing and other business	Environment Agency
Apply the memorandum of understanding agreement covering the strategic road network and remediation of high risk outfalls.	Government and agencies (Environment Agency) and Highways England	Environment Agency
Operate under the terms of a memorandum of understanding covering contaminated land, water discharge and use of pesticides.	Government and agencies (Environment Agency, Natural Resources Wales) and urban and transport (Network Rail)	Environment Agency
Consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.	All sectors	Environment Agency
Follow codes of conduct and non-statutory estuary and coastal management plans to protect and improve the water environment in specific locations.	Industry manufacturing and other business, local government, navigation and general public	Environment Agency
Work with industry, manufacturing and other business (Local Enterprise Partnerships), and non-governmental organisations (catchment partnerships and Local Nature Partnerships) to develop joint improvement programmes.	Local government	Environment Agency
Work in partnership with all sectors to help identify where money from the European Growth Programme is	Industry, manufacturing and other business (Local Enterprise Partnerships)	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
invested to develop local economies and enhance the environment.		
Operate under the terms of a memorandum of understanding covering contaminated land, water discharge and use of pesticides.	Government and agencies (Environment Agency, Natural Resources Wales) and urban and transport (Network Rail)	Environment Agency
Investigate and deal with misconnections, for example, through the National Misconnections Strategy group and in accordance with Defra's diffuse urban action plan and Natural Resources Wales' Diffuse Pollution Plan.	Government and agencies (Environment Agency, Natural Resources Wales and water industry)	Environment Agency
Use planning conditions, legal agreements and enforcement powers under the Town and Country Planning Act 1990 and the Planning (Wales) Bill to prevent or stop pollution from developments, roads and other infrastructure.	Local government	Environment Agency
Make sure that new developments address potential pollution problems by using sustainable drainage systems to manage surface water.	Local government	Environment Agency
Use powers under the Building Act 1984 to rectify misconnected waste water pipe work, and statutory nuisance powers under the Environmental Protection Act 1990 to stop water pollution from unauthorised operations such as transient car wash operations.	Local government	Environment Agency

3.3.4 Manage pollution from rural areas

Who needs to be involved

Welsh Government, Defra, Natural Resources Wales, Environment Agency, Water Industry, Industry, Manufacturing and other Business, Agriculture and rural land management, NGOs through partnerships and campaigns, Academia, Local Authorities, Relevant Authorities Groups for European Marine Sites, Wales Biodiversity Partnership, General public.

By 2021

- We want to strengthen regulatory, financial and operational mechanisms to support a sustainable agricultural sector that protects the water environment, from

catchment to coast, and helps deliver the full range of ecosystem services that provide financial, social and ecological benefits to Wales.

