



**Cyfoeth  
Naturiol**  
Cymru  
**Natural  
Resources**  
Wales



**Environment  
Agency**

# Environmental Report

## Draft Dee River Basin Management Plan

Rev No 3.0

October 2014

## Natural Resources Wales

Our purpose is to ensure that the natural resources of Wales are sustainably maintained, used and enhanced, now and in the future

We will work for the communities of Wales to protect people and their homes as much as possible from environmental incidents like flooding and pollution. We will provide opportunities for them to learn, use and benefit from Wales' natural resources

We will work for Wales' economy and enable the sustainable use of natural resources to support jobs & enterprise. We will help businesses and developers to understand and consider environmental limits when they make important decisions.

We will work to maintain and improve the quality of the environment for everyone. We will work towards making the environment and natural resources more resilient to climate change and other pressures.

## Environment Agency

We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people's lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.

## Non-Technical Summary

The Water Framework Directive (WFD) provides the main framework for managing the water environment throughout Europe. Under this framework a management plan must be developed for each river basin district (RBD). The first Dee river basin management plan was published by Environment Agency Wales in December 2009. It detailed the actions required to bring all inland surface, groundwaters and coastal waters in the Dee RBD to agreed quality standards by 2027.

The RBMPs must be reviewed and updated every six years to describe progress against the targets and update the actions required. The draft update to the Dee river basin management plan will be published in December 2015. The Dee RBMP outlines a programme of measures to improve the water environment in the Dee RBD, from the upland streams, lakes and rivers, through the valleys and meandering lowland river to the Dee Estuary.

The Strategic Environmental Assessment is a legal requirement under the Environmental Assessment of Plans and Programmes Regulations 2004. It assesses the measures aimed at improving the water environment to determine potential positive and negative effects on the wider environment. Natural Resources Wales and the Environment Agency have chosen to adopt the ecosystem approach as the method for assessing the environmental effects for the Strategic Environmental Assessment.

The RBMP assigns measures to each waterbody in the RBD and these have been amalgamated to determine the potential effects at the RBD scale. The most common measures proposed within the Dee are removal of barriers to fish, targeting sustainable agricultural solutions, additional treatment at sewage treatment works and remediate impacts from flood defences.

The RBMP was assessed as having potential effects on the following ecosystem services:

### Provisioning services

- **Food (e.g. crops, fruit, fish):** minor positive effect
- **Water for Non-Consumptive Use (e.g. hydropower, navigation):** minor, negative effect due to the limiting of quantities of water available for abstraction at certain times.

Mitigation for this potential negative effect may include careful site selection, with works managed for the avoidance of local effects and appropriate consultation with affected parties undertaken.

### Regulating services

- **Climate Regulation:** [minor positive effect](#)
- **Water Regulation (e.g. flooding):** [minor positive effect](#)
- **Soil & Erosion Regulation:** [minor positive effect](#)
- **Water Purification and Waste Treatment:** [major positive effect](#)

### Cultural services

**Cultural Heritage:** [major negative effect](#) from the potential for measures to disturb buried, unknown archaeology, which may have been preserved in peat or excavation and removal of weirs or obstructions could damage heritage assets. To conserve and enhance the historic environment it will be important that individual schemes at the earliest stage identify any designated or non-designated heritage assets, including the risk of unknown buried archaeology, in order to: establish the potential for adverse effects as well as opportunities for enhancement; determine whether any action should be taken due to the significance of the heritage assets and likely impacts; inform scheme options and detailed design; and identify an appropriate mitigation strategy.

- **Recreation and Tourism (including accessible blue and green space):** [minor positive effect](#).
- **Aesthetic Value (e.g. landscape, seascape, tranquillity):** [minor positive effect](#)

### Supporting services

- **Provision of Habitat:** [major positive effect](#)

Overall, the Dee RBMP is anticipated to have a positive effect on the environment, through beneficial effects to a number of ecosystem services. These beneficial effects will largely result from measures to improve the sustainability of agricultural and forestry management practices, removal of or easements on barriers to fish passage, improve the efficiency of sewage treatment, naturalise banks and channels in urban areas and remediate contaminated mine discharges in the RBD.

From the measures however, there are anticipated to be negative effects to the water for non-consumptive use and cultural heritage services through reductions in availability of water for hydropower and in water available for use in industrial cooling; and also through potential disturbance and effects on setting to heritage assets. Proposed methods for mitigation, avoidance or reduction of environmental impacts in lower tier plans or projects will be taken forward into RBMP actions.

We propose to monitor the effects the plan is having on the environment. The main mechanism will be through the plan itself which will report annually on various water quality aspects. We will also use readily-available and regularly collected information from existing sources to monitor change associated with the other predicted environmental effects. In this way, we will be able to determine whether any further action is necessary to manage the wider environmental effects of the Dee river basin management plan.

This environmental report was published with the draft update to the Dee RBMP on 10 October 2014 and is available for consultation for a six month period. Consultation will close on 10 April 2015. We are seeking your views and have set out some specific consultation questions below:

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- 1. Do you agree that we have sufficiently assessed the significant effects of the Dee River Basin Management Plan? Please describe any further aspects we should consider.**
  - 2. Do you have concerns about the environmental effects of the river basin management plan that are not covered by this assessment? Please describe what they are.**
  - 3. Are there other mitigation or opportunities that we should consider delivering with the proposed measures?**
- 

### **How to respond**

Natural Resources Wales would prefer you to respond to this consultation by email at:

[ardalbasnafondyfrdwy@cyfoethnaturiolcymru.gov.uk](mailto:ardalbasnafondyfrdwy@cyfoethnaturiolcymru.gov.uk)

[deerbd@naturalresourceswales.gov.uk](mailto:deerbd@naturalresourceswales.gov.uk)

This will allow you to make your comments more effectively, while helping us to gather and summarise responses quickly and accurately. However, if you want to respond in another way, please contact your regional contact for the Dee River Basin District, below.

You can view the consultation documents and consultation questions online. But, if you would prefer a printed version of the document, please call 0300 065 3000.

Please return written responses by 10 April 2015 to:

Jill Brown

Natural Resources Wales

29 Newport Road

Cardiff

CF24 0TP

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## 1. Introduction

The Environmental Report provides details of the outcome of the Strategic Environmental Assessment of the draft update to the Dee River Basin Management Plan (RBMP). The Strategic Environmental Assessment is used to take account of the likely effects on the wider environment when developing the plan.

The Dee RBMP outlines a programme of measures to improve the water environment. It builds on and updates the plan that was published in 2009. The RBMP aims to deliver a healthy water environment to benefit society, the economy and the wider environment. To do this we need to integrate actions to deliver multiple benefits, such as:

- Maintaining water supply to our homes, for public health and for manufacturing
- Farming – including maintaining water supply for crops and animals
- Industry, business and civic use – producing energy, mining, amenity
- Waste disposal and treatment of waste sewage and industrial effluent
- Transport of people and goods
- Commercial fishing, fish farms and shellfish
- Wellbeing, enjoying landscapes and wildlife, active leisure, boating, canoeing, angling, surfing, swimming
- Wildlife diversity of plants, fish, animals through maintaining and enhancing habitats
- increasing resilience to the impacts of a changing climate
- Reducing the impact of floods and droughts on people and the economy

The RBMP has been developed at three scales:

- The Plan covers the River Basin District (RBD). Natural Resources Wales is responsible for developing plans for Western Wales and the Dee RBDs. For the parts of the Dee RBD that are in England we are working with the Environment Agency. This Environmental Report is for the plan developed for the Dee RBD.
- The RBDs are usually divided into Management Catchments. Due to the relatively small size of the Dee RBD there is only one management catchment within it and this aligns with the Flood Risk Management Plan and Catchment Abstraction

Management Plan. The updated RBMP is supported by catchment summaries that provide more detail about the individual characteristics and issues for water bodies at a local level. The environmental assessment of the measures to be taken to improve the water environment of the Welsh part of the RBD has been undertaken at this level.

- In England the management catchments are further subdivided into ‘operational catchments’. There are two “operational catchments” within the Dee RBMP in England. Each operational catchment covers a number of smaller water bodies based around the same local geography or sharing specific pressures. The effects of the measures to be taken to improve the water environment have been initially assessed at this level by the Environment Agency and has then subsequently been integrated into the RDB level assessment by NRW.
- Each management catchment is further subdivided into “water bodies”. There are 115 water bodies in the Dee RBD. Evidence collected during the first cycle investigations has been used to assign measures to each of these water bodies, depending upon their current status and pressures identified. For each water body we have identified the actions that are required overall to prevent deterioration in WFD status and:

**For surface waters:**

- achieve Good Ecological Status/Potential by 2021
- achieve Good Chemical Status by 2021

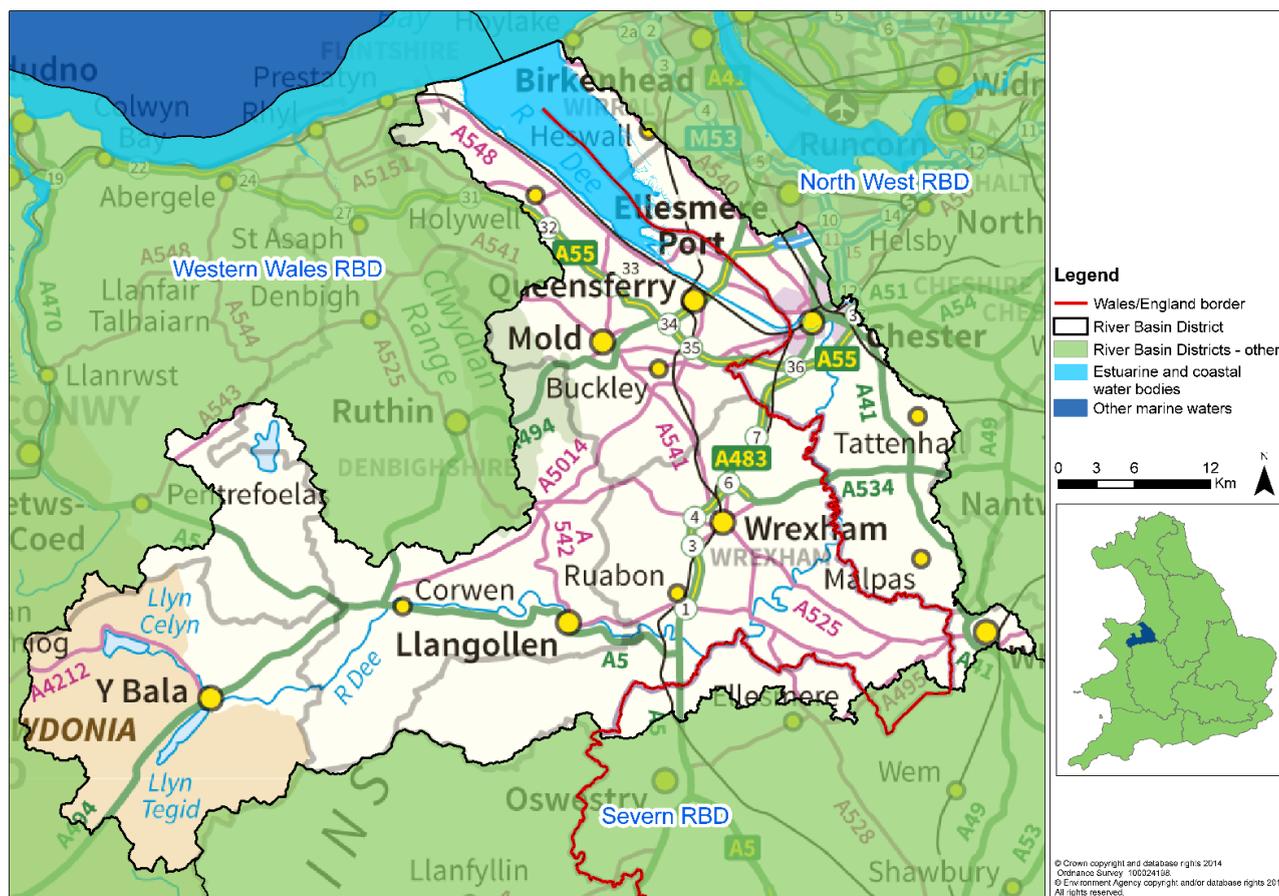
**For groundwaters:**

- achieve Good Quantitative & Chemical Status by 2021

**For protected areas:**

- achieve the objectives specified in the Directive under which they were established by 2021. These objectives are often more stringent than the standards used to assess ecological or chemical status, e.g. Special Areas of Conservation or Special Protection Areas.

**Figure 1.1: The Dee River Basin District**



**Purpose of the Environmental Report**

The purpose of this report is to consider the significant environmental effects at the scale of the River Basin District.

The RBMP is fundamentally a plan to improve the water environment. As a result it can be anticipated that the significant environmental effects are most likely to be positive and the risk of significant adverse effects occurring is considered to be low. Nevertheless, the focus on the water environment does mean that it has the potential to have intended or unintended consequences for people or the wider environment. These may be positive, for example by improving recreational opportunities in an area; or may be negative, for example risk harming historic features. We have used the Strategic Environmental Assessment to anticipate these effects and ensure the plan addresses negative effects as well as generating broader benefits to the wider environment.

The Strategic Environmental Assessment has also been undertaken to fulfil the requirements of the Environmental Assessment of Plans and Programmes Regulations 2004 (known as the 'Strategic Environmental Assessment Regulations'). This requires plans within certain sectors (including the water sector) that provide a framework for future development to be subject to a strategic environmental assessment to ensure that the environment is considered from the outset. Table 1.1 sets out the requirements for an environmental report produced in accordance with the strategic environmental assessment regulations and indicate where these are addressed within this report.

### Finding your way through this report

This report provides a record of how we have taken the wider environment into account during the development of the RBMP:

- Section 2 of the report provides further detail on how we have integrated environmental considerations into the development of the plan and how we have undertaken the assessment of significant environmental effects. We have also set out how the consideration of alternatives has been part of the development of the plan;
- Section 3 sets out the key themes arising from a review of plans and policies that may impact on the update to the RBMP;
- Section 4 sets out the significant environmental effects of the plan at the river basin district scale. Where we have identified significant adverse effects mitigation is proposed to avoid or reduce them;
- Section 5 sets out our initial proposals to monitor the significant effects of the plan; and
- Finally, Section 6 provides further information on how you can comment on the plan and/or the Environmental Report and asks specific questions on which we would like to hear your views.

**Table 1.1: How the requirements of the strategic environmental assessment regulations are addressed in this report.**

<b>SEA regulations requirement</b>	<b>How this has been addressed</b>	<b>Section</b>
1. An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes.	<i>Section 1 sets out the main objectives of river basin planning and an outline of the content of the plan can be found in section 4. Section 3 sets out the relevant key themes arising from a review of relevant plans and programmes. A full list of plans reviewed is provided in Annex A.</i>	1, 3 and 4 Annex A
2. The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme.	<i>An overview of the river basin district is provided in Section 3. Section 4 provides a description of the current state of the ecosystem services provided by the water environment and how these are likely to evolve in the absence of the plan.</i>	3 and 4
3. The environmental characteristics of areas likely to be significantly affected.		
4. Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds(a) and the Habitats Directive.	<i>Existing environmental problems are presented as part of the baseline in Section 4.  Consideration of designated sites (SAC, SPA and Ramsar sites) is outlined in Section 4.10, Provision of Habitat (Biodiversity)</i>	4
5. The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.	<i>Environmental protection objectives are summarised as part of the review of relevant plans and programmes in Section 3.</i>	3
6. The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects.	<i>The likely significant effects of the plan are described in Section 4</i>	4
7. The measures envisaged to prevent, reduce and as fully as possible offset any significant	<i>Mitigation measures and opportunities for additional environmental improvements are provided in Section 4.</i>	4

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adverse effects on the environment of implementing the plan or programme.