- Appropriate new woodland creation and forestry management that benefits the water environment, people through outdoor recreation and delivers ecosystem services such as reduced diffuse pollution, reduced flood flows, clean drinking water, habitat for fish and wildlife, and shade in river margins to mitigate the impacts of climate change.
- In Wales, where necessary we will propose designation of further areas as Nitrate Vulnerable Zones in order to protect surface and groundwater quality.
- For those groundwater dependent wetlands that are in a poor ecological condition as a result of high nutrient groundwater inputs we will encourage local changes in catchment management to mitigate and if possible prevent.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Monitor, investigate and resolve the source of pollution in Drinking Water Protected Areas	Natural Resources Wales, Environment Agency, Water Industry	Natural Resources Wales
Welsh Government to review legislative framework surrounding rural diffuse pollution	Welsh Government	Natural Resources Wales
Ensure the Rural Development Plan supports sustainable agricultural practices to achieve WFD and Protected Area objectives	Welsh Government, Natural Resources Wales	Natural Resources Wales
Natural Resources Wales work in partnership with key stakeholders (e.g. Farming and Forestry Connect, farming unions) to develop and deliver targeted advice and guidance to land managers	Agriculture and rural land management, Natural Resources Wales	Natural Resources Wales
Natural Resources Wales delivers a prioritised Programme of Measures on the Welsh Government Woodland Estate to support delivery of WFD and Protected Area objectives	Natural Resources Wales	Natural Resources Wales
Continue to improve awareness and implementation of the UK Forestry Standard Guidelines (including “Forests and Water” Guidelines), and Practice Guides, across the forest sector.	Natural Resources Wales	Natural Resources Wales
Welsh Government target Glastir Woodland Management incentives	Welsh Government	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
to deliver improvements to the water environment		
Welsh Government implement the Nitrates Directive as appropriate	Welsh Government	Natural Resources Wales
Deliver Water Awareness Events to staff and contractors who work on Welsh Government Woodland Estate (and in private forestry) to cover water management on operational sites.	Natural Resources Wales	Natural Resources Wales
Natural Resources Wales to promote relevant measures for tree planting, new woodland creation and woodland management measures that are consistent with 'Woodland for Water: Woodland measures for meeting Water Framework Directive objectives' 2011	Natural Resources Wales	Natural Resources Wales
Use the Small Business Research Initiative (SBRI) innovation programme to develop new solutions to environmental issues.	Natural Resources Wales	Natural Resources Wales
Review the implementation of Statutory Management Requirements (SMR) and Good Agricultural Environmental Condition (GAEC) to strengthen the drivers for best agricultural practice - ensure that there is parity in terms of the monitoring for and consequences of practices causing diffuse pollution (within the catchments of Natura 2000 sites) with SMR.	Welsh Government	Natural Resources Wales
Strengthen links between agri-environment options and Natura 2000 objectives on farms within catchments which are currently impacting on Natura 2000 sites	Welsh Government	Natural Resources Wales
Review and strengthen the effectiveness and enforcement of relevant legislation and policy (gap analysis) to improve its ability to deal with diffuse water pollution	Welsh Government	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Investigation to identify where Natura 2000 sites downstream of forestry may benefit from improvements (i.e. riparian vegetation improvements, forest drain realignment and roadside drain disconnection from watercourses) to meet current UKFS standards (Forestry Standards), in order to minimise any risk of diffuse pollution and acidification.	Natural Resources Wales	Natural Resources Wales
Undertake a pilot investigation to identify sources of diffuse pollution within a Marine Natura 2000 site and recommend target actions to address the diffuse issues.	Natural Resources Wales	Natural Resources Wales
Natural Resources Wales and our own Agricultural Advisory Services to work with landowners to develop a common understanding of diffuse pollution and how they can help to prevent it through improved land management.	Welsh Government	Natural Resources Wales
Encourage catchment scale community action through area statements developed by Natural Resources Wales and other co-operative groups aiming to improve water quality in their area.	Welsh Government	Natural Resources Wales
Check and ensure compliance against environmental permits under the Environmental Permitting (England and Wales) Regulations 2010 and against requirements of a wide range of environmental legislation.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Comply with permits granted under the Environmental Permitting (England and Wales) Regulations 2010. Permitted activities include some discharges to groundwater, spreading of waste to land for agricultural	Agricultural and rural land management (farm businesses)	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
benefit, pig and poultry units over a certain size and safe recovery of agricultural waste.		
Comply with the action programme measures within the Nitrate Pollution Prevention Regulations 2015 in all nitrate vulnerable zones.	Agricultural and rural land management (farm businesses)	Environment Agency
Comply with the requirements of the Control of Pollution (Silage Slurry and Agricultural Fuel Oil) Regulations 2010 (SSAFO).	Agricultural and rural land management (farm businesses	Environment Agency
Ensure that polluting matter is not present at a place where it has or is likely to enter controlled waters to avoid enforcement action under Water Resources Act 1991.	Agricultural and rural land management (farm businesses	Environment Agency
Advise farmers on general requirements of cross compliance and regulations required under the WFD.	Government and agencies (Farming Advice Service)	Environment Agency
Provide site-level advice on the specific requirements of regulations.	Government and agencies (Environment Agency, Natural England and Natural Resources Wales)	Environment Agency
Provide advice on the specific requirements of regulation that relate to designated sites, and can prevent or stop potentially damaging activities.	Government and agencies (Natural England, Natural Resources Wales)	Environment Agency
Deliver advice and training to farmers in some priority catchments through an approach such as Catchment Sensitive Farming and Glastir.	Government and agencies (Natural England, Natural Resources Wales)	Environment Agency
Review the effectiveness of measures within catchments, and where there is sufficient need, consider whether further action should be proposed.	Government and agencies (Natural England, Natural Resources Wales)	Environment Agency
Comply with the UK Forestry Standard, the government's approach to sustainable forestry.	Government and agencies (Forestry Commission, Natural Resources Wales)	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Use planning conditions, legal agreements and enforcement powers under the Town and Country Planning Act 1990 to prevent or stop pollution from rural developments, roads and other rural infrastructure.	Local government	Environment Agency
Consider the impact of pollution when preparing spatial plans, minerals and waste plans and making decisions on development management, new rural buildings and rural infrastructure.	Local government	Environment Agency
Meet cross compliance requirements of the Basic Payment scheme funded by the Common Agricultural Policy.	Agricultural and rural land management (farm businesses)	Environment Agency
Voluntarily participate in Countryside Stewardship and Countryside Productivity schemes to prevent deterioration, improve water quality and reduce flood risk.	Agricultural and rural land management (farm businesses)	Environment Agency
Participate in sector led approaches including farm assurance and the Campaign for the Farmed Environment schemes	Agricultural industry manufacturing and other business	Environment Agency
Use opportunity mapping to identify and promote locations where woodland creation can achieve multiple benefits for the environment.	Government and agencies (Forestry Commission, Environment Agency and Natural Resources Wales)	Environment Agency

3.3.5 Managing invasive non-native species (INNS)

Who needs to be involved?

Dealing with INNS is a collective responsibility involving all sectors and land owners including Welsh Government, Natural Resources Wales, Environment Agency, Natural England, Forestry Commission, Industry, Manufacturing and other Business including relevant retailers, Navigation, Agriculture and rural land management, NGOs through partnerships and campaigns, Academia, UKTAG, GB Non-Native Species Secretariat (GBNNSS), Welsh local records centres, Wales Biodiversity Partnership (Invasive Non-Native Group), General public.

By 2021

- We want to prioritise actions to slow down or prevent the spread of existing species and eradicate these or new introductions where possible to do so.

- We also want to minimise the risk posed by INNS generally through improved biosecurity and improved local information on INNS distribution and impact.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Work with partners and support the development of new and innovative solutions, such as AquaWales and Aquainvade led by Swansea University to investigate early detection and eradication of freshwater INNS and aquaculture; and the Small Business Research Initiative innovation programme.	Natural Resources Wales	Natural Resources Wales
In-line with the regulation implemented by Defra for England under the Wildlife & Countryside Act, ban the sale of five invasive non-native aquatic plants in Wales: floating pennywort, floating water primroses, New Zealand pigmyweed, parrot's-feather, water fern	Welsh Government	Natural Resources Wales
Develop and promote adoption of codes of conduct and biosecurity initiatives, and raise awareness of impacts of INNS across marine, terrestrial and freshwater Natura 2000 habitats and species.	Welsh Government	Natural Resources Wales
Ensure that risks to Natura 2000 habitats and species posed by INNS are managed by integrating biosecurity best practice into appropriate regulatory regimes.	Natural Resources Wales	Natural Resources Wales
Support research into effective control and eradication methods for INNS (marine, terrestrial and freshwater) with significant impacts on Natura 2000.	Welsh Government	Natural Resources Wales
Use the Keeping and Introduction of Fish Regulations 2015 and Wildlife and Countryside Act 1981 to control movements of invasive non-native species. A change in legislation, implemented in April 2014, introduced a ban on selling 5 high-risk plant species including water primrose and floating pennywort.	Government and agencies (Environment Agency, Natural England and Natural Resources Wales)	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Is aware of the Wildlife and Countryside Act 1981 and does not allow certain species to escape into the wild.	Agriculture and rural land management	Environment Agency
Use policies within emerging marine plans and marine policy statements to support controlling and mitigation against invasive non-native species.	Government and agencies (Marine Management Organisation, Welsh Government and Natural Resources Wales)	Environment Agency
Implement EU Regulation 1143/2014 on Invasive Alien Species. Implementation of the regulation is gradual and will take place throughout the period of this plan.	Government and agencies	Environment Agency
Work together to develop and implement codes of practice to reduce the spread of invasive non-native species.	All sectors	Environment Agency
Implement rapid responses to contain and eradicate new invasions where practicable. This measure is aided by Species Control Agreements and Orders in the Wildlife & Countryside Act 1981 as amended by the Infrastructure Act 2015.	Government and agencies (includes Environment Agency, Defra, Welsh Government and Natural Resources Wales), non-governmental organisations (angling, conservation and recreation) and navigation	Environment Agency
Manage invasive non native species at selected protected sites as appropriate.	Government and agencies (Natural England and Natural Resources Wales)	Environment Agency
Can form Local Action Groups to deal with invasive non-native species and raise awareness.	All sectors	Environment Agency
Work in partnership to influence recreational users to slow the spread of invasive non native species by promoting 'Check, Clean, Dry' actions.	Government and agencies (includes Environment Agency, Natural England and Natural Resources	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
	Wales), non-governmental organisations (including angling, conservation and recreation), local government and navigation	
Raise public awareness of the risk of transferring non-native species accidentally and of preventative approaches.	Government and agencies (Defra and Welsh Government) and all sectors	Environment Agency
Help the non-native species secretariat co-ordinate alert systems, species records and a central repository for information, including public online and smart phone submission of species records.	Central government	Environment Agency
Implement the updated Great Britain strategy on invasive species, which includes species impact risk assessments, action plans and rapid response.	Government and agencies (includes Environment Agency, Natural England and Natural Resources Wales), non governmental organisations (including angling, conservation and recreation)	Environment Agency

3.3.6 Managing pollution from mines

Who needs to be involved

Welsh Government, Coal Authority, Natural Resources Wales, Local Authorities, Landowners, NGOs through partnerships and campaigns, Academia.

By 2021

- We want to mitigate the impacts of abandoned mines on the water environment through a strategic work programme across Wales. It will take decades to address all the issues and we will prioritise actions that deliver the best ecological, social and economic outcomes for society's investment.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
A programme to deliver appropriate treatment at a small number of high priority, high benefit metal mines	Natural Resources Wales, Coal Authority	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
identified under the Metal Mine Strategy for Wales		
Research programme to look at the remediation of spoil heaps (coal) using woodland and habitat creation	Natural Resources Wales	Natural Resources Wales
Coal Authority minewater preventative and remediation programme	The Coal Authority	Natural Resources Wales
Implementation of best practice controls and remediation at abandoned coal mines. DECC funded prioritised (phased) programme	The Coal Authority	Natural Resources Wales
Implementation of best practice controls and remediation at abandoned metal mines	Natural Resources Wales, Coal Authority	Natural Resources Wales
Continue to investigate minewater impact and develop remediation plans in accordance with the Metal Mines Strategy for Wales	Natural Resources Wales, Coal Authority	Natural Resources Wales
Investigate discharges from abandoned metal, and other non-coal mines in accordance with the Metal Mine Strategy for Wales. Prioritise for inclusion in national agreement with relevant mines partner organisations	Natural Resources Wales, Coal Authority	Natural Resources Wales

3.3.7 Changes to natural flow and levels of water

Who needs to be involved

Welsh Government, Defra, Natural Resources Wales, Environment Agency, Water Industry, Industry, Manufacturing and other Business, Agriculture and rural land management, NGOs through partnerships and campaigns, Wales Biodiversity Partnership, UKTAG, General public.

By 2021

- We want to ensure current and future abstraction licences protect the water environment.
- We want to encourage sustainable land use patterns in urban and rural environments that reduce runoff from rainfall.
- We want to deliver interventions such as in-channel habitat improvement that mitigate the impacts of abstraction on the water environment. We want to improve water use efficiency to reduce the need for additional abstraction in the future.
- We will implement the new groundwater abstraction regime when the new Regulations are in force.

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Welsh Government to review the abstraction licensing system to inform future policy in relation to water resource management	Welsh Government	Natural Resources Wales
Bring currently exempt water abstractions within licence (New Authorisations)	Welsh Government, Natural Resources Wales	Natural Resources Wales
Investigations to assess the environmental impacts of impoundments and possible mitigation measures	Natural Resources Wales	Natural Resources Wales
Prioritise solutions to tackle water body failures due to abstraction	Natural Resources Wales	Natural Resources Wales
In line with the Welsh Government's Water Strategy for Wales, seek ways to reduce waste and improve water efficiency	Welsh Government	Natural Resources Wales
Contribute to maintenance of, or restoration to, favourable conservation status on Natura 2000 Protected Areas through undertaking review of consents	Natural Resources Wales	Natural Resources Wales
Dŵr Cymru/Welsh Water customers special offer on water butts (subject to funding) to encourage recycling of rainwater for garden watering and therefore help to reduce demand during dry periods	Water Industry	Natural Resources Wales
Target land management measures through Glastir agri-environment scheme and Section 15 agreements to mitigate diffuse pollution from agriculture and reduce impact of drainage to enhance biodiversity and achieve favourable conservation status.	Natural Resources Wales	Natural Resources Wales