<b>8.</b> An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information.	<i>Section 2 sets out the alternatives considered together with the reasons the selection of the one presented in the draft update to the river basin management plan.</i>	<i>2</i>
<b>9.</b> A description of the measures envisaged concerning monitoring in accordance with regulation 17.	<i>Proposals for monitoring are provided in Section 5</i>	<i>5</i>
<b>10.</b> A non-technical summary of the information provided under paragraphs 1 to 9.	<i>A non-technical summary is provided at the front of this document and is available as a separate document.</i>	

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## 2. Undertaking the assessment

In this section we set out how environmental issues were considered in the development of the plan; the approach to considering alternatives and how we undertook the assessment of the significant environmental effects of the draft plan.

### The approach to the Strategic Environmental Assessment

The purpose of Strategic Environmental Assessment is to integrate environmental considerations into the preparation and adoption of plans that are likely to have significant effects on the environment<sup>1</sup>. When developing our approach to the assessment of the RBMP we considered how it could best be integrated into the plan making process to enable it to influence outcomes.

River basin management planning investigated failures to achieve standards across the RBD in order to identify the underlying reasons for failure. Then, following consultation, the pressures were grouped to ensure the focus was on those where more action is needed. Measures have been proposed to address these pressures. The river basin management

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<sup>1</sup> Paragraph 4 of the preamble to Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. (the Strategic Environmental Assessment Directive)

planning annex of the draft update to the river basin management plan describes how river basin planning is undertaken.

We undertook the assessment of effects using an Appraisal Summary Table for each management catchment in Wales and at an operational catchment level in England. These documented the current baseline for each ecosystem service and their evolution without plan implementation. The evolution of the baseline with implementation of the proposed measures was assessed for positive and negative effects, consideration of the duration of predicted effects and prediction of any secondary and cumulative effects. This information was considered and the significance of the predicted effect at a River Basin District scale was proposed. Chapter 4 of this report documents the outputs from this assessment, with figures showing significant positive and negative effects on ecosystem services at a waterbody level.

### **The Ecosystem Services Approach**

Welsh Government and Natural Resources Wales have agreed that we will adopt the ecosystem approach in all our natural resource planning. The ecosystem approach is about managing the environment so that its different components are considered together, including its natural systems and the benefits that people get from it. The emerging Environment Bill sets out a new framework for managing natural resources and will build on the United Nations' Convention on Biological Diversity. The approach is guided by 12 principles. Part 4 of the River Basin Management Plan shows how our approach reflects essential elements of the framework.

There is an increasing level of support for the adoption of an ecosystems approach in decision making processes as well as in decision support tools such as Strategic Environmental Assessment and Environmental Impact Assessment. We therefore chose to adopt the ecosystems approach as the method for assessing the environmental effects for the Strategic Environmental Assessment.

Of the 12 Core Principles of the Ecosystem Approach the SEA will specifically consider:

- Potential positive and negative effects of the plan on adjacent and other ecosystems.
- Consider potential effects of the plan on the structure and function of the ecosystem services, this in turn will influence the plan development to ensure the resilience of ecosystems.
- Potential positive and negative effects on ecosystem services, including cumulative effects. This will be assessed against specific limits where possible but where there is a lack of defined limits or data, assessment will be qualitative.
- Potential positive and negative effects on Biological Diversity itself and the services that are reliant upon it.

Figure 2.1 shows the relationship between ecosystem services and the environmental receptors we are required to consider by the Strategic Environmental Assessment regulations. This demonstrates that, even based on a conservative comparison, the ecosystem services based assessment provides coverage of the receptors required to be covered by the Regulations.

**Figure 2.1: Relationship between ecosystem services and the factors required to be considered by the strategic environmental assessment regulations.**

Ecosystem services		SEA Regulations environmental factors								
		Biodiversity, flora & fauna	Population & human health	Soil	Water	Air	Climatic factors	Cultural heritage	Landscape	Material assets
Provisioning services	Fresh water				*					
	Food (e.g. crops, fruit, wild collected food)	*	*							*
	Fibre & fuel (e.g. timber & wool)		*							
	Genetic resources	*								
	Biochemical, natural medicines		*							
	Water for non-consumptive use (e.g. Hydropower, navigation)		*		*					*
Regulating services	Air quality regulation					*				
	Climate regulation						*			
	Water regulation (e.g. flooding)		*		*					
	Natural hazard regulation		*							
	Disease & Pest regulation		*							
	Soil & Erosion regulation	*	*	*						
	Water purification & waste treatment	*			*					
	Pollination	*								
Noise & light regulation	*	*								
Cultural services	Cultural heritage							*	*	
	Recreation & tourism (accessible blue & green space)		*							*
	Aesthetic value (e.g. landscape, seascape, tranquility)								*	
	Intellectual & scientific, education value		*							
	Spiritual & religious value		*							
	Existence value (appreciation of nature & wildlife)	*						*	*	
Supporting services	Soil formation (geodiversity)			*						
	Primary production	*								
	Nutrient cycling			*						
	Water recycling				*					
	Photosynthesis	*								
	Provision of habitat (biodiversity)	*								

This Environmental Report provides an aggregated summary of the anticipated significant changes across the river basin district.

The objective of the RBMP is to improve the environment. So, we would anticipate that the majority of the effects will be positive. However, where adverse effects have been identified we have considered mitigation measures that could be included in the plan or at lower tiers of assessment to avoid or reduce those adverse effects.

## Scope of the assessment

The scope of the strategic environmental assessment has been informed by the scoping document published with the Challenges and Choices document in June 2013 and the consultation responses to this.

Within the scoping document we indicated that we did not consider that the plan would be likely to result in significant effects on air quality at a river basin district level and this would be removed from the scope of the assessment. A few responses to the consultation indicated that air quality should be part of the scope of the assessment. We therefore reconsidered whether the plan is likely to have any strategic implications for air quality. It is possible that individual measures will result in localised air quality impacts for a temporary period (e.g. associated with construction), but this is not a strategic consideration and is best addressed at the project level. More strategically, some measures may have air quality benefits, such as the creation of habitat or the planting of trees and buffer zones. These measures are likely to increase the absorption of carbon dioxide, nitrogen dioxide and sulphur dioxide and the capture of airborne particles (dirt, dust and soot). However, the scale of new planting, the relative change to existing land uses and the scale of the benefit are too uncertain to provide the basis for a more detailed assessment beyond the identification of these generic benefits.

Consultation responses on the scope of the assessment highlighted the key environmental issues that stakeholders considered should be covered by the assessment:

- The assessment needs to have appropriate depth and proportionate analysis of issues;
- The impact on health and recreation and in particular, how the plan could affect opportunities for people to access and enjoy rivers, lakes, coastal and transitional waters;
- The benefits of sustainable land management practices, tree planting, Sustainable Urban Drainage Systems and Green Infrastructure on biodiversity, recreation, landscape and tourism should be recognised;
- The positive and negative effects of flood risk management;

- The impact of flow regulation and abstraction within river basins and between river basins in the context of adapting to climate change;
- The impact on coastal and transitional waters and their use by people;
- The impact on climate change through greenhouse gas emissions arising from RBMP actions such as additional wastewater treatment or carbon sequestration through land management changes;
- The impacts of land use management; and
- The historic value of some structures associated with water bodies should be recognised.

Scoping is a continuous process and after initiating the assessment we were able to identify ecosystem services that are not anticipated to significantly change as a result of the plan. To focus the assessment we undertook an initial review of the possible measures that could be included in the plan and the ecosystem services that could be significantly affected by them. Other services were unlikely to warrant further consideration. Nevertheless, we considered whether these services were important in particular localities.

In addition, when undertaking the assessment there were further ecosystem services for which no significant effects were identified. In this way we have narrowed down the services which are not considered to be significant at the RBD-scale. We have therefore not given further consideration to the following ecosystem services in this report:

<b>Provisioning services</b>	Genetic resources	This includes the genes and genetic information used for animal and plant breeding and biotechnology.
	Biochemicals, natural medicines, pharmaceuticals	Many medicines, biocides, food additives such as alginates and biological materials are derived from ecosystems.

<b>Regulating services</b>	Pest regulation	Ecosystems are important for regulating pests that attack plants, animals and people. Ecosystems regulate pests through the activities of predators and parasites. Birds, bats, flies, wasps, frogs and fungi all act as natural controls.
	Disease regulation	Ecosystems are important for regulating vector borne diseases that attack plants, animals and people. Ecosystems regulate diseases through the activities of predators and parasites. Birds, bats, flies, wasps, frogs and fungi all act as natural controls.
	Noise and light regulation	Noise, or unwanted sound, and light can have a negative effect on human well-being and wildlife, but can be regulated by ecosystems.
<b>Cultural services</b>	Intellectual, scientific and education value	The natural environment provides an outdoor classroom and laboratory for the study and teaching of a diverse range of subjects.
	Spiritual and religious value	Many religions attach spiritual and religious values to ecosystems or their components.

### Assessing Significance

Significant effects of the river basin management plan have been determined at the river basin district scale. There are no definitive criteria that can be used to determine whether an effect is significant, particularly when assessing the change to an ecosystem service. Rather we have determined significance by characterising the types of effects that would be considered to be significant:

- Effects are widespread across the river basin district
- Local effects that are of a large enough scale to be considered significant for the river basin district. For example, this might apply to a major habitat creation project.
- Effects that are likely to result in a demonstrable change in the health and/or social or economic wellbeing of communities.

Significant effects of the plan are likely to occur over the long term. However, the assessment does note effects that could occur over the short to medium term. For clarity, we have defined these terms in the following way:

- Short term – within the current proposed plan cycle, 2015 to 2021
- Medium term – within the cycle covered by the third update to the plan, 2021 to 2027
- Long term – beyond 2027

### Alternatives considered

NRW have developed three alternative approaches (scenarios) to present information on the programme of measures and water body objectives within the consultation. They are designed to help explain and describe at the RBD scale what outcomes are achievable by 2021 and the RBMP itself will consider the overall costs and benefits, apportionment of costs across the types of intervention, and relative cost-effectiveness of different types of intervention. The environmental implications of the alternatives are considered below and are compared against a baseline of current actions continuing (Alternative 1).

The five alternative approaches (scenarios) under consideration are:

1. **Current measures (2015 baseline):** This option reflects the impact of ongoing measures (from the current plan) and trends (population growth and climate change) that will change the environmental baseline (2015 status) beyond 2015. Given the scale of ongoing actions to manage the quality of the water environment there is no true 'do nothing' option.
2. **Long Term Aspiration. Aim to achieve no deterioration, protected areas objectives and good overall status in all water bodies**, except those where alternative objectives are appropriate, e.g. due to natural conditions, disproportionate cost or technical infeasibility. (This is Scenario A in the RBMP).
3. **Statutory Objectives. Aim to achieve no deterioration and protected areas objectives.** That is target all water bodies linked to N2K and Ramsar sites to achieve good overall status. (This is Scenario B in the RBMP).

4. **Short Term Opportunities. Target improvements to good overall status by 2021 where NRW has a reasonable level of evidence that a short term outcome is achievable.** (This is Scenario C in the RBMP).
5. **Possible Outcomes.** Target improvements to good overall status by 2021 in water bodies where there is a greater certainty of funding and delivery through existing mechanisms (e.g. water company, Coal Authority and NRW forestry programmes). (This is Scenario D in the RBMP).

None of the alternatives consider the affordability of measures (in line with Welsh Government's guidance) or the effectiveness of mechanisms to deliver measures. Alternatives 2 and 3 describe what needs to happen to achieve statutory objectives, whilst 4 and 5 describe the opportunities to achieve short term (2021) improvements to good status.

### **Assessment of strategic alternatives**

A summary of the wider environmental effects of the strategic alternatives is presented here and in Figure 2.2. The effects are presented in terms of the predicted changes to ecosystem services. To understand these changes in terms of the issues set out in the strategic environmental assessment regulations, please refer to Figure 2.1 that sets out the relationship between these and ecosystem services.

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**Alternative 1** This option is likely to result in significant negative effects on the wider environment as human population pressure and the effects of climate change are felt. There is widespread risk of deterioration in water body status and failure to achieve protected area objectives.

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**Alternative 2** This option sees the achievement of good status wherever there is a technically feasible solution available and therefore the maximum possible improvement in ecosystem services. Providing adequate mitigation of potential negative effects is applied there are few direct losers. Indirect losers may result from the diversion of high levels of resource from other priorities.

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**Alternative 3** Deterioration is prevented and the level of ecosystem service  
(Scenario B) provision is broadly maintained in Wales. Improvement is limited to geographically-defined protected areas, delivering localised benefits through specific ecosystem services. Preventing deterioration may become increasingly difficult in the face of the population and climate change pressures.

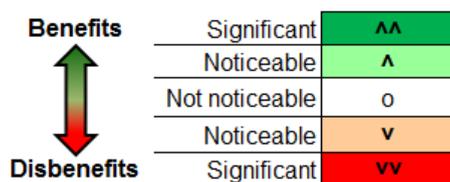
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**Alternative 4** This option would result in achievement of good status in specific  
& 5 locations, however, it is likely to result in significant negative effects  
(Scenario C outside of these locations, particularly as human population pressure  
& D) and the effects of climate change are felt. There is widespread risk of deterioration in water body status and failure to achieve protected area objectives.

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The consultation on the RBMP will determine the priorities in terms of measures and objectives. The SEA has assessed the effect of all proposed measures and will inform the prioritisation.

Figure 2.2: Summary of the assessment of strategic alternatives



Ecosystem Service Category	Significance of change between baseline and alternative				
	RBMP Strategic Alternatives				
	1	2	3	4	5
<b>Provisioning Services</b>					
Fresh Water	vv	^^	^^	v	v
Food	0	^^	0	0	0
Water for non-consumptive use	0	^	0	0	0
<b>Regulatory Services</b>					
Climate Regulation	vv	^	v	v	v
Water Regulation	vv	^^	0	v	v
Erosion Regulation	vv	^^	v	v	v
Water purification and waste treatment	v	^^	^	v	v
<b>Cultural Services</b>					
Cultural heritage	0	v	0	0	0
Recreation and tourism	v	^^	^	v	v
Aesthetic services	v	^^	0	v	v
Existence Values	vv	^^	0	v	v
<b>Supporting Services</b>					
Provision of habitat	vv	^^	^	v	v

### Alternatives at waterbody level

There were limited opportunities to consider alternatives at the waterbody level. The staged process to the development of the plan has meant that the proposed measures for each water body were specifically designed to address the problems identified. For example, where a water body is failing due to high metal concentrations, metal mine remediation is the option proposed. Options for how to remediate the metal mine would be considered at a project level.

### 3. The environmental context for the plan

In this section we provide an overview of the environmental context for the Dee RBD. We also consider how other national and local plans relate to the RBMP. In some cases these will provide opportunities through shared objectives or areas of activities. In others there are potential challenges where objectives may appear to conflict with those things that the RBMP is seeking to achieve.

#### The Dee River Basin District

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

The River Dee and Llyn Tegid are designated as a Special Area of Conservation (SAC) under the Habitats Directive. The Dee estuary is a Special Protection Area (SPA) and SAC. Chester and Wrexham are the two major urban centres, but the dominant land uses are agriculture and forestry, particularly in the upper part of the basin. Key economic sectors in the region include business services, retailing, health, banking and insurance. Llyn Tegid, Celyn and Brenig reservoirs in the upper catchment are used for water storage to regulate river flows in the Dee downstream all year round. In the drier months, typically between April and September, this is to sustain abstractions for public supply, and industry.

Nearly three million people get their drinking water from the Dee, including many in North West England. The reservoirs are also used to modify flood response and reduce the flooding frequency in the Dee between Bala and Chester.

Since the 1<sup>st</sup> 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.

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

Section 4 of this report documents the baseline for each of the ecosystem services that the river basin district provides along with the future baseline in the absence of the plan.

### **Review of relevant plans and policies within the Dee River Basin District**

The SEA Regulations require that consideration is given to the relationship with other plans and programmes and environmental objectives set at an international (European), community or national level. Given the geographical scale of this plan, only relevant policies, plans, strategies and legislation relevant to the RBD have been considered as part of this review. Table 3.1 sets out the key themes arising from the policy review. The purpose of the review is to take account of the objectives of these key documents in the assessment with a view to aligning the Plan to compliment and work with other environmental policies and legislation rather than against. The documents consulted are detailed in Annex A.