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Revise Glastir to better support and prioritise Natura 2000 wetlands/peatlands conservation management and water level management.	Welsh Government, Natural Resources Wales	Natural Resources Wales
Complete actions to address abstraction licences identified in the Review of Consents process as having an adverse impact on site integrity.	Natural Resources Wales	Natural Resources Wales
Support the delivery of the Welsh Government National Peatland Restoration Programme.	Natural Resources Wales	Natural Resources Wales
Grant licences under the Water Resources Act 1991 to regulate how much water is taken from rivers, lakes estuaries and groundwater. The Environment Agency and Natural Resources Wales reviews the sustainability of time-limited abstraction licences as they expire and the licence holders seek replacement licences. The Environment Agency and Natural Resources Wales will take action to curtail time-limited licences that are not sustainable. Replacement licences are granted on a sustainable basis in line with water body objectives.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Change or revoke permanent licences to protect the environment from actual or potential damage, including serious damage under the Water Resources Act 1991.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Work to bring a number of currently exempt abstraction activities into regulation following public consultation and formulation of government policy and legislation. This includes dewatering, transfers for inland navigation and previously exempt irrigation activities. Some reductions in currently exempt abstractions that are causing serious damage to the environment may be necessary. This	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
may result in an improvement in groundwater and flow in affected water bodies.		
Consider the Marine Policy Statement and marine plans in decisions that affect marine and coastal environments. These plans set out the strategic framework for sustainable development of the sea.	All sectors	Environment Agency
Identify water resource pressures due to abstraction and restore sustainable flows and groundwater levels through changes to abstraction licences and physical changes to river channels to improve flows. New licences must be sustainable and prevent future impacts.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Implement the Restoring Sustainable Abstraction (RSA) programme. This programme identified, investigated and is solving environmental risks or problems caused by unsustainable licensed water abstraction. The Environment Agency and Natural Resources Wales take action to curtail abstraction licences that have been identified as causing an environmental problem under the RSA programme. The Environment Agency and Natural Resource Wales aim to complete the programme by the end of March 2020.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Complete statutory water resource management plans, setting out how supplies and demand for water will be managed over a 25 year period, and takes action to restore sustainable groundwater and flows where impacts due to abstraction have been confirmed.	Water industry	Environment Agency
Produce drought plans to make sure that public water supplies are maintained while minimising the environmental impact of drought.	Water industry	Environment Agency

Description	Who leads	Who Reports (Natural Resources Wales/ Environment Agency
Produce abstraction licensing strategies to help ensure a consistent approach to managing water resources and balancing the needs of water users and the environment.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Revoke unused licences where the licence holder does not have a reasonable need for the water.	Government and agencies (Environment Agency, Natural Resources Wales)	Environment Agency
Carries out adaptive management trials to determine the best measures for improving heavily modified water bodies used for water supply.	Water industry	Environment Agency
Take up or encourage water efficiency measures, including water industry work on metering, leakage, audits, providing water efficient products, promoting water efficiency and education.	All sectors	Environment Agency
Set out local plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of Schedule 1 to the Building Regulations 2010.	Local government	Environment Agency
Implement tighter levels of water efficiency, as proposed by changes to the Building Regulations.	Industry manufacturing and other business	Environment Agency
Manage demand for water and use water more efficiently to have a sustainable water supply for the future.	Agriculture and rural land management	Environment Agency
Commission water cycle studies to inform spatial planning decisions around local water resources.	Local government	Environment Agency

3.4 Summary programme of local measures

These measures encourage local action to protect and enhance the water environment. These allow some flexibility to target actions through working with partners with an interest in the water environment. A list of national and local measures are included on **Water**

Watch Wales. As with national measures there are significant relationships between groups which will act to address particular pressures collectively.

Generic Local measures

- Actions to control or manage diffuse source inputs: reduce diffuse pollution at source:
    1. Natural Resources Wales and Environment Agency staff undertake agriculture site visits
    2. Soil management workshops
    3. Mapping of sewage sludge deployments
    4. Work on misconnections
- Actions to control or manage point sources: reduce point source pollution at source
    1. Targeted Water Quality inspections
    2. Combined sewer overflow (CSO) inspections
    3. Industrial estate pollution prevention
- Actions to improve regulated flows: Appropriate management of water releases
- Actions to improve modified habitat: Removal or easement of barriers to fish migration
- Actions to improve modified habitat: Improvement to condition of channel/bed and/or banks/shoreline

Specific Local measures

These will include some of Natural Resources Wales and the Environment Agency's key programmes of work such as;

- Working in partnership with the Water Companies to look at the potential for phosphate removal. These water bodies are likely to require other actions to tackle other sources of both diffuse and point. Source pollution within the catchment.
- Working with Water Companies on actions identified from the AMP6 Event Duration Monitoring programme.
- Ongoing Dee pollution monitoring. The Water Companies (Dŵr Cymru, Dee Valley Water and United Utilities), co-fund an intensive monitoring programme of river water quality, working closely with Natural Resources Wales and the Environment Agency.
- United Utilities and Dee Valley Water have partnered with the Welsh Dee Rivers Trust to fund two Catchment Advisors over the next four years to work in the Upper and Middle Dee catchments. The advisors will work within the community to raise awareness of how pesticides and nutrients can enter the river and how this can lead to increased costs and difficulties for drinking water treatment.
  The advisors will bring practical help, in the form of small grants funded by the water companies, to improve water quality. These can cover items such as fencing out watercourses, training for farmers, soil samples, slurry and silage analysis, track improvements, sprayer equipment testing and MOT, 1:1 farm advice, pesticide amnesties. The aim is to engage with many sectors not just farmers including anglers, gardeners, householders and smallholders to raise awareness and take action to protect the water environment. The advisors will also work closely with other organisations such as the NFU, Environment Agency & Natural Resources Wales, Snowdonia National Park Authority, English Nature, Wildlife Trusts, Woodland Trust, farm advisors, agronomists and local councils.

- Actions required for Protected Area drivers such as NVZs where actions are needed on sources of both point and diffuse source pollution.
- Actions to prevent deterioration. For example action on diffuse sources in rural water bodies that are borderline for phosphate failures.
- Actions to support partners in their work.
- Actions to improve modified habitats such as the removal or easement of barriers to fish migration in water bodies that do not necessarily fail for the fish element but require habitat restoration.
- Support Water Companies in their Drinking water Protected Area investigations (and potential requirement for follow up actions).

The Tidal and Middle Dee catchment partnerships have also identified the following projects and partnerships;

- The Worthenbury and Wych Rural Diffuse Pollution Project aims to reduce phosphates and other pollutants (such as nitrates, pesticides and sediment) from entering four water bodies, and to improve their ecological status by 2021. The total cost of this project to date is £146,000 (including in-kind contributions), of which £70,000 has been funded by United Utilities and Dŵr Cymru/Welsh Water. Natural Resources Wales joint working partnership contributed to this in 2015/16 and will extend this work to the Emral brook in 2016.
- The Aldford Brook Rural Diffuse Pollution Project has received £39,000 support from Defra's Catchment Partnership Action Fund and Partner Led Fund to target diffuse agricultural pollution in a deteriorating water body. The project uses the Partnership's established rural diffuse pollution project template but extends it further by aiming to increase riparian biodiversity, identify sites to reduce the impact of invasive non-native species and also identify opportunities to attenuate flow.
- Following a report into the Dee SSSI, Natural England funded survey work on the Ceiriog catchment, resulting in the identification of 13 habitat improvement schemes. One, involving 1.1km of riverbank, has been funded by the Environment Agency and completed.
- Love my Estuary project. A community engagement project which raises awareness between stakeholders of their impact on the water environment and its wildlife and facilitates improvement of the water environment through identifying and tackling pollution issues.
- West Kirby Outfall project. Reduce pollution to the West Kirby Designated Bathing Water by identifying and solving the issue of contaminated surface water discharging onto the beach. The Environment Agency, United Utilities and Wirral Borough Council have worked in partnership.
- River survey work is being organised on the River Alyn, from Mold to the Dee Confluence, with river walks undertaken by volunteers. This will identify issues, such as barriers to migratory fish, bank erosion and lack of in-stream habitat, which could be addressed with future funding bids.

Other partnership work/project ideas in addition to those from Tidal and Middle Dee include;

- A catchment-wide partnership initiative which aims to coordinate the control and monitoring of Invasive Non-Native Species (INNS) within the Dee catchment to ensure a joined up approach to INNS management is delivered. The project will also work to raise awareness of invasive non-native species and biosecurity within the Dee catchment to ensure our native wildlife is protected for the future.
- The Big Dee Day is an annual initiative coordinated by Flintshire Country Council and involves other local authorities around the Dee estuary supporting volunteer and other groups and organisations in celebration of the River Dee with a focus on cleaning up the environment.
- The Invasion is a spin off from Big Dee Day and takes place in July encouraging people to come together and tackle invasive non-native species in the Dee catchment.
- Restoration of Mill Brook, Tattenhall – The Environment Agency is working with the Tattenhall Wildlife Group and the Bolesworth Estate to restore 240 metres of Mill Brook, upstream of Tattenhall near Chester. Grazing marsh, ponds and reedbed priority habitats will also be created. Alternative mitigation to stocking. Investigating and delivering, where prioritised, increased access, quantity and quality of spawning areas for salmonid fish, initially focusing in the upper part of the Dee catchment.
- Natural Resources Wales is working with those with an interest in the upper Dee catchment to identify potential causes of low fish abundance, prioritise investigative work and deliver solutions where necessary.
- Alyn/Wheeler living landscapes project – Wildlife Trust, cross border with the Western Wales RBD

4. Environmental Objectives and outcomes

The River Basin Management Planning process is about using our evidence base to develop a Programme of Measures and understanding what this means in terms of achieving WFD objectives within the planning timeframe. In line with the RBMP guidance we have set objectives and identified measures for every water body.

Current status and environmental objectives for each water body, can be accessed at **Water Watch Wales**. Explanations of the justifications for alternative objectives can be found in the **Annex/ Part 2.**

4.1 Water body objectives

For surface waters, objectives are set for ecological and chemical status. For artificial or heavily modified water bodies objectives are set for ecological potential and chemical status. For groundwater objectives are set for quantitative and chemical status. Water body objectives consist of 2 pieces of information: the status (for example, good) and the date by which that status is planned to be achieved (for example, by 2021).