The plan review can also help to identify where other planning processes and organisations may be able to work with the river basin planning process. Table 3.1 below lists the main themes emerging from this review in terms of areas of possible mutual influence with respect to the RBMP.

**Table 3.1 Main themes from the review of policies, plans, programmes and environmental objectives of the RBMP**

<b>Environmental Topic</b>	<b>Common Themes</b>
Maintain and restore habitats	The Water Framework Directive's objectives are consistent with the policies, plans and programmes (PPP) we reviewed, aiming to protect, maintain and enhance the quality of the water environment. Terrestrial habitats need to be considered. The Water Framework Directive's objectives should contribute to protecting and enhancing biodiversity but the effects of achieving good ecological status will need to be compared with the conservation objectives of protected sites.
Improve status and diversity of species	The policy direction is to protect and enhance biodiversity and the natural environment; this should help the realisation of good ecological status.
Landscape	PPPs generally aim to conserve and enhance valuable landscapes; opportunities for land use or land management to benefit landscape, with land use planning and flood risk management planning requiring consideration of the landscape in designs.
Water resources / efficiency / water abstraction	The PPPs and Water Framework Directive aspire to protect natural resources. Some PPPs promote reducing water use and greater water efficiency, while others will put pressure on water resources and may conflict with Water Framework Directive objectives.
Water quality	There is alignment within the PPPs that potable and non-potable water quality should be both protected and enhanced, through a wide range of strategies.
Flood risk	The PPPs concur that the management of flood risk, and also raising awareness of flood risk is desirable and should be supported. However, this should be progressed whilst also considering the wider environment and potential effects of reducing flood risk. A move away from direct flood defence is evident, with flood risk management offering the potential for delivering WFD objectives.
Waste/ pollution	Reducing waste and pollution should further Water Framework Directive objectives, but increasing development pressures may counter them. The PPPs outline a desire to reduce waste and increase resource efficiency.
Material assets	PPPs aim to provide sustainable transport networks. Depending upon implementation, there could be divergences between this and river basin planning through development of infrastructure potentially damaging to the water environment.
Planning	The PPPs set out that future land use planning should be undertaken through the principle of sustainable development, and also that the water environment should be specifically considered. Sustainable development supports river basin planning and ensures all aspects of any development project are considered.

<b>Environmental Topic</b>	<b>Common Themes</b>
Mitigation and adaptation to climate change	The recognition of the need to adapt to climate change is a common theme through the PPP and this encompasses a wide range of changes to the economy, society and environmental management such as changes to land use practices and soil management. Many adaptation strategies could also deliver improvements to WFD objectives (e.g. land use management, soil management)
Land Use	Farming practices are changing to ensure long-term sustainability of the industry, e.g., a move to organic farming, promotion of locally-based producers; agricultural practices increasingly seeking to protect and enhance the landscapes of Wales for the environmental benefits they offer, their cultural features and associated wildlife. Woodland management is aspiring to high-quality woodlands, with a diverse mixture of species and habitats that will provide, among other things, a better quality environment.
Natural Resources	Managing Wales' natural resources is a key direction within the PPPs, and includes maintaining the diversity of species and habitats and Wales' landscape and heritage assets, whilst realising the economic benefits of forestry, fisheries, agriculture and mineral resources.
Water-based/waterside Recreation and tourism	PPP's identify the water environment as a key tourist and recreation resource. It promotes opportunities to provide appropriate water-based recreation. Recreational activities and facilities may cause deterioration in water quality through pollution and bank erosion, but could contribute to Water Framework Directive objectives if water and waterside areas are well managed to promote environmental benefits.
Historic Environment	The WFD should ensure that it does not compromise the historic environment in achieving its objectives, as the PPPs outline a desire to conserve and enhance heritage assets, and provide a framework to value these assets.

## 4. Significant effects of the Dee River Basin Management Plan

In this section we set out the significant effects of the RBMP. We have presented these in terms of how they affect the ecosystem services we currently receive from the water and related environment. Where adverse effects occur we have proposed mitigation that will assist in avoiding or reducing them. We have undertaken the assessment of environmental effects using a combination of previous experience of the catchments and using our wider experience of strategic environmental assessment.

In the strategic environmental assessment a precautionary approach has been adopted so mitigation, unless it is specifically identified as being part of the measures to be implemented in a catchment, will be documented. This assures that any risks of adverse effects are identified and that mitigation requirements are specifically identified and captured in this environmental report. This approach does mean that on a minority of occasions there may be some variance between the assessment in the environmental report and the conclusions presented in the catchment summaries. As we continue to develop the 2015 update to the river basin management plan during and following the consultation period we will seek to embed any required mitigation within the plan.

### Overview of the effects of the updated Dee River Basin Management Plan

River basin management planning investigated failures to achieve standards to identify underlying reasons for failure. Then, following consultation, grouped these pressures and focused on those where more action is needed. Measures have been proposed to address these pressures. Please refer to the RBMP itself for details of our proposed measures aimed at improving the water environment in the Dee RBD. The most common measures proposed in the Dee RBMP are:

- **Improve fish passage and habitat** (proposed in 13 water bodies).
- **Sustainable agricultural practices** (proposed in 12 water bodies). Implement basic and additional measures such as correct management of slurry, silage, fuel oil, and agricultural chemicals; clean and dirty water separation; nutrient management planning; buffer strips and riparian fencing; cover crops and soil management.

- **Improve flows and water levels** (proposed in 10 water bodies). Ensure current and future abstraction licences protect the water environment. Deliver interventions (e.g. in-channel habitat improvement) that mitigate the impacts of abstraction on the water environment. Improve water efficiency.
- **Mitigate impacts of flood and coastal defences** (proposed in 9 water bodies). Habitat improvements.
- **Reduce pollution from sewage discharges** (proposed in 8 water bodies). Includes investigating and tackling sewer blockages and implementing sustainable drainage to reduce surface water drainage to sewers.

The RBMP was assessed as having likely significant effects on the following ecosystem services:

#### Provisioning Services

- Food (e.g. crops, fruit, wild collected food)
- Water for Non-Consumptive Use (e.g. hydropower, navigation)

#### Regulating Services

- Climate Regulation
- Water Regulation (e.g. flooding)
- Soil & Erosion Regulation
- Water Purification and Waste Treatment

#### Cultural Services

- Cultural Heritage
- Recreation and Tourism (including accessible blue and green space)
- Aesthetic Value (e.g. landscape, seascape, tranquillity)

#### Supporting Services

- Provision of Habitat (e.g. Biodiversity)

We have set out below, under each of these headings, an outline of the current status of the service within the RBD, how the service is considered to change as a result of the RBMP and any mitigation likely to be required if the effects are considered to be adverse.

## Significant effects of the updated Dee River Basin Management Plan

### 1. Food (e.g. crops, fruit, wild collected food)

#### **Description of food services that ecosystems provide**

Ecosystems provide the conditions for growing food. Food comes principally from managed agro-ecosystems but marine and freshwater systems or forests also provide food for human consumption.

#### **What food services are currently provided in the Dee RBD?**

The RBD is primarily rural in character, with urban centres situated in the lower catchment. Rural land in the Dee RBD is mainly used for agriculture and forestry. Mixed sheep and beef-cattle farming is undertaken in the uplands, with intensive dairy farming in the lower lying land of the Cheshire Plain and some arable farming in the lower Dee valley. The Dee Estuary supports commercial fishing, including a nationally important cockle fishery situated within the estuary. The upper waters also support salmon and trout game fishing with excellent fly fishing for Brown Trout, Sea Trout, Salmon and Grayling. The River Dee is recognised as one of North Wales' premier rivers for Atlantic salmon. The Mynach, Meloch and Ceiriog tributaries are the most important salmon spawning tributaries in the Dee catchment.

Many of the areas providing food services are sensitive to changes potentially caused as a result of the RBMP, notably from those measures involving land use change, riparian zone management and work to reduce nutrient runoff and sedimentation which are often focused on agricultural land.

#### **Future baseline – what food services are likely to be provided in the absence of the plan?**

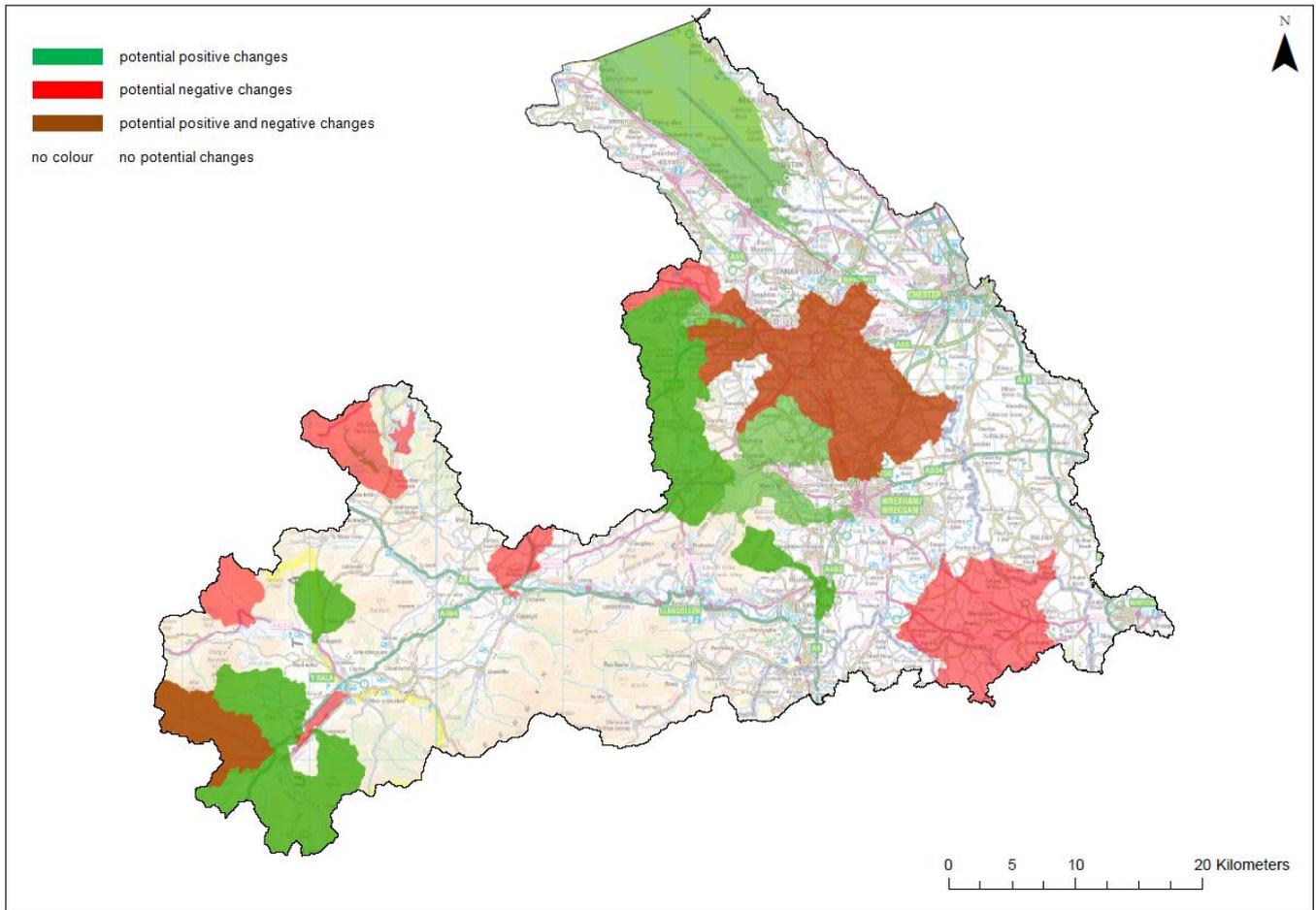
In the absence of the RBMP, the management of land and waters for agricultural purposes and the production of food is likely to continue, with increased technological and scientific advancements enhancing the productivity of the land and waters within the RBD and thus the amount of food that is produced. Development in the lower areas of the RBD are likely to encroach onto agricultural land around the urban centres of Chester, Wrexham and Buckley, which will reduce the amount of agricultural land available and thus the amount of

food produced and the value of this service in the RBD. Increasing use of the lower catchment for industrial use could cause changes to water quality and availability, which in turn could decrease fish populations.

### **What is the predicted change in food services in the Dee RBD?**

Key measures that result in potential effects on the food services in the RBD include:

- In the short term, there will be a reduction of available agricultural land through implementation of riparian buffer strips, planting and management and thus reduced food supply and increased cost to farmers where these measures are implemented. However, in the long term the measures would cause a positive effect as farming methods become more sustainable. Measures will result in efficiencies in the use of fertilisers and nutrients, improved availability of water supplies for irrigation and livestock and potentially more productive soils and reduced erosion of soils.
- Improvements to water quality leading to a healthier water environment for the cockle and shellfisheries in the RBD, and a positive effect on the food service.
- Removal or easement of barriers to fish passage, and enhanced fisheries habitat with geomorphological diversity and more naturalised channels will increase the available habitat for fish in the rivers of the RBD. This will lead to an increase in population of this food resource.



**Figure 4.1: Distribution of potential effects to food service within the Dee RBD**

Overall, it is anticipated that as a result of the RBMP there will be a minor positive effect on the food services provided within the Dee RBD in the long-term, but there may be short term negative effects associated with reductions in available agricultural land. Effects will largely be concentrated in the lower catchment and Dee Estuary, as well as the grazed uplands as shown in Figure 4.1.

### **How significant are the predicted changes to food services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the food services in the RBD, however there is anticipated to be a minor, positive effect to the food services overall, with some specific areas of the RBD experiencing negative effects in the short-term but a positive effect in the long-term. The main beneficiaries of this positive effect will be the agricultural and fishing industries as their land will be more productive and

the water environment will be healthier for fish and shellfisheries. The indirect and cumulative effects of the improvements to the food service are outlined in Section 3 below.

## **2. Water for Non-Consumptive Use (e.g. hydropower, navigation)**

### **Description of water for non-consumptive use services that ecosystems provide**

The use of water for economic activity that does not involve permanent abstraction, this includes water used for energy generation (hydroelectric, cooling for thermoelectric such as fossil fuel and nuclear plants), navigation and transport.

### **What water for non-consumptive use services are currently provided in the Dee RBD?**

The water bodies in the RBD are widely used for water sports such as canoeing, sailing and rowing. The National White Water Centre is on the River Tryweryn and the centre relies on timed releases from Llyn Celyn. Whilst the primary aim of this regulation is drinking water supply in the lower catchment, a nationally significant recreational resource indirectly benefits. The River Dee is navigable from Farndon Bridge to the Dee Estuary by sea-worthy craft, however Chester Weir on the river restricts vessels over 2.8 metres in height and 0.9 metres in draught. The river Dee also connects to the Shropshire Union Canal at Crane Wharf in Chester, which then joins the Llangollen and Montgomery Canal. These channels are regularly navigated by barges for recreational purposes.

There are a range of industrial operations within the lower section of the RBD, in the Deeside area most notably including Deeside Power Station, a 498MW gas-fired power station; Connah's Quay Power Station, a 1,420 MW gas-fired power station; and Tata Steel's Deeside plant. These operations use water from the River Dee and Dee Estuary for cooling purposes.

There are a number of weirs along the River Dee and its tributaries in the upper RBD that would have originally been used for abstraction purposes for industrial, commercial and residential purposes. Water is also stored in lakes and reservoirs in the upper RBD, including in Llyn Celyn, Llyn Tegid (or Bala Lake) and Llyn Brenig.