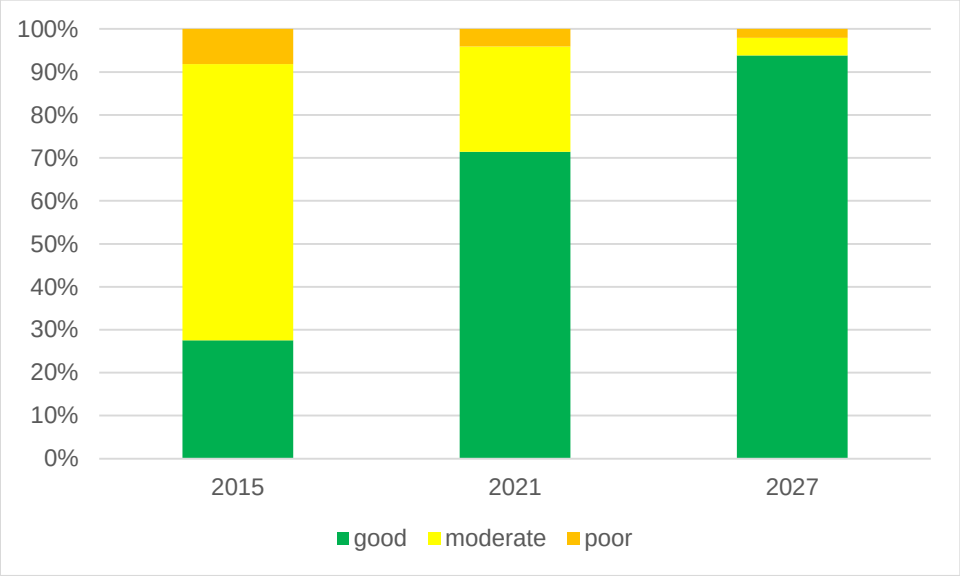
The WFD alternative objectives and defences can only be used in relation to the standards and objectives arising from the mechanisms of the WFD itself, not in relation to standards or objectives arising from other EU legislation. Table 9 summaries these justifications.

Table 9. Summary of justifications of alternative objectives. A water body may have more than one justification.

Justifications	Number of water bodies
Technically infeasible - cause of adverse impact unknown.	13
Ecological recovery time	7
Background conditions	0
Technically infeasible - no known technical solution is available.	5
Disproportionately costly – unfavourable balance of costs and benefits.	1
Disproportionate burdens (England only)	7

There are 28 water bodies (29%) for which we are proposing an alternative objective (i.e. other than good by 2021). Figure 5 shows current overall status in 2015 and the outcomes by 2021 and 2027 if all feasible and cost-beneficial measures are put in place. In 2015, 27 water bodies which is equivalent to 28% are in good or better overall status. 70 water bodies which is equivalent to 71% have an objective of good status or better to be achieved by 2021 however, there is a large degree of uncertainty that such a significant increase in achieving good status or better will be observed by 2021 as outlined in section 4.1. In Wales we plan to improve compliance with good status by delivering measures locally in an integrated way to achieve environmental improvements in WFD water bodies and Protected Areas. This will include targeting an improvement to good status in 7 water bodies (equivalent to 7%) in WFD compliance by 2021.

Figure 5. Percentage overall water body status and objectives for 2015, 2021 and 2027



Outcomes and uncertainty

There is a large degree of uncertainty in terms of delivering the required measures and environmental improvements by 2021. The main factors are:

- uptake of voluntary measures, in particular when working with multiple land managers across a catchment
- available funding and resources beyond 2015/16. Uncertainty increases as we project forward
- understanding of ecological recovery. We have a limited understanding of how and when the ecology will respond following delivery of measures.

In Wales, we believe that we can maximise our outcomes by developing our approach integrated natural resources management and working at the local catchment level.

We are already working with strategic and local partners to deliver improvements (e.g. Water Industry programme, Coal Authority and eNGOs) and looking for opportunities to 'join up' actions to deliver benefits to the environment, economy and society of Wales. We have provided local information on planned and resourced measures on Water Watch Wales in order to help facilitate partnership work. We plan to review delivery programmes with partners in order to refine and align co-delivery.

Catchment partnerships in the Dee RBD are a major initiative to drive local action to protect and enhance the water environment. The partnerships consist of a wide range of groups with an interest in the water environment, including local government, angling interests, wildlife organisations, water companies, land managers, business representatives and government agencies. Actions identified by the Tidal and Middle Dee catchment partnership are described in Section 3.4. Further information on the partnership is available at: http://www.welshdeetrust.com/

4.2 Protected Area compliance and objectives

Protected areas are a priority for action to ensure they achieve their objectives and protect the benefits that they provide. The extent to which protected areas are compliant with their current standards and objectives is summarised below;

Drinking Water Protected Areas

In Wales, the objectives for drinking water protected areas are to ensure that:

- under the water treatment regime applied, the drinking water produced meets the standards of the Drinking Water Directive plus any Wales specific requirements to make sure that drinking water is safe to drink
- the necessary protection to prevent deterioration in the water quality in the protected area in order to ensure that existing purification treatment does not have to be significantly increased in future

In England, the objectives for drinking water protected areas are to ensure that:

- under the water treatment regime applied, the drinking water produced meets the standards of the Drinking Water Directive plus any UK requirements to make sure that drinking water is safe to drink
- the necessary protection to prevent deterioration in the water quality in the protected area in order to reduce the level of purification treatment required

These objectives are at risk when increasing pollution levels caused by human activity could lead to more treatment being needed in the future and where measures are needed to reduce pollution. For groundwater bodies only, not meeting these objectives may also mean the water body is classed as poor chemical status. Safeguard zones are non statutory areas identified for 'at risk' abstractions where land use management practices and other activities can affect the quality of the untreated water. Measures to prevent and reduce pollution are targeted within these zones. Table 10 summarises those at risk (surface water) and at poor status (groundwater).

Table 10. Drinking water protected areas current status and at risk

Water body type	Number of drinking water protected areas	% at risk (surface water)/% at poor status (groundwater
Surface water	18	39
Groundwater	4	0

Economically significant species (shellfish waters)

Some areas of estuarine and coastal waters are designated as shellfish waters. Shellfish waters are areas requiring protection or improvement to support shellfish life and growth in order to contribute to the high quality of shellfish for people to eat. Since 2013 the requirements for Shellfish Water Protected Areas (SWPA) has transferred to the WFD. There are 2 shellfish protected areas in the Dee RBD. Compliance with the standards during the first cycle is reported in the **Progress Report**. There is a significant amount more understanding of the behaviour of microbial pathogens in the estuarine and coastal environment and interactions with Shellfish required before we can be confident of

achieving and maintaining the microbial standard. For this reason the objective to endeavour to achieve the microbial standard is extended to 2027. Table 11 summarises the shellfish water protected area objectives.

Table 11. Shellfish water protected areas objectives

Number of shellfish waters	Objective	Current status 2015 (achieving compliance)	Achieving objective by 2021	Achieving objective by 2027
2	Endeavour to achieve the shellfish flesh guideline standard	0	0	2

Recreational waters (bathing waters)
Bathing waters are designated waters and beaches that large numbers of bathers use. The objective for bathing waters is to preserve, protect and improve the quality of the environment and to protect human health by meeting the 'sufficient' water quality standards of the Bathing Waters Directive and to take such realistic and proportionate measures considered appropriate with a view to increasing the number of bathing waters classified as 'excellent' or 'good'. A revised Bathing Water Directive introduced new water quality objectives for bathing water protected areas from 2015. 2015 is the first year of the new Directive that imposes tighter standards on bathing water qualify classifications aimed at achieving higher standards than the past Directive. In the Dee RBD there is 1 bathing water at West Kirby. Table 12 summarises the bathing water Protected Areas current status with regard to the revised Directive standards.

Table 12. Bathing water protected areas objectives

Number of bathing waters	Objective	Number which met at least the sufficient classification in 2014*	Number we expect to achieve at least sufficient in 2015	Number at risk of not achieving sufficient in 2015
1	At least sufficient classification	1	1	0

* This is the number that would have met at least the sufficient class if the new 2015 standards had been in force

Classifications against the revised Bathing Waters Directive standards have been calculated using the 2012-2015 data. The one designated bathing waters met the 'Excellent' standard.

Nutrient sensitive areas (Nitrate Vulnerable Zones)
The objective of the Nitrates Directive is to reduce water pollution caused by nitrates from agricultural sources and to prevent further such pollution occurring. Nitrate Vulnerable Zones (NVZs) are designated where nitrate concentrations in water bodies are high or

increasing, or water bodies are, or may become, eutrophic due to agricultural nitrate pollution. Farmers within NVZs must comply with mandatory action programme measures to reduce agricultural nitrate losses. In addition, a code of good agricultural practice has been established for voluntary implementation by all farmers. 19% of the Dee RBD land area is designated as NVZ and Table 13 gives figures for the reason for designation.

Table 13. Nitrate vulnerable zone protected areas extent

Reason for designation	Number of NVZs	Land area (ha) covered by NVZ type	%of RBD covered by NVZ type
High nitrate in surface water	7	40,545	89%
High nitrate in groundwater	4	5,346	12%
Eutrophication in lakes or reservoirs	1	104	<1%
Eutrophication in estuaries or coastal waters	0	-	0%

Nutrient sensitive areas (Urban Waste Water Treatment Directive)
The objective of the Urban Waste Water Treatment Directive is to protect the environment from the adverse effects of waste water discharges. Sensitive areas are designated for water bodies affected by eutrophication or where surface water abstraction is affected by elevated nitrate concentrations. Reductions or emission standards for nutrients in sewage effluent must be met within areas sensitive to nutrient pollution. Table 14 summarises these.

Table 14. Urban Waste Water Treatment Directive protected areas type and extent

Reason for designation	Number of sensitive areas	Length (Km) /Area (Km^2) designated
Eutrophication in rivers	1	27
Eutrophication in canals	0	0
Eutrophication in lakes or reservoirs	0	0
Eutrophication in estuaries or coastal waters	0	0
High nitrate in surface fresh water	0	0

Natura 2000 sites: Water dependant 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.

Natura 2000 sites in England

Natural England advises what meeting conservation objectives means in terms of the environmental conditions (targets) and ecological requirements expected for designated habitats and species on English Natura 2000 sites. The targets set specifically to measure the condition of designated features, and the progress towards meeting the objectives, are based on UK Common Standards for Monitoring Guidance (CSMG), published by the Joint Nature Conservation Committee. Some of these monitoring attributes of Natura 2000 sites are the same or equivalent to the objectives for elements of water bodies. Natural England monitors compliance with these objectives. Where there are CSMG targets for flow and water quality elements, they have been taken into account when setting water body status objectives. Where the deadline for achieving Natura 2000 water body objectives (CSMG target) has been extended beyond 2021, the Environment Agency has agreed interim goals locally with Natural England.

Ramsar sites are wetland sites of international importance. For the purposes of river basin management planning, Ramsar sites are considered in the same way as Natura 2000 sites.

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.

Extended deadlines are applied to Natura 2000 sites based on expert judgement and data held in the Site Improvement Plans (SIPs). SIPs have been 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 is not yet confirmed.

Natura 2000 sites in Wales

In Wales, Natural Resources Wales determines what favourable condition means in terms of the environmental conditions (targets) and ecology that is expected for designated habitats and species. The targets required are based on UK Common Standards for Monitoring Guidance (CSMG), published by the Joint Nature Conservation Committee. Some of the conservation objectives for attributes of Natura 2000 sites are the same or equivalent to objectives for elements of water bodies. Natural Resources Wales monitors compliance with these objectives.