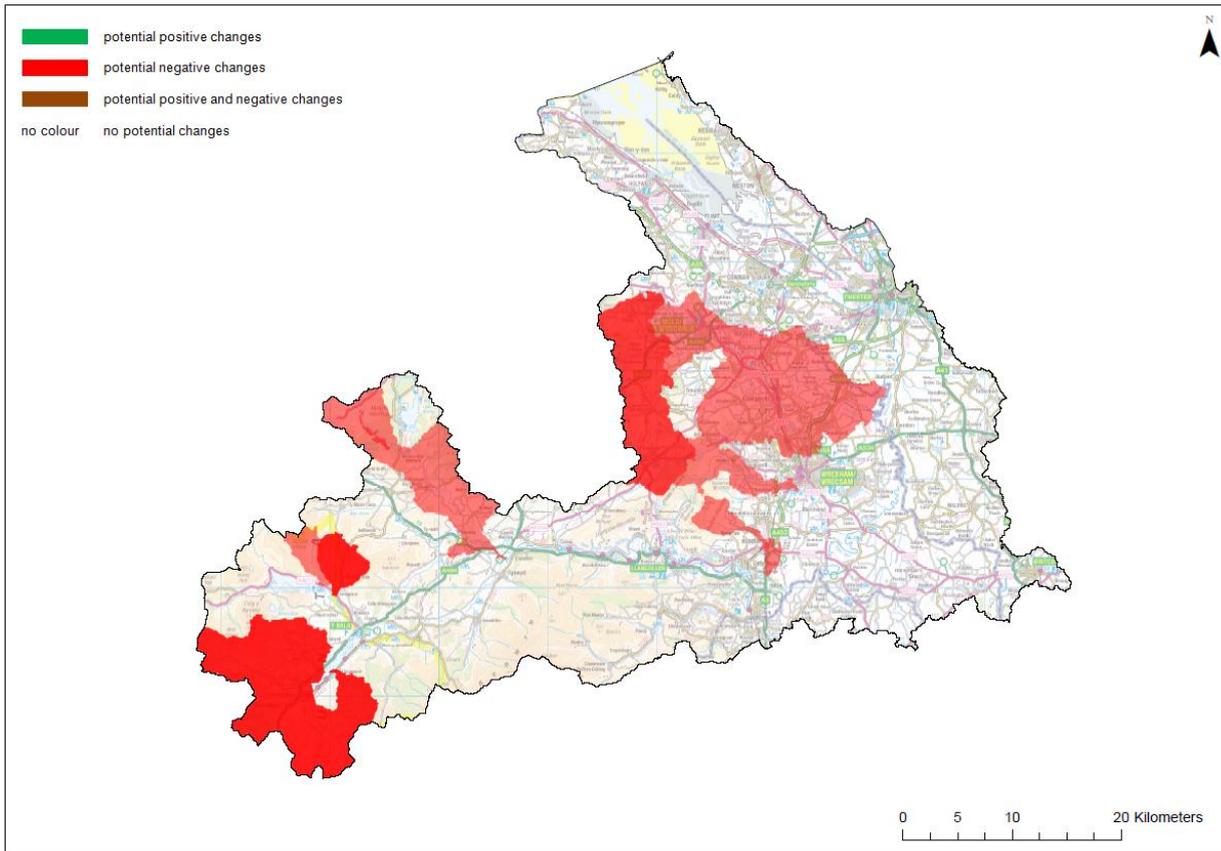
### **Future baseline – what water for non-consumptive use services are likely to be provided in future in the absence of the plan?**

The use of water for navigation is likely to continue as currently, however the use of water for industrial cooling purposes may increase in the short-term with predicted increases in gas-fired power generations but then decrease in the long-term as renewable energy generation increases. The weirs along the rivers and the discharge points of the lakes and reservoirs in the RBD have the potential to be utilised for run-of-river and high-head hydropower schemes to generate renewable energy for the surrounding areas and the national grid.

### **What is the predicted change in water for non-consumptive use services in the Dee RBD?**

Key measures resulting in potential effects on the water for non-consumptive use service in the RBD include:

- Reduction of the generation capacity of existing hydropower schemes and reduction in the potential for implementation of future hydropower schemes, due to the removal or modification of existing barriers to fish passage.
- Prevention of construction of new barriers (for hydropower or abstraction) that would result in reduced availability of fish habitat.
- Decreased navigational ability resulting from modifications to or reductions in the dredging regime of the water bodies, which would be implemented to improve channel morphological diversity.
- Decreased availability of water for cooling and other industrial purposes from measures to increase regulation of water abstraction across the RBD.



**Figure 4.2: Distribution of potential effects to water for non-consumptive use service within the Dee RBD**

Overall, it is anticipated that as a result of the RBMP there will be a minor negative effect on the water for non-consumptive use services provided within the Dee RBD. Effects will largely be concentrated in the western uplands of the RBD and in the more urbanised areas in the central section of the RBD. No effects are anticipated in the industrialised areas around Deeside, as shown in Figure 4.2.

**How significant are the predicted changes to water for non-consumptive use services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the water for non-consumptive use service in the RBD, however there is anticipated to be a minor, negative effect to the water for non-consumptive use service overall. The main parties subject to this negative effect will be industrial and energy-generation businesses, as quantities of water available for abstraction could be limited at certain times. Mitigation for this potential negative effect may include careful site selection, with works managed for

the avoidance of local effects and appropriate consultation with affected parties undertaken. There are also opportunities for improving water availability for non-consumptive use such as hydroelectric schemes and navigation through permitting, improving access to rivers and lakes and provision for other users. The indirect and cumulative effects of the improvements to the water for non-consumptive use service are outlined in Section 3 below.

### **3. Climate Regulation**

#### **Description of climate regulation services that ecosystems provide**

Ecosystems influence climate both locally and globally. For example, at the local level, changes in land cover can affect both temperature and precipitation. At the global level, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases.

#### **What climate regulation services are currently provided in the Dee RBD?**

There are several major lakes and storage reservoirs situated in the upper part of the RBD, including Llyn Tegid. These lakes and reservoirs, due to their depth, are likely to be sequestering carbon and storing it in the lake sediments. The storage reservoirs are used to control flood risk and manage abstraction in the lower sections of the RBD. Areas of peat are present in the upland areas of the RBD, especially in the west, within Snowdonia National Park and the Berwyn Range. There is also extensive forest cover in the RBD and both this and the areas of peat provide significant carbon stores and local climate regulation. In more urbanised areas, urban tree cover and open, vegetated parkland provide local climate regulations services, reducing the effect of urban heat islands.

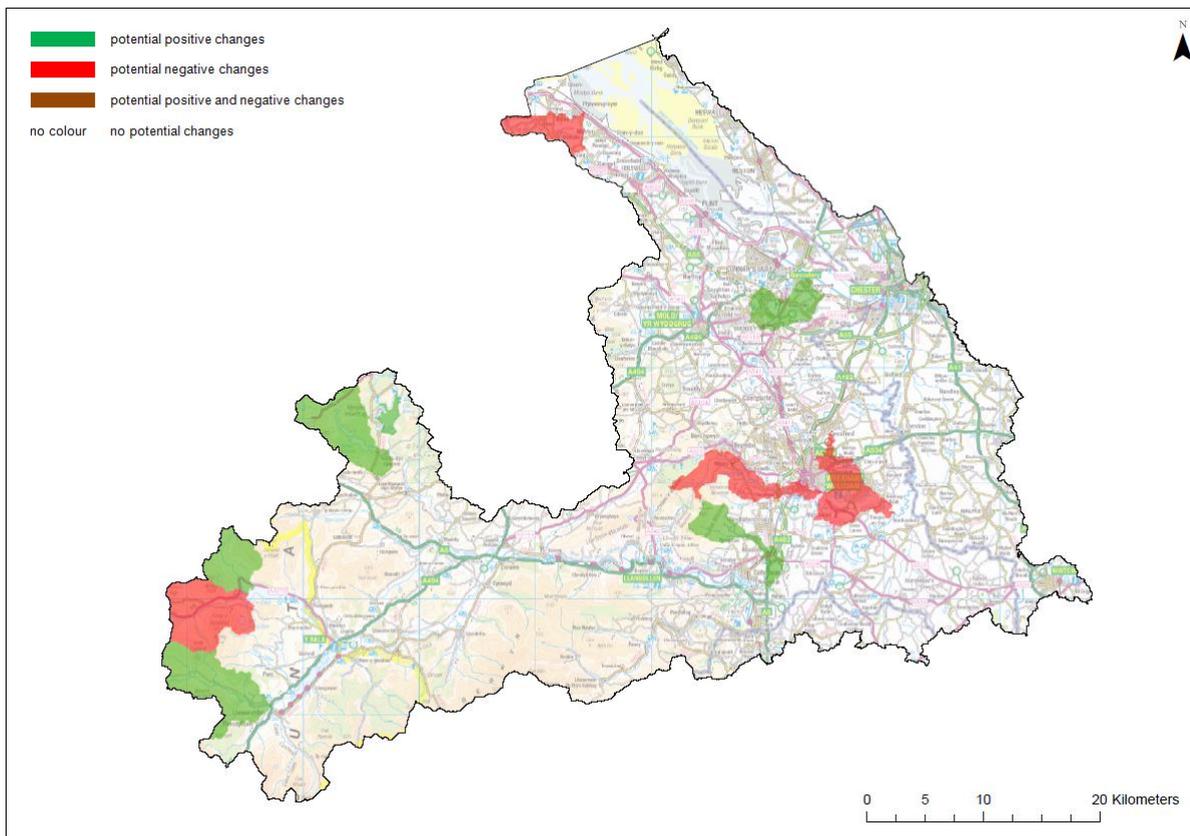
#### **Future baseline – what climate regulation services are likely to be provided in future in the absence of the plan?**

In the absence of the RBMP, it is predicted that by the 2050s, temperatures across the RBD could rise by between 1.2 and 4.4°C as a result of natural climatic variability and also anthropogenic climate change from land use changes, increased urbanisation and increased atmospheric emissions. Rainfall patterns are also predicted to change with more frequent and severe rainfall events expected. A changing climate also causes water-

related issues such as decreased water availability and increased flood risk from fluvial and coastal sources. With predicted climate change, there is a risk of increased temperatures and decreased precipitation resulting in the drying out of peat stores and release of carbon.

### What is the predicted change in climate regulation services in the Dee RBD?

Overall, it is anticipated that as a result of the RBMP there will be a minor positive effect on the climate regulations services provided within the Dee RBD. Effects will be spread across disparate areas of the RBD, in the uplands where peat and forestry stores are important and in more urbanised areas around Wrexham and Deeside, as shown in Figure 4.3.



**Figure 4.3: Distribution of potential effects to climate regulation service within the Dee RBD**

Key drivers of potential positive effects to the climate regulation service in the RBD include:

- Ditch blocking, to create areas of wetland, and planting of buffer strips around forestry and along riparian zones would increase the amount of carbon that is stored in the RBD and the climate regulation services provided by the catchment.
- Creation of habitat and greenspace in urban areas will provide a small carbon store but also provide local cooling and climate regulation.

Whilst the overall effect is anticipated to be positive, there are anticipated to be small, localised negative effects to this service through carbon-intensive measures such as remediation of historic metal mines and coal mine, and construction works associated with improving sewage treatment works efficiency and sewage infrastructure.

### **How significant are the predicted changes to climate regulation services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the climate regulation services in the RBD, however there is anticipated to be a minor, positive effect to the climate regulation service overall. The main beneficiaries of this positive effect will be the population, habitats and species of the RBD, who will be exposed to a slightly lesser risk from a changing climate and the associated effects. The indirect and cumulative effects of the improvements to the climate regulation service are outlined in Section 3 below.

## **4. Water Regulation (e.g. flooding)**

### **Description of water regulation services that ecosystems provide**

The timing and magnitude of run-off, flooding and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water-storage potential of the system such as the conversion of wetlands or the replacement of forests with farmland or farmland with urban areas.

### **What water regulation services are currently provided in the Dee RBD?**

The River Dee is 110 kilometres long from its source in the Snowdonia National Park to where its estuary discharges into Liverpool Bay. Upstream of Llyn Tegid the river is fast flowing in a narrow incised valley, whilst downstream of the lake the valley bottom and

natural floodplain opens out to approximately one kilometre wide. The river once again follows a narrow incised valley through Llangollen and downstream to Erbistock (upstream of Bangor-on-Dee). Between Erbistock and Chester the floodplain is flat and very wide.

Downstream of Chester Weir the river was canalised over 200 years ago and flood defences, which are still maintained today, were constructed to protect land from tidal inundation. The River Dee is normally tidal up to Chester Weir. This boundary is exceeded for spring high tides and extreme tides when tidal influence can affect river levels as far upstream as Shocklach, 15 kilometres upstream of Chester Weir.

The natural river system is modified in the upper catchment through flow -control at the Bala sluices located at the confluence of the River Dee and the River Tryweryn. The River Dee is a heavily regulated channel, for drinking water abstractions and flood alleviation purposes. This regulation is also beneficial for recreation around Tryweryn, with the presence of the National White Water Centre. When flows in the river are low, the lakes are regulated to maintain the volumes required for drinking water abstractions. Similarly, where flows in the river are high, the releases from the lakes are regulated to reduce the risk of flooding in the lower reaches. The regulation of the reservoirs in the upper RBD affects the whole reach of the main River Dee as drinking water abstraction points are in the lower reaches of the RBD.

Flooding has occurred at many locations in the RBD, mostly from the main River Dee and its major tributaries, but also from smaller watercourses. Significant fluvial floods were recorded in 1890, 1946, and 1964 and recently in 2000. The RBD is also at risk of tidal flooding from the Dee Estuary. The areas that are at risk from tidal flooding from the Dee Estuary are between Talacre, Chester and Neston, covering the main centres of population around Talacre, Holywell, Flint, Connah's Quay, Queensferry, Sealand and Neston.

Land use within the catchment is predominantly agricultural, forestry or open moorland and peat bog. There are a number of large urbanised areas. Run-off from the agricultural land

and urban areas is likely to be relatively quick, but the forestry and upland peat bogs will store water for a time.

### **Future baseline – what water regulation services are likely to be provided in future in the absence of the plan?**

In the absence of the plan, water regulation services are likely to be under increasing pressure in the Dee RBD due to new development, agricultural intensification and climate change. Urban expansion, for example, will lead to greater rates of surface water run-off and further reduce the capacity of natural floodplains to retain and store flood waters. Agricultural intensification could also increase surface water run-off in rural areas of the RBD. Predicted climate change increases the risk of more severe precipitation events, causing an increased risk of surface water and fluvial flooding, reducing the water regulation service provided by the RBD. Sea level rise will also increase the flood risk in the tidally affected reaches.

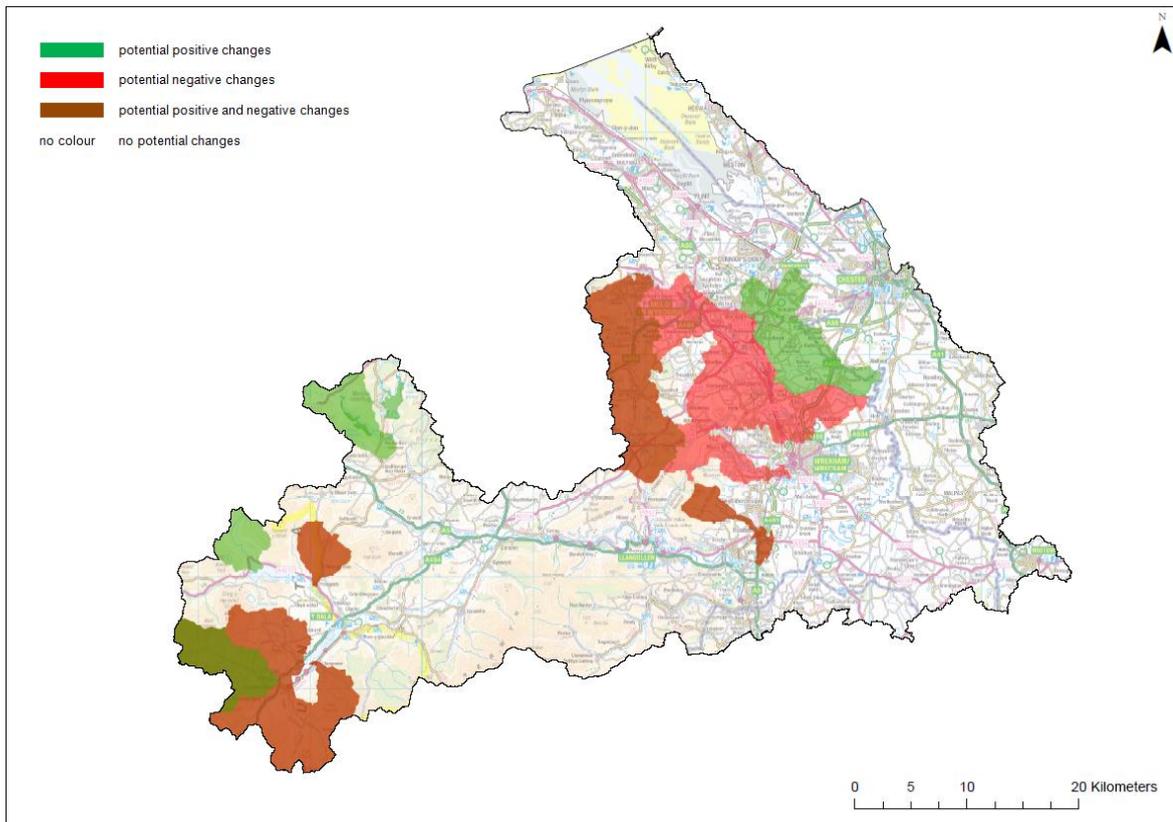
### **What is the predicted change in water regulation services in the Dee RBD?**

The key measures that result in the potential positive effect on the water regulation service in the RBD are:

- Ditch blocking and creation of wetland areas will provide areas for water storage in the upper sections of the RBD, slowing rates of runoff and downstream conveyance and thus the risk of flooding; and
- Increased vegetation and tree cover, and riparian planting will reduce surface water runoff rates and also stabilise banks from erosion, both of which will reduce the risk of flooding and improve the water regulation services provided by the RBD.