In Wales, the condition of designated habitats and species features in SAC and SPAs for the Habitats and Birds Directives are reported over 6 year cycles. This reporting approach differs between England and Wales. In England, condition is reported on a unit basis and in Wales, on a designated habitat or species feature basis. In addition there are slight differences to some of the categories used for reporting. Table 13 summarises the data for the Welsh section of the Dee RBD based on the number of designated habitats and species features in each category. The most recent data available has been used. There are some gaps in the data due to the differences in the requirements in which the status of some designated features are reported. For example, SPA features are reported at a UK level and not at a site level. So, in Table 13 the condition of individual features are reflected as unknown. Also, the boundary of some of the SACs and SPAs cross more

than one river basin district. In these cases the relevant SAC or SPA has been considered in each river basin district where the boundaries overlap.

The default objective for all N2K sites is favourable condition by 2021. An extended deadline has been applied where there is robust evidence that 2021 is not achievable. For the Dee RBD 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, the objectives are unlikely to be achieved by 2021.
2. Technically infeasible. A number of sites are impacted by the presence of invasive non-native species (INNS), for example, American signal crayfish, Himalayan balsam. In most cases it is technically infeasible to eradicate the INNS by 2021.

Table 15 gives the Natura 2000 water protected areas objectives for England and Wales in the Dee RBD. It should be noted that the boundary of some of the Natura 2000 sites cross more than one RBD. In these cases the relevant site has been considered in each RBD where the boundaries overlap.

Table 15. Natura 2000 water protected areas objectives

Objective	Number of protected areas		
	By 2015	By 2021	By 2027
All measures complete to enable conservation objectives to be achieved (England)	2	0	1
Achieve conservation objectives (Wales)	0	6	6

4.3 Outcomes for 2021

For the next six years the focus in Wales will be on:

- Preventing deterioration in all water bodies to the new tighter standards for some elements.
- Improving compliance with good status in Wales by targeting measures locally in an integrated way to deliver environmental improvements in WFD water bodies and Protected Areas. This will involve targeting 7 water bodies predicted to achieve good across Wales to deliver a 7% improvement in WFD compliance.
- In Wales improving some of our worst performing water bodies by aiming to improve the overall status of by one class for 1 water body.
- Identifying where element level improvements will be achieved, but where further measures will be required to deliver an overall ecological status change. This will enable us to measure progress towards achieving good status and will lead to important benefits for the environment and improve ecological resilience.
- Developing our approach to natural resource management by working at a local catchment level and capturing the wider benefits delivered through WFD. Water is a valuable natural resource and WFD is a key tool in delivering natural resource management. We will also make the most of opportunities provided by the requirements

of the Well-being of Future Generations (Wales) Act 2015, the Planning (Wales) Act 2015 and Environment (Wales) Bill to help us deliver objectives.
- We are already working with partners to deliver improvements (e.g. Water Industry programme, Coal Authority and eNGOs) and looking for opportunities to 'join up' local actions to maximise benefits to the environment, economy and society of Wales.

How the water environment will be managed in England is detailed in Section 2 of **Part 2** and additional information' document which can be found at https://www.gov.uk/government/collections/river-basin-management-plan-update.

4.4 Economic appraisal

Economic appraisal in Wales

For the consultation on the updated RBMPs we carried out a high level assessment of the costs and benefits of delivering WFD objectives under four scenarios.
Where we have identified the reason for failure and the measures that are required to achieve good overall status by 2021 we have applied indicative costs for those measures. Where more accurate costs are available (for example water company schemes) we have used this information.
To calculate benefits we have used monetised values (£ per km or km^2) for different standards (i.e. Good, Moderate, Poor, Bad) of water body based upon the National Water Environment Benefit Survey (NWEBS). The net value of improvement between standards has been calculated and multiplied by the length of water body or area.

Following the consultation we have developed a better understanding of the costs of some Natura 2000 actions.

Further details can be found in the **Annex**.

Economic appraisal in England

In 2005, in preparation for the 2009 plans, a wide-ranging economic analysis was carried out and reported through a collaborative research programme overseen by UK authorities (in England this was undertaken by Defra) and stakeholder organisations. As a result Article 5 'Economic Analysis of Water use' reports were produced that describe the socio-economic characteristics of each river basin district and sectors' use of water. These reports have been reviewed for the updated river basin management plans but not updated as the socio-economic characteristics have not significantly changed.

Defra and the Environment Agency will continue to develop an economic analysis to provide evidence for water policy development. Future economic analysis will include projections of bills for water and sewerage services for household and non-household customers using a commissioned model. Where new policies or changes in water-related policy are considered, in line with government practice, appropriate economic analysis will be carried out.

The Environment Agency, as a public body seeks to identify those areas where money could be spent to achieve the best outcomes for society.

Stage 4 of the objective setting process is catchment economic appraisals to assess the benefits, cost and any negative impacts of implementing measures to improve the water environment. The Environment Agency has designed a robust approach, based on HM

Treasury guidelines, that is proportionate and fit for purpose. The approach is designed to aid decision making on setting objectives.

Water Appraisal Guidance and associated cost benefit analysis tools have been developed in consultation with a range of stakeholders. The features of the economic appraisal approach are that:

- It is catchment based, covering all water body types. This is important to help achieve integrated and cross pressure management of the water environment.
- It is about identifying the greatest level of improvement that is justified where the benefits to the environment and society outweigh the cost of implementing measures.
- It builds up a broad picture of the environmental outcomes and benefits of measures in a descriptive way, using an ecosystem services framework, and includes a monetary estimation of the major benefits.
- It is a systematic and transparent framework that helps engagement with others in managing the water environment.

The results of the economic appraisals help ensure that wider benefits and the value of the water environment are taken into account in decision making. Further details of this can be found in section 5.3 of **Part 2** and additional information' document which can be found at https://www.gov.uk/government/collections/river-basin-management-plan-update.

5. Third Cycle Planning - Planning ahead and the challenges for 2021–2027

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). In England this has led to justifications for extended deadlines under disproportionate cost. 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 1.6 together with the Catchment Based Approach (CaBA) in England 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
- 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