There are also potential negative effects on flood risk through increased conveyance from removal or modification to weirs and also potential blockages in-channel from increased channel roughness.

Overall, it is anticipated that as a result of the RBMP there will be a minor positive effect on the water regulation service provided within the Dee RBD. Effects will largely be concentrated in the uplands of the RBD, and in the lowland areas to the north of Wrexham, as shown in Figure 4.4.



**Figure 4.4: Distribution of potential effects to water regulation service within the Dee RBD**

### **How significant are the predicted changes to water regulation services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the water regulation services in the RBD, however there is anticipated to be a minor, positive effect to the water regulation service overall. The main beneficiaries of this positive effect will be the residents and business in low-lying parts of the RBD, near the rivers and Dee Estuary, as their flood risk will be reduced. Benefits to sensitive ecological habitats and species will also benefit through reduced potential for damage or mortality. The indirect and cumulative effects of the improvements to the water regulation service are outlined in Section 3 below.

## 5. Soil & Erosion Regulation

### **Description of erosion regulation services that ecosystems provide**

Soil erosion is a naturally-occurring process involving the mobilisation and deposition of soil particles, mainly by water and air. Erosion Regulation Services are a means of describing the ability of habitats and plants to help retain soils and reduce rates of erosion.

### **What erosion regulation services are currently provided in the Dee RBD?**

Rates of soil erosion are influenced by factors such as rainfall, slope, soil type and the type and extent of vegetation cover. Where vegetation is removed through cropping, grazing or deforestation for example, erosion rates generally increase. Agricultural practice is considered to be the main cause of soil erosion in England and Wales. With its high rainfall, steep upland catchments and a relatively large amount of rural land used for agriculture, soil erosion rates have the potential to be high in the Dee RBD. Soil erosion and sedimentation is a widespread issue, the majority caused by high rates of surface water run-off from agricultural land (diffuse pollution). This is typically the result of limited riparian buffer zones, agricultural practices, soil compaction, bankside damage caused by livestock poaching and heavy rainfall events.

Some soil types are more susceptible to erosion in the Dee RBD. The acid upland soils in elevated catchments of the RBD are at risk of gullyng and loss of particulate matter especially where the vegetation is lost or damaged. The thin acid soils on steep fell slopes can also be affected by erosion especially through grazing or walking pressures.

### **Future baseline – what erosion regulation services are likely to be provided in future in the absence of the plan?**

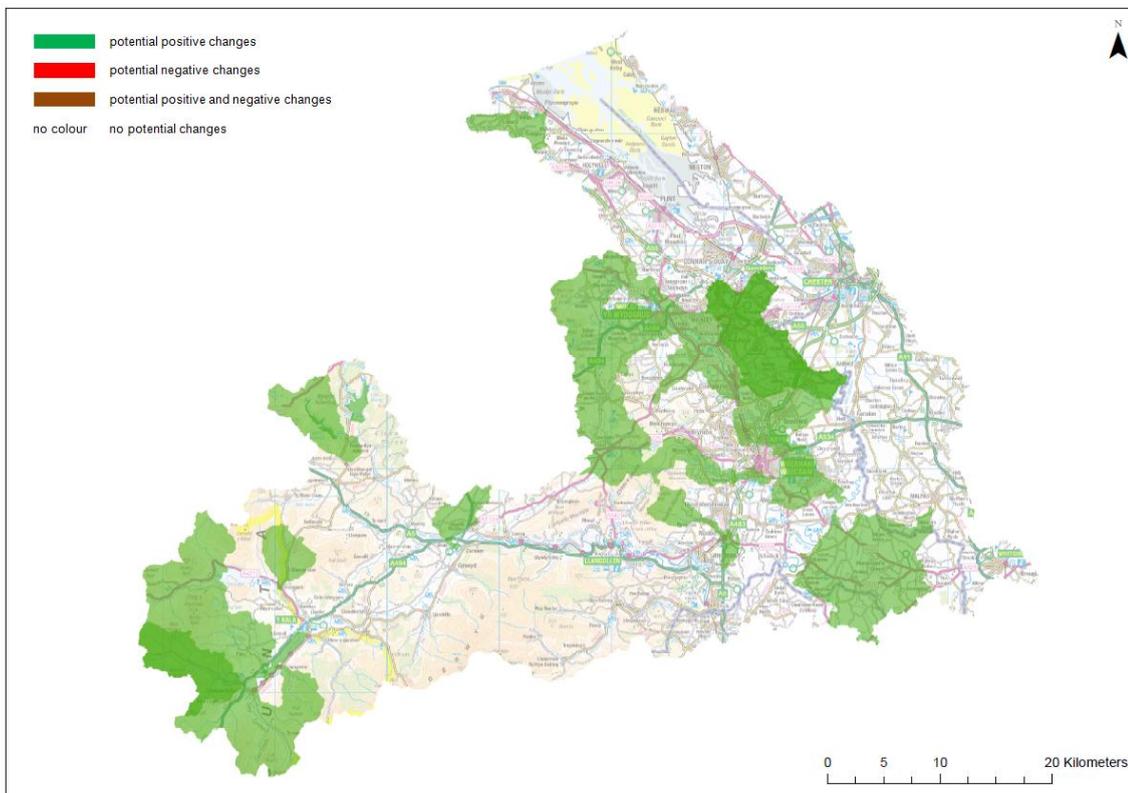
In the absence of the RBMP, predicted climate change and subsequent increased severity of weather events, erosion from rainfall, increased river levels and storm damage (e.g. falling trees) as well as predicted population growth and subsequent increased urbanisation and intensification of food production will lead to more soil erosion within the RBD and the erosion regulation service to be lessened. Ongoing initiatives to restore peatlands could lessen the effects to this service and reduce rates of erosion in upland areas and there is a growing awareness of good soil management in the agricultural community leading to improved yield.

## What is the predicted change in erosion regulation services in the Dee RBD?

Key measures that result in positive effects on the erosion regulation service in the RBD include:

- Implementation of agricultural measures, including fencing of river banks to stop poaching would reduce erosion in the short/medium term.
- Creation of wetland areas, increased tree and vegetation cover, forestry buffer strips and riparian zone management and planting, all associated with sustainable agricultural and forestry management practices, would reduce soil erosion due to increased soil stability and less exposure of soil to erosive processes;

Overall, it is anticipated that as a result of the RBMP there will be a minor positive effect on the erosion regulation service provided within the Dee RBD. Effects will be spread across the RBD, in Snowdonia National Park and also in the more lowland areas, as shown in Figure 4.5.



**Figure 4.5: Distribution of potential effects to erosion regulation service within the Dee RBD**

## **How significant are the predicted changes to erosion regulation services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the erosion regulation services in the RBD, however there is anticipated to be a minor, positive effect to the erosion regulation services overall. The main beneficiaries of this positive effect are wildlife and people who use rivers and lakes. Controlling soil erosion and sedimentation will be likely to increase people's use and enjoyment of ecosystems and the services they provide (recreation and freshwater for example). Reducing erosion will benefit fish and invertebrate populations that are either sensitive to elevated levels of sediment or are affected by a reduction in breeding habitat. Controlling soil erosion and sedimentation will also lead to a positive effect on the amount of nutrients (especially nitrogen and phosphorus) entering rivers and lakes which can negatively affect ecology. The indirect and cumulative effects of the improvements to the erosion regulation service are outlined in Section 3 below.

## **6. Water Purification and Waste Treatment**

### **Description of water purification and waste treatment services that ecosystems provide.**

Ecosystems can be a source of impurities (e.g. in fresh water). However, they can help in the filtering out and decomposition of organic wastes introduced into inland waters and coastal and marine ecosystems and can also assimilate and detoxify compounds through soil and sub-soil processes.

### **What water purification and waste treatment services are currently provided in the Dee RBD?**

The Dee RBD has an extensive sewerage system to collect, treat and dispose of waste water from approximately 500,000 residents and businesses and there are a number of treatment works along the River Dee. In wet weather, many sewer systems cannot cope with the influx of rainwater leading to storm water overflows discharging untreated sewage. This can have an adverse impact upon the receiving water course and affect bathing water standards around the coast. Leaking sewers in some larger urban centres may be affecting groundwater. Water quality is influenced by urban and industrial waste and sewage and by runoff from agricultural land throughout the catchment. Further information

on the risks to water quality within the Dee RBD is provided in the main RBMP. The ecosystem of the Dee RBD provides services to purify water and treat waste through filtering properties of geology, vegetation and wetland areas.

### **Future baseline – what water purification and waste treatment services are likely to be provided in future in the absence of the plan?**

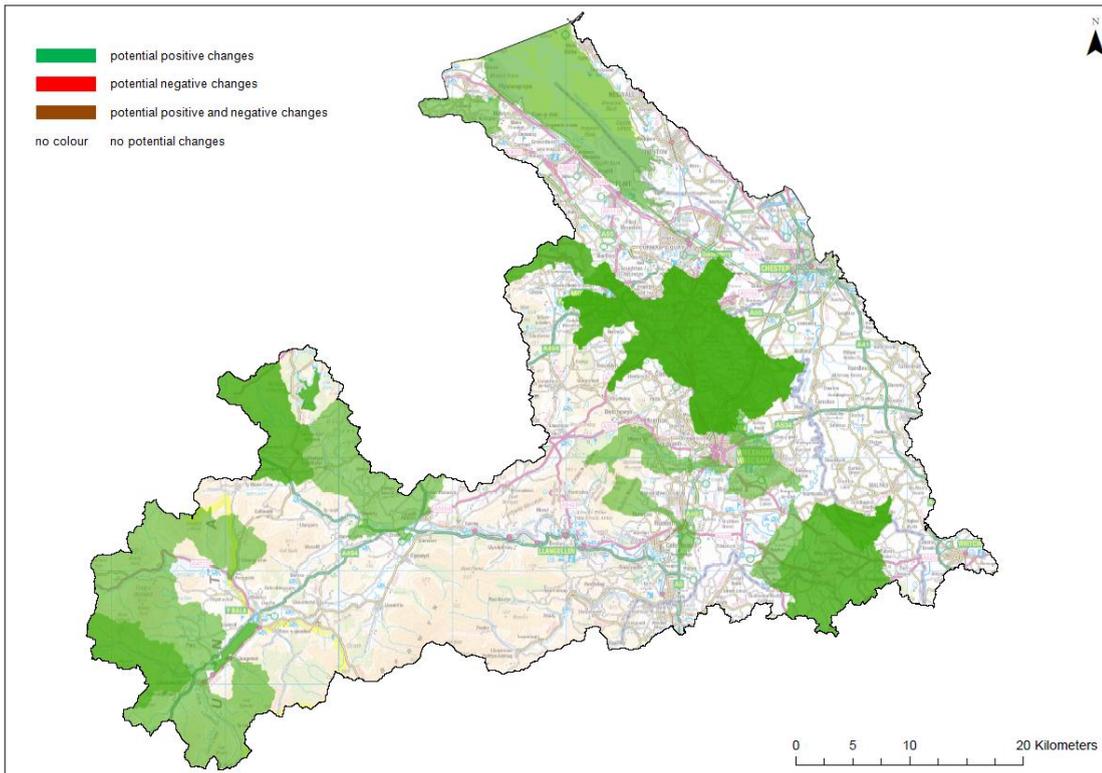
In the absence of the RBMP, the ability of the ecosystems to dilute, store and detoxify waste products and pollutants in the Dee RBD is likely to remain broadly consistent with the baseline situation. In some areas, however, the situation could deteriorate due to urban growth and the increased pressures on levels of water abstraction and the capacity of sewage treatment infrastructure.

### **What is the predicted change in water purification and waste treatment services in the Dee RBD?**

Key measures resulting in potential positive effects on the water purification and waste treatment service in the RBD include:

- Measures to reduce acidification and implement sustainable agricultural and forestry practices, through wetland creations, forestry planting and forestry buffer strips, and also nutrient and riparian zone management will positively affect water quality and the ability of the ecosystem to purify water. This will occur through reduction in pollutants and other suspended material in the watercourses and also increased vegetation cover and reduced nutrient-rich runoff into water bodies.
- Measures to reduce pollutants in water from abandoned metal mines and coal mines, as well as from water treatment works through direct treatment of water, remediation projects and infrastructure improvements.

Overall, it is anticipated that as a result of the RBMP there will be a major positive effect on the water purification and waste treatment services provided within the Dee RBD. Effects will be seen across the majority of the RBD, in the uplands, lowlands and in the Dee Estuary, as shown in Figure 4.6.



**Figure 4.6: Distribution of potential effects to water purification and waste treatment service within the Dee RBD**

### **How significant are the predicted changes to water purification and waste treatment services in the Dee RBD?**

Implementation of the Dee RBMP is anticipated to have a significant positive effect on the water purification and waste treatment services in the RBD. The main beneficiaries will be the users of and visitors to the rivers, lakes and estuary, as the waters will be cleaner and healthier. Water companies and other operators are likely to incur increased costs in the short term due to the implementation of improved treatment facilities. However, in the longer term water companies will also benefit through reduced treatment costs due to the improved ability of natural systems to retain nutrients and contaminants. The indirect and cumulative effect of the improvements to the water purification and waste treatment service are outlined in Section 3 below.

## 7. Cultural Heritage

### **Description of cultural heritage services that ecosystems provide**

Many societies place high value on the maintenance of both historically important landscapes ('cultural landscapes') and other features (buildings, archaeology, and links to past industrial uses).

### **What cultural heritage services are currently provided in the Dee RBD?**

There are more than 400 Scheduled Monuments within the Dee RBD, as well as numerous sites of historical or archaeological importance (e.g. Listed Buildings, Registered Historic Parks and Gardens) and landscapes listed on the Register of Landscapes of Historic Interest in Wales including Holywell Common and Halkyn Mountain; Vale of Llangollen and Eglwyseg; Maelor; Bala and Bala Lakeside. Of particular importance to this plan is the heritage value of the canal network which includes the Pontcysyllte Aqueduct and Canal World Heritage Site.

The city of Chester has an important heritage value, having been founded as a Roman fort with the name Deva Victrix. Chester's four main roads, Eastgate, Northgate, Watergate and Bridge, follow routes laid out at the time of founding. The first evidence of settlement in the town of Wrexham was from the 12<sup>th</sup> century, and the town contains important medieval heritage. The settlement of Llangollen also has intrinsic heritage value, with Castell Dinas Brân standing above the town, the site of a medieval castle and prior to that an iron age hill fort. Llangollen also has an important post-medieval history, with the Llangollen Canal and Llangollen Railway constructed during the industrial revolution.

Many structures such as mills, bridges, weirs and sluices within the river basin district have listed status or are of local historic importance and therefore removing or altering them to aid fish passage can have negative cultural heritage impacts. The legacy of mining in the catchment has impacted water quality, but surviving mine features may also be important for their heritage value.

There are also likely to be numerous other, non-designated archaeological and built heritage assets across the RBD. Archaeological features associated with the flood plain

and land saturated by groundwater can be put at risk from drying out, erosion or inundation.

### **Future baseline – what cultural heritage services are likely to be provided in future in the absence of the plan?**

The future baseline for cultural services is dependent on the actions of a range of stakeholders (e.g. public, private and voluntary sectors) to conserve and enhance the historic environment, heritage assets and their settings. In the absence of the plan, there is the potential for heritage assets within the Dee RBD to be affected by the abstraction of water and the resulting changes in groundwater flows and chemistry on buried, waterlogged archaeological and palaeo-environmental remains associated with the river valleys, floodplains and wetland habitats. Heritage assets may also be subject to increased flood risk as a result of climate change and increased development pressures in urban areas leading to more frequent and intense fluvial and surface water flooding events.

### **What is the predicted change in cultural heritage services in the Dee RBD?**

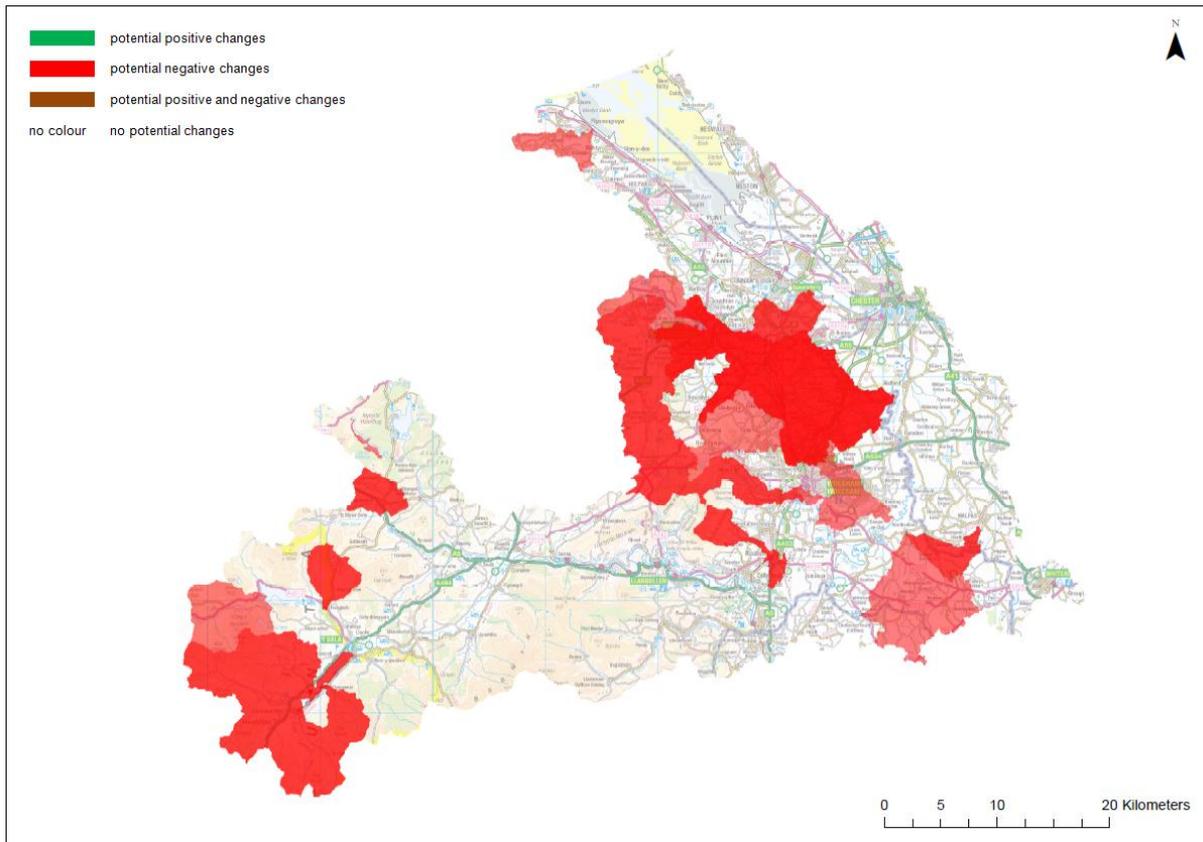
Key measures resulting in potential negative effects to the cultural heritage service in the RBD include:

- Potential to harm features of historic interest and archaeological remains, including peat deposits and palaeo-environmental channels through changes to land use or ditch blocking and forestry buffer strips;
- Modifying or removing barriers to fish passage, as many weirs and other barriers to fish passage have heritage value and removing or altering them could change their heritage value;
- Disturbance of buried archaeological assets or modifications to existing heritage assets (such as Scheduled Monuments, Listed Buildings etc.) from undertaking works to sewage treatment plants, and other utilities infrastructure and abandoned metal mines.

To mitigate for these potential negative effects, a cultural heritage assessment of any intrusive works should be undertaken, maximising use of local knowledge, prior

implementing the relevant measure. This will ensure all effects on the archaeological or built heritage resource are managed appropriately. Also, ditch blocking and creation of wetland areas will preserve buried archaeological remains which could enhance the archaeological resource. The method of implementation of these measures must be carefully controlled to ensure this opportunity is realised. There are opportunities for delivering localised positive changes in cultural heritage services by preserving and recording heritage at risk and by increasing awareness, understanding and enjoyment of the historic environment. These positive changes could occur through increasing the awareness of landowners and local communities of water related heritage assets and their significance; promoting their conservation and enhancement as part of an integrated approach to catchment management and sustainable land management; and improving public access and interpretation.

Overall, it is anticipated that as a result of the RBMP there will potentially be a major negative effect on the cultural heritage services provided within the Dee RBD. This is highly dependent upon the siting of measures however, as the cultural heritage value within the catchment is confined to distinct spatial areas and landscapes, and avoidance of these by measures will minimise the potential for effects. Effects will largely be concentrated in the upland regions, where there is the potential to disturb buried, unknown archaeology, which may have been preserved in peat. Also, in the central section of the RBD where excavation and removal of weirs or obstructions to fish passage could damage heritage assets, as shown in Figure 4.7.



**Figure 4.7: Distribution of potential effects to cultural heritage service within the Dee RBD**

### **How significant are the predicted changes to cultural heritage services in the Dee RBD?**

Implementation of the Dee RBMP is anticipated to have a potential significant effect on cultural heritage services. This adopts a precautionary approach given the high degree of uncertainty across the majority of the RBD as to the location and design of measures and the nature of cultural heritage features that could be affected. The main parties subject to this negative effect will be the users of and visitors to assets, as the appreciators of the cultural heritage of the RBD. The intrinsic heritage value of the catchment could also be affected.

To conserve and enhance the historic environment it will be important that individual schemes at the earliest stage identify any designated or non-designated heritage assets, including the risk of unknown buried archaeology, in order to: establish the potential for adverse effects as well as opportunities for enhancement; determine whether any action

should be taken due to the significance of the heritage assets and likely impacts; inform scheme options and detailed design; and identify an appropriate mitigation strategy.

If potential adverse effects are identified, scheme specific mitigation will need to be developed in consultation with the relevant organisations, such as Cadw or English Heritage, the relevant Archaeological Trust and the local authority conservation officer. The indirect and cumulative effects of the improvements to the cultural heritage service are outlined in Section 3 below.

## **8. Recreation and Tourism (including accessible blue and green space)**

### **Description of recreation and tourism services that ecosystems provide**

People often choose where to spend their leisure time based, in part, on the characteristics of the natural or cultivated landscapes in a particular area.

### **What recreation and tourism services are currently provided in the Dee RBD?**

Recreational and tourism opportunities within the RBD are extremely varied from angling and other water sports to walking and popular visitor destinations such as Snowdonia National Park, Clwydian Range and Dee Valley AONB, Llangollen, Chester and Erddig near Wrexham.

The catchment has a network of walks often centred around watercourses and lakes, such as the Dee Valley Way. There is a variety of navigation and water sports in the catchment, including canoeing and white water rafting at the National Watersports Centre at Tryweryn, Sailing and Wind Surfing on Bala Lake, rowing at Chester and boating on the Llangollen Canal. There are also numerous biking opportunities in the RBD from mountain biking in upland areas to cycling along the Dee Estuary from Chester.

Angling is a popular recreational activity within the RBD. Salmon, trout and grayling fishing on the Dee itself and its tributaries, coarse fishing in the Llangollen canal and lakes in the RBD and saltwater fishing along the Dee estuary. The Dee Estuary is also considered to be a premier bird watching location for wetland and shore birds.

These water and land-based recreational opportunities can contribute to improving the quality of people's lives and human health whilst bringing economic benefit from tourism. Recreation and tourism industries account for at least 10,000 jobs in north east Wales.

### **Future baseline – what recreation and tourism services are likely to be provided in future in the absence of the plan?**

In the absence of the RBMP, it is anticipated that the recreation and tourism service will change and develop through time, influenced by projects and strategies to develop certain areas of the RBD. Some post-industrial areas will be transformed through regeneration initiatives, for example in the Deeside Enterprise Zone. People's perception of the local environment, which includes water quality, can play a significant role in the appeal of an area. For example, algal blooms in lakes have the potential to have a lasting impact on their use by people and the appeal of popular recreation areas within the RBD has the potential to decline.

### **What is the predicted change in recreation and tourism services in the Dee RBD?**

Key measures resulting in potential positive effects to the recreation and tourism service in the RBD include:

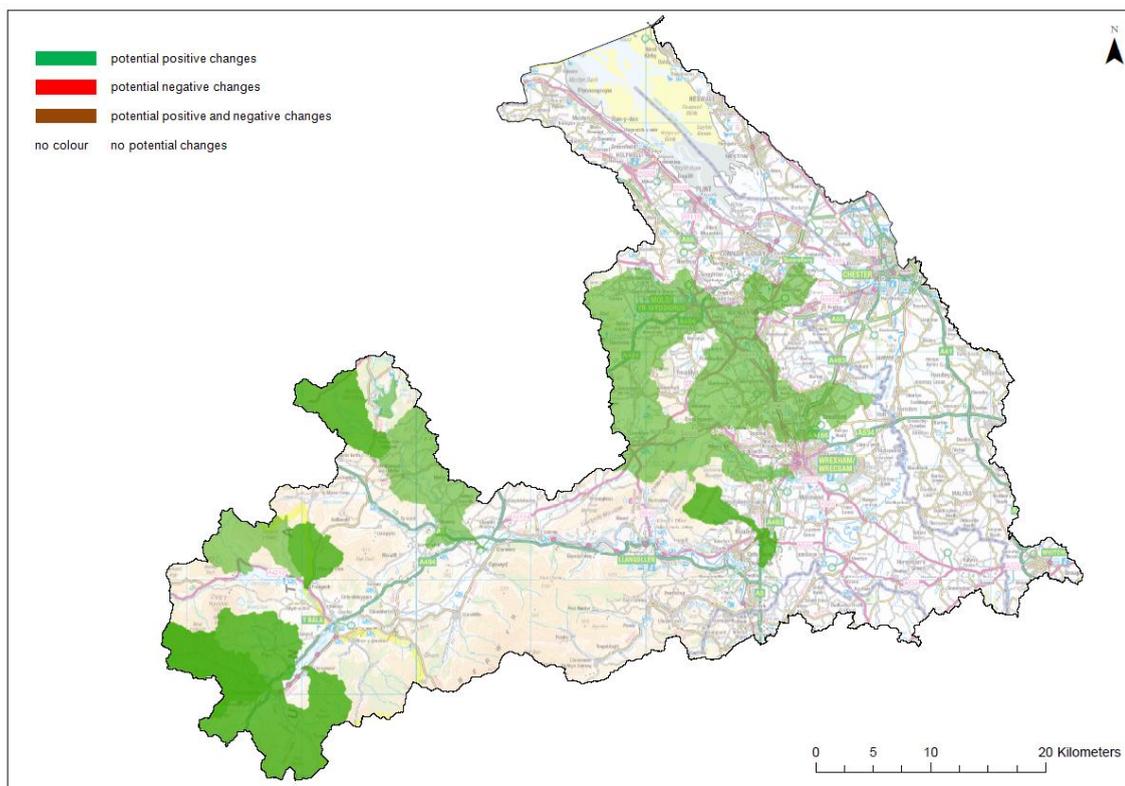
- Increased spawning habitats for fish, through removal of barriers to fish passage and improvements to riparian and in-channel habitats and diversity, bringing greater recreational fishing interests to the RBD;
- Riparian planting, and land use changes from sustainable forestry and agricultural management would create habitat valued as a tourist and recreational resource, and contribute to a more pleasant network of water bodies to undertake formal and informal recreational activities; and
- Reduction in pollution of water bodies from improvements to sewage infrastructure will improve the water environment for recreational and tourist use.

The numbers of users of water bodies is likely to increase in the long term as the water quality, clarity, flow and aesthetic value will be improved by the measures. An uptake in sports and outdoors activity would provide both physical and mental health benefits.

Environmental improvements resulting in better water quality, in combination with

economic and tourism developments, would encourage visitor numbers and spending in the medium to long-term.

Overall, it is anticipated that as a result of the RBMP there will be a minor positive effect on the recreation and tourism services provided within the Dee RBD. Effects will largely be concentrated in Snowdonia National Park, an important tourist destination in the RBD, and Clocaenog Forest as shown in Figure 4.8.



**Figure 4.8: Distribution of potential effects to recreation and tourism service within the Dee RBD**

### **How significant are the predicted changes to recreation and tourism services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the recreation and tourism service in the RBD, however there is anticipated to be a minor, positive effect to the recreation and tourism service overall. The main beneficiaries of this positive effect will be the users of and visitors to the rivers, lakes and estuary, as there will be a more naturalised landscape with increased vegetation and tree cover, with reduced pollution levels and better quality infrastructure. The tourist industry will also benefit from

increased expenditure on activities associated with the water environment. The indirect and cumulative effect of the improvements to the recreation and tourism service are outlined in Section 3 below.

## **9. Aesthetic Value (e.g. landscape, seascape, tranquillity)**

### **Description of aesthetic values services that ecosystems provide**

Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks and scenic drives and in the selection of housing locations.

### **What aesthetic value services are currently provided in the Dee RBD?**

The landscape and visual amenity of the Dee RBD varies considerably, as does land use. Agriculture and forestry dominate in the upper RBD and there are a variety of landscape and settlement patterns. The upper sections of the RBD include part of Snowdonia National Park and are predominantly rural in character. In the middle to lower sections of the RBD, the landscape changes to rolling hill slopes that gradually form the Cheshire plain. In this lower part, urban development has had a significant impact upon the river system and many river channels and flood plains no longer function naturally. There is one Area of Outstanding Natural Beauty (AONB) on the north-western boundary of the RBD; the Clwydian Range and Dee Valley, which comprises a network of heather-clad hills and the historic towns of Llangollen and Corwen in the lowlands. The upper, rural RBD and the rolling hills of the middle sections of the RBD provide key aesthetic value services, through picturesque scenery and wide vistas. In the lower parts of the RBD, parkland, gardens and urban trees provide a natural element to the urban setting, and equally important aesthetic value services within the RBD.

Many of the areas providing aesthetic value services, those designated as sensitive landscapes and the urban green space areas, such as Grosvenor Park in Chester and Belle Vue Park in Wrexham, are sensitive to changes potentially caused as a result of the RBMP, notably from those measures involving extensive construction or land use change.

### **Future baseline – what aesthetic value services are likely to be provided in future in the absence of the plan?**

In the absence of the RBMP, management of the sensitive landscapes is likely to continue to improve their quality and thus the aesthetic value services they provide. However, in the lowlands, there is a greater risk of changes to the landscape and to visual amenity through commercial, residential and industrial developments, particularly in Deeside and the surrounding area, due to the desire for economic development in this part of Wales with the proximity of the Port of Liverpool for industrial shipping.

### **What is the predicted change in aesthetic value services in the Dee RBD?**

Key measures resulting in potential positive effects to the aesthetic value service in the RBD include:

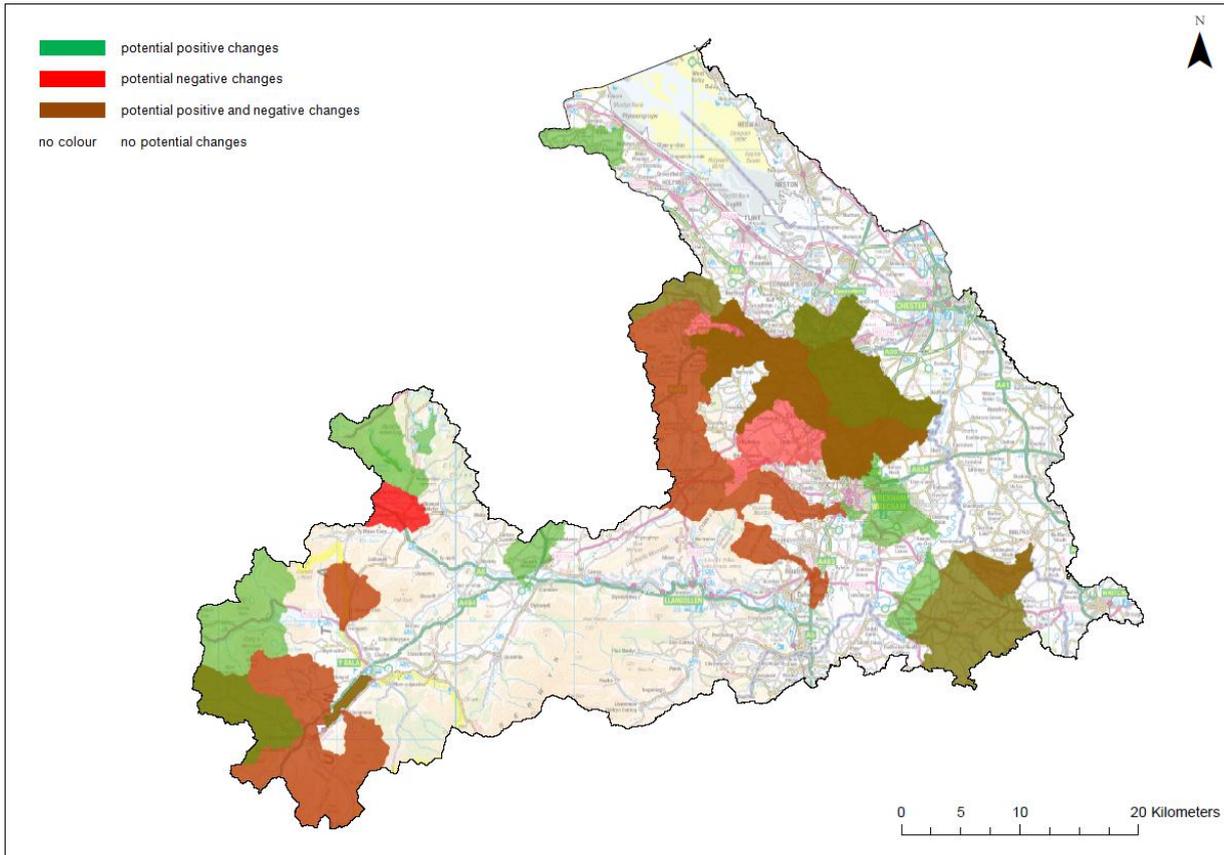
- Land use changes, through creation of wetlands and planting of buffer strips and other riparian vegetation;
- Nutrient management, riparian zone management and improvements to farmyard infrastructure, also leading to reduction in visible pollution of watercourses; and
- Naturalising of river channels and estuary banks through removal of hard bank infrastructure, riparian planting and landscaping.

Key measures resulting in potential negative effects within the RBD include:

- Changes to valued landscape character through remediation of historic metal mines; and
- Construction activities and utilities infrastructure at sewage treatment works and to improve Combined Sewer Overflows (CSOs).

In the assessment it is recognised, however, that many changes to this service are subjective and dependent upon the nature of the receptor and the value placed in certain landscapes.

Overall, it is anticipated that as a result of the RBMP there will be a minor positive effect on the aesthetic value services provided within the Dee RBD. Effects will largely be concentrated in the upland, sensitive landscapes of the Snowdonia National Park and areas north of Wrexham, as shown in Figure 4.9.



**Figure 4.9: Distribution of potential effects to aesthetic value service within the Dee RBD**

### **How significant are the predicted changes to aesthetic value services in the Dee RBD?**

Implementation of the Dee RBMP is not anticipated to have a significant effect on the aesthetic value services in the RBD, however there is anticipated to be a minor, positive effect to the aesthetic value services overall, with some specific areas of the RBD experiencing negative effects. The main beneficiaries of this positive effect will be the users of and visitors to the rivers, lakes and estuary, as there will be a more naturalised landscape with increased vegetation and tree cover, with reduced pollution levels and better quality infrastructure. The indirect and cumulative effects of the improvements to the aesthetic value service are outlined in Section 3 below.

## 10. Provision of Habitat (Biodiversity)

### Description of provision of habitat services that ecosystems provide

Habitats provide everything that an individual plant or animal needs to survive: food; water; and shelter. Each ecosystem provides different habitats that can be essential for a species' lifecycle. Many species of bird, fish, mammal and insect rely on different ecosystems during migration.

### What provision of habitat services are currently provided in the Dee RBD?

The catchment provides a wide range of important ecological habitats, including wetland, dunes, bog, natural river corridors and grassland. There are a range of locally, nationally and internationally designated sites for ecology within the catchment, which support a diverse range of species. The Dee RBD supports varied wetland wildlife and the importance of wetland habitat is reflected by the number and variety of international and national nature conservation designations. Of the designations present, 7 of the Special Areas of Conservation (SACs) and 3 of the Special Protection Areas (SPA) within the river basin district are water dependent. Water dependent Ramsar sites include the Dee Estuary and the Midlands Meres and Mosses. Many of the Sites of Special Scientific Interest (SSSIs) within the river basin district (approximately 70 in total) also have close links with the water environment.

The River Dee itself is designated a SAC and a SSSI. The interest features include Floating Water Plantain, Atlantic Salmon, Lamprey, Otter and fluvial geomorphology. The tidal Dee Estuary is also internationally important for nature conservation. As well as being a SAC and SSSI, it is also designated a SPA and a Ramsar wetland.

For each of these European Sites, Natural Resources Wales is in the process of reviewing Conservation Objectives aimed at ensuring the sites achieve favourable conservation status. In principle it has been agreed that favourable conservation status is the more stringent objective for European sites, and that achieving Good Ecological Status is a milestone towards this goal.

Water bodies and wetland areas within the Dee RBD support a number of protected species (such as Otters and Water Voles) and priority species listed in the UK Biodiversity Action Plan (such as Freshwater White-clawed Crayfish and Fresh Water Pearl Mussel). Fish are also important and the highly modified nature of the River Dee has led to there being many barriers to fish migration (45 in total). Invasive species in the catchment include Japanese Knotweed, Himalayan Balsam and North American Signal Crayfish. Offshore, parts of the marine environment are protected as part of the Marine Protected Area network. This incorporates different levels of protection and including SPAs, SACs and SSSIs with marine components.

Habitat creation is planned in the RBD, through projects such as the Sustaining Welsh Rivers Project, led by Afonydd Cymru and supported by Natural Resources Wales (NRW). There are also numerous projects to remove in-river obstacles and build fish passes in order to re-open existing spawning and feeding habitat for fish.

### **Future baseline – what provision of habitat services are likely to be provided in future in the absence of the plan?**

In the absence of the RBMP, climate change will place increasing pressures on this service, however, the provision of habitat services are likely to improve gradually over time associated with other initiatives and legislation targeted at environmental improvements and resilience to climate change.

### **What is the predicted change in provision of habitat services in the Dee RBD?**

Key measures resulting in potential positive effects to the provision of habitat service in the RBD include:

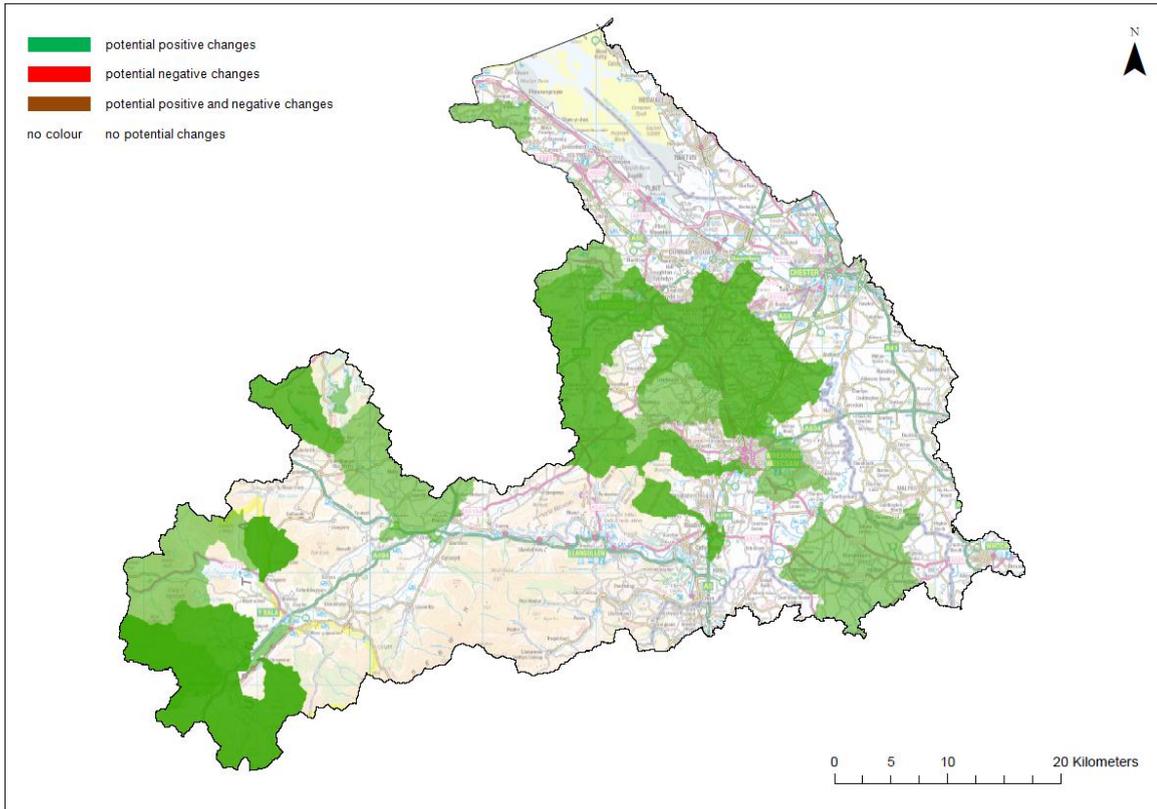
- Sustainable agricultural and forestry management practices, including creation of wetlands, land use changes and riparian planting will enhance habitats and the ability of the ecosystem to provide habitat across the RBD;
- Removal of barriers to fish passage and naturalising of urbanised channels and coastlines would make new habitat available for fish and also increase the habitats on the riverbank for species such as otter and water vole.

The RBMP includes a range of measures that will either directly or indirectly lead to the creation of new habitats (e.g. wetlands, riparian buffer strips, woodland and intertidal habitats) or improvements in their condition and connectivity with the wider landscape. Improvements in habitat diversity and quality will also serve to benefit wildlife and fisheries. These improvements, in turn, will contribute to other ecosystem services such as enhancing the character of riparian and coastal landscapes (aesthetic values) as well as supporting recreation and tourism services. The implementation of the measures also offers the opportunity to increase awareness and understanding of the water environment and its valued habitats and species (existence values), this in turn encouraging further engagement and support of landowners and local communities.

Measures to improve water quality, for example phosphate reduction, will have a positive impact on biodiversity both locally and within the River Dee protected sites. Whilst in the short term the levels of phosphate may not achieve WFD/Habitat Directive standards, in the medium to long term major benefits should be noticed.

There is the potential for some works, such as construction work associated with improving the efficiency of sewage treatment works and the sewer network, to cause a negative change on the provision of habitat service in the RBD, however this is considered to occur at a small scale and construction activities will be temporary with reinstatement undertaken. Also, remediating abandoned metal mines may cause a negative change on some specific habitats, for example rare metallophytic lichens or other lower plants that have adapted to the metal-rich conditions.

Overall, it is anticipated that as a result of the RBMP there will be a major positive effect on the provision of habitat services provided within the Dee RBD. Effects will be felt across large areas of the RBD, in Snowdonia National Park, Clocaenog Forest, between Wrexham and Buckley and the rural areas between Worthenbury and Penley, as shown in Figure 4.10.



**Figure 4.10: Distribution of potential effects to provision of habitat service within the Dee RBD**

### **How significant are the predicted changes to provision of habitat services in the Dee RBD?**

Implementation of the Dee RBMP is anticipated to have a significant effect on the provision of habitat services in the RBD. The main beneficiaries of this positive effect will be the habitats and species within the RBD with increased species diversity and habitat cover, and also the users of and visitors to the rivers, lakes and estuary, as there will be a more naturalised landscape with increased vegetation and tree cover. The indirect and cumulative effects of the improvements to the aesthetic value service are outlined in Section 3 below.

In the updated RBMP we aim to propose a prioritised programme of measures that will help European designated sites, with water dependent habitats and species, meet the conservation objectives set by NRW with the overall aim of achieving favourable conservation status. However, certain measures have the potential to have a significant negative effect on other features of designated sites. The likely effects on features of the

European designated sites within the RBD will be assessed under the Habitats Regulations and will be documented in a separate Habitats Regulations Assessment. It is good practice to undertake this iteratively with the plan development. It is therefore proposed that we will undertake the HRA in conjunction with the refinement of measures and conservation objectives that will take place during and following the current consultation period.

### **Assessing effects on supporting services**

Supporting services underpin the delivery of all other ecosystem services. They include the formation of soils, the cycling of nutrients and water, biodiversity and the provision of habitat. The National Ecosystem Assessment notes that these services are strongly interrelated and are underpinned by a vast array of physical, chemical and biological interactions. Our understanding of these interactions and their influence on supporting services is limited.

#### **Soil formation**

Soil formation in the UK is a long term process, taking place over decades and centuries. While we anticipate that the plan would result in additional organic matter that would contribute to soil formation, this is unlikely to be significant. Of more importance will be the contribution of the updated plan to addressing the threats to soil formation and quality. The compaction and erosion of soils associated with intensive agriculture is one of the threats to soils identified the National Ecosystem Assessment. Measures aimed at the retention of more soil on the land should contribute to reducing this.

#### **Nutrient cycling**

Nutrient cycling refers to the uptake, use, release and storage of nutrients by plants and their environments. The National Ecosystem Assessment noted that the most dramatic trend in nitrogen cycling over the last 50 years has been the enrichment of UK terrestrial habitats with nitrogen due to the application of fertiliser nitrogen in managed land and atmospheric nitrogen deposition in semi-natural systems. Increasing the availability of nutrients can affect the composition and diversity of plant communities, favouring those plants that are fast growing and able to take advantage of the additional resource. The

updated river basin management plan will have little influence on the latter source, but is likely to be more significant in influencing changes to managed land.

Measures in the river basin management plan that are aimed at reducing erosion and sedimentation are also likely to have benefits in terms of nutrient cycling. Soil erosion is considered to contribute significantly to nutrient loss from land. The retention of nutrients on the land should contribute to moving managed land to a more sustainable nutrient cycling process that minimises losses.

### **Primary production**

Primary production is focused on the formation of biological material by fixing carbon dioxide through photosynthesis and the assimilation of nutrients. The production of food and fibre and the developments that have resulted in increases in yields over the last 150 years are considered to be the main influence on primary production. The addition of nutrients has been successful in increasing primary production for food crops. However, there have been detrimental effects, particularly where this affects water bodies, their water quality and species composition. In some cases eutrophication occurs affecting fish, shellfish and invertebrates in rivers, lakes and marine environments.

The river basin management plan includes measures that are designed to reduce the extent to which nutrient enrichment of agricultural land is washed into rivers. This will have the benefit of supporting more efficient use of nutrient enrichment for food and fibre provision, while reducing the adverse effects on the water environment.

### **Water cycling**

As supporting ecosystem services, water cycling the major water flows (rainfall, evapotranspiration, river flow) and water storage (soil, groundwater, lakes) that combine to determine the availability of water. . Human activity has a significant influence over the water cycle through land use, drainage, impounding water, changing the structure of rivers (particularly associated with flood risk management) and abstracting water. The effects of these activities are likely to be exacerbated by climate change, population growth and

associated increased urbanisation. These will increase competition for a limited resource, particularly during the predicted dryer summers associated with climate change.

The river basin management plan has the more sustainable use of water at its heart and should provide benefits to water cycling. The plan includes measures that contribute to establishing more sustainable patterns of abstraction and flow. Measures that restore rivers and natural processes will help to ensure that water is available to support the provision of other ecosystem services.

### Indirect and Cumulative Effects

As the natural environment and all the ecosystem services are intrinsically linked, each cannot be considered in isolation and indirect and cumulative effects are caused. An indirect effect arises where one effect of the plan has a subsequent effect on another ecosystem service and a cumulative effect arises, for instance, where several plans, policies and programmes each have insignificant effects, but together have a significant effect; or where several individual effects of the plan have a combined effect. The alignment of, and cumulative effects of, the Dee RBMP with other plans, policies and programmes is considered in Chapter 3, and the indirect effects of the Dee RBMP are considered below:

- A negative effect to the water for non-consumptive use could have a minor, negative effect on the climate regulation service in the RBD, through a reduced potential for water-based renewable power generation from hydropower or tidal energy schemes, lessening the potential for climate change mitigation;
- A positive effect to the climate regulation service will mitigate for sea-level rise and could lessen the severity and frequency of extreme weather events, which will reduce coastal and fluvial erosion, and provide a greater erosion regulation service in the RBD as well as improving the water regulation service;
- A positive effect to the water regulation service will lead to less risk of erosion and thus a greater erosion regulation service; less risk of contamination from flooding and thus a greater water purification and waste treatment service; less risk of

damage to productive agricultural land and loss of crops, so increasing the food production service;

- A positive effect to the erosion regulation service will lead to more soil formation in the RBD and more productive soil so the provision of habitat and food services are anticipated to improve;
- A positive effect to the water purification and waste treatment service will lead to cleaner and more visually pleasing water bodies, which will attract more visitors and encourage recreational use. This is anticipated to improve the recreation and tourism, and aesthetic value services in the RBD. Also, cleaner waters will reduce pollution of agricultural land and provide better habitat for fish, leading to a positive effect in the food service. Lastly, improved water quality will lead to greater biodiversity, reduced loss of habitats and reduced species mortality. This improvement to the local provision of habitat service in the RBD will in turn help to purify the water further through natural filtration processes, resulting in a positive feedback loop;
- A negative effect to the cultural heritage service through physical damage or degradation of setting of heritage assets may result in decreases in visitor numbers to assets and thus a minor negative effect to the recreation and tourism service in the RBD;
- A positive effect to the aesthetic value service is anticipated to cause a positive effect to the recreation and tourism service, through more pleasant scenery, increased vegetation cover and healthier water environments attracting more visitors to the RBD and enhancing the recreational resource of the water environment for users. It is also anticipated to cause a positive effect to the cultural heritage service through improvements to the setting of heritage assets, leading to greater appreciation of the assets.
- A positive effect to the soil formation service will provide more productive land for habitats and biodiversity and also the soil will be able to store more carbon, therefore enhancing the provision of habitat and climate regulation services in the RBD; and
- A positive effect in the provision of habitat service will increase the extent, value and diversity of habitats and species across the RBD, which will improve local

landscapes, encourage visitors to the area, provide a carbon store and protection from soil erosion. This will provide benefits to multiple ecosystem services, notably aesthetic value, recreation and tourism, climate regulation and erosion regulation.

### Summary of Effects

Overall, the Dee RBMP is anticipated to have a positive effect on the environment, through beneficial effects to a number of ecosystem services:

#### Provisioning Services

- Food (e.g. crops, fruit, wild collected food)

#### Regulating Services

- Climate Regulation
- Water Regulation (e.g. flooding)
- Soil & Erosion Regulation
- Water Purification and Waste Treatment

#### Cultural Services

- Recreation and Tourism (including accessible blue and green space)
- Aesthetic Value (e.g. landscape, seascape, tranquillity)

#### Supporting Services

- Provision of Habitat (e.g. Biodiversity)

These beneficial effects will largely result from measures to improve the sustainability of agricultural and forestry management practices, remove barriers to fish passage, improve the efficiency of sewage treatment, naturalise banks and channels in urban areas and remediate contaminated mine discharges in the RBD.

From the measures however, there are anticipated to be negative effects to the water for non-consumptive use and cultural heritage services through reductions in availability of water for hydropower and in water available for use in industrial cooling; and also through potential disturbance and effects on setting to heritage assets. The effects of the Dee RBMP are summarised in Table 4.3

These effects to the ecosystems services provided within the RBD will have a range of cumulative and indirect effects. The cumulative effects with other plans, policies and

programmes are assessed in Chapter 3, and the anticipated indirect effects are provided in Table 4.3.

**Table 4.3: Potential indirect effects of Dee RBMP**

<b>Ecosystem Service</b>	<b>Effect of Dee RBMP</b>	<b>Indirect Effect of Dee RBMP</b>
Food	Minor Positive	No indirect effects anticipated
Water for Non-Consumptive Use	Minor Negative	Negative effect on climate regulation service
Climate Regulation	Minor Positive	Positive effect on erosion regulation and water regulation services
Water Regulation	Minor Positive	Positive effect on erosion regulation, water purification and waste treatment and food services
Erosion Regulation	Minor Positive	Positive effect on soil formation, provision of habitat and food services
Water Purification and Waste Treatment	Major Positive	Positive effect on recreation and tourism, aesthetic value, food and provision of habitat services
Cultural Heritage	Major Negative	Negative effect on recreation and tourism
Recreation and Tourism	Minor Positive	No indirect effects anticipated
Aesthetic Value	Minor Positive	Positive effect on recreation and tourism, and cultural heritage services
Provision of Habitat	Major Positive	Positive effect on aesthetic value, recreation and tourism, climate regulation and erosion regulation

## Summary of Mitigation

For the potential negative effects identified in the above assessment sections, the following mitigation is proposed to avoid or reduce these negative effects:

- For the Water for Non-Consumptive Use service, mitigation for this potential negative effect may include careful site selection, with works managed for the avoidance of local effects and appropriate consultation with affected parties undertaken. There are also opportunities for improving water availability for non-consumptive use such as hydroelectric schemes and navigation through permitting, improving access to rivers and lakes and provision for other users
- For the Cultural Heritage service, to mitigate for this potential negative effect, a cultural heritage assessment of any intrusive works should be undertaken, maximising use of local knowledge, prior implementing the relevant measure. This will ensure all effects on the archaeological or built heritage resource are managed appropriately. It will be important that individual schemes at the earliest stage identify any designated or non-designated heritage assets, including the risk of unknown buried archaeology, in order to: establish the potential for adverse effects as well as opportunities for enhancement; determine whether any action should be taken due to the significance of the heritage assets and likely impacts; inform scheme options and detailed design; and identify an appropriate mitigation strategy. If potential adverse effects are identified, scheme specific mitigation will need to be developed in consultation with the relevant organisations, such as Cadw or English Heritage, the relevant Archaeological Trust and the local authority conservation officer.

## 5. Monitoring the effects of the plan

This section sets out the monitoring that we propose to understand the significant effects of the plan in practice. The water environment is subject to considerable monitoring activity by Natural Resources Wales and others and so we propose an approach that takes advantage of this existing activity.

Measures are required to monitor the effects that the Dee RBMP is having on the environment. The Plan itself is objective based and will be monitored throughout its life in order to assess whether objectives to improve or maintain the quality of the water environment are being met. At the heart of this will be annual reporting on waterbody classification and publication of monitoring data. Given the focus of the Plan on protection and enhancement of the ecological quality of waterbodies, this annual reporting of waterbody status will be the key monitoring regime and is not duplicated here. Current waterbody classification is reported in Water Watch Wales<sup>2</sup>.

In addition to water body status monitoring, we have identified further indicators to cover wider significant effects as shown in Table 5.1. The indicators have to be practical, cost-effective and strategic, and must inform on the effects of the Plan itself, rather than on wider trends. Indicators will reflect the effects identified as significant by the SEA process. Effects of significant individual projects will be monitored according to Environmental Action/Monitoring Plans devised during project level environmental impact assessment.

**Table 5.1 Proposed sources of information for monitoring significant effects on the environment.**

<b>SEA Receptor</b>	<b>Proposed Monitoring Indicator</b>	<b>Source</b>
Water	No additional monitoring proposed	Existing monitoring of water body quality and through River Basin Management Plan requirements
Population and human health	No additional monitoring proposed	NRW - Angling Numbers - Rod licences sold

<sup>2</sup> [www.waterwatchwales.naturalresources.gov.uk](http://www.waterwatchwales.naturalresources.gov.uk)

		User numbers for coastal path & visitors to National Nature Reserves (visitor counters at certain locations) Visitor numbers to National Parks (NPA)
Biodiversity, flora and fauna	No additional monitoring proposed	Existing monitoring of aquatic invertebrates and fish through River Basin Management Plan requirements.
Cultural heritage	Status of listed and non-listed historic and archaeological features to be monitored at individual project level	Cadw, Welsh Archaeological Trusts

## 6. What happens now?

This section sets out how to respond to this Environmental Report that accompanies the draft RBMP. It provides the questions to prompt in your response to this consultation on the Environmental Report. It also sets out the next steps in the Strategic Environmental Assessment process to the publication of the final RBMP.

This Environmental Report has been published with the Dee RBMP on 10 October 2014 and is available for consultation for a six month period. Consultation will close on 10 April 2015. In seeking your views on this Environmental Report we have set out some specific consultation questions provided below:

- 
- 1. Do you agree that we have sufficiently assessed the significant effects of the Dee River Basin Management Plan? Please describe any further aspects we should consider.**
  - 2. Do you have concerns about the environmental effects of the river basin management plan that are not covered by this assessment? Please describe what they are.**
  - 3. Are there other mitigation or opportunities that we should consider delivering with the proposed measures?**
- 

### How to respond

Natural Resources Wales and the Environment Agency would prefer you to respond to this consultation by email at:

[ardalbasnafondyfrdwy@cyfoethnaturiolcymru.gov.uk](mailto:ardalbasnafondyfrdwy@cyfoethnaturiolcymru.gov.uk) /

[deerbd@naturalresourceswales.gov.uk](mailto:deerbd@naturalresourceswales.gov.uk)

This will allow you to make your comments more effectively, while helping us to gather and summarise responses quickly and accurately. However, if you want to respond in another way, please contact your regional contact for the Dee River Basin District, below.

You can view the consultation documents and consultation questions online. But, if you would prefer a printed version of the document, please call 0300 065 3000.

Please return written responses by 10 April 2015 to:

Jill Brown

Natural Resources Wales

29 Newport Road

Cardiff

CF24 0TP

### **What Natural Resources Wales will use the responses for**

Natural Resources Wales will use the responses from this consultation to inform the Final Dee River Basin Management Plan. Natural Resources staff dealing with this consultation will see all responses in full. Other staff may also see the responses to help them plan future consultations.

A full summary of the responses will be published on the Natural Resources Wales website.

### **How Natural Resources Wales will use your information**

Natural Resources Wales will make all comments (apart from personal information) publicly available on the Natural Resources Wales website. This includes comments received online, by email, post and by fax, unless you have specifically requested that your response be kept confidential. Only names of organisations that respond and not individuals will be published.

If you provide an email address, you will receive an acknowledgement of your response. After the consultation has closed, a summary of the responses will be published on the Natural Resources Wales website. You will be contacted to let you know when this is available. You will also be notified of any forthcoming river basin consultations unless you request otherwise.

Under the Freedom of Information Act 2000, Natural Resources Wales may be required to publish your response to this consultation, but will not include any personal information. If you have requested your response be kept confidential, it may still be required to provide a summary.

If you have any questions or complaints about the way this consultation has been carried out, please contact:

Jill Brown

Natural Resources Wales

29 Newport Road

Cardiff

CF24 0TP

## Next steps

The RBMP sets out how we will continue to develop the plans:

- taking into account new information;
- refining the cost benefit analysis; and
- taking into account responses to this consultation.

As the plan evolves we will consider any implications this might have for effects on the environment as part of our strategic environmental assessment requirements.

The adopted RBMP will be published in December 2015. This will be accompanied by a Statement of Environmental Particulars which will provide:

- Summary of how environmental considerations have been integrated into the plan.
- Summary of how consultation responses to the draft plan and environmental report have been taken into account (with cross reference to the detailed consultation response report)
- Summary of how the plan has changed since the draft plan and what this means in terms of changes to the environmental effects that were reported in the environmental report.
- The reasons for choosing the plan as adopted in the light of alternatives.
- The measures to be adopted to monitor the effects of the plan.

## Annex A: Plans, policies and programmes reviewed for the SEA

### Background

SEA requires a good understanding of the strategic and policy context of the River Basin Management Plan, in order to identify areas of mutual influence and tension with other policies plans and programmes (PPPs) and to contribute to development of the environmental baseline. This helps ensure the RBMP is robust, realistic and SEA Directive compliant.

This information needs to be included in the Environmental Report, whose required contents are set out in Annex I of the SEA Directive and are extracted below followed by interpretive official guidance<sup>3</sup>:

Annex I (a) requires:

*“An outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes.”*

EC guidance: Information on the relationship with other relevant plans or programmes sets the plan or programme in a broader context: it might, for instance, concern its place in the stage of decision-making or its contribution amongst other plans or programmes to changes in the environmental conditions of a certain area. Relevant plans or programmes can thus be those at other levels in a hierarchy which the actual plan or programme forms part of or they can be those drawn up for other sectors affecting the same or adjacent areas.

Annex I (e) requires identification of:

*“The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.”*

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<sup>3</sup> See ‘Implementation Of Directive 2001/42 On The Assessment Of The Effects Of Certain Plans And Programmes On The Environment’ on the European Union website.

EC guidance: The environmental protection objectives to be dealt with should cover at least the issues listed in paragraph (f)<sup>4</sup>. International and Community objectives are often incorporated in objectives on national, regional and local levels and these could often be sufficient for this purpose. It should be noted that the paragraph concerns objectives that are relevant to the plan or programme, which would imply relevant to its likely significant effects or to issues it raises.

## **Methodology**

A list of relevant PPPs for review was developed by Natural Resources Wales, based on an initial list set out at the scoping stage and modified following consultation. This prioritises relevant national and regional PPPs. It is a significantly shorter list than usual for this element of SEA and thereby follows the EC guidance above regarding (a) implicit or explicit incorporation of international and EC environmental objectives in national and regional plans and (b) consideration of PPP relevance, bearing in mind the significance of effects around a particular environmental receptor. Local Authority plans were reviewed to extract key spatial planning information with a focus on likely land use of significance at the level of the River Basin District. Each PPP was reviewed to identify any relevant links with the draft Plan. PPPs which could operate as drivers for delivery of Water Framework Directives objectives were highlighted.

A summary of relevant PPPs that were reviewed is presented in Section 2 below and these fall under the following topics:

- Water (water resources, water companies, flooding and coastal erosion);
- Spatial Planning / Population
- Biodiversity
- Recreation
- Geology, Soils and Agriculture
- Material Assets (e.g. transport)

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<sup>4</sup> (f) *the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors.*

- Waste
- Climate
- Landscape
- Cultural Heritage

The objective was to focus on the most relevant PPPs. Each entry in the summary table below is extracted from a more detailed review of each of the documents listed. The more detailed assessment compiled the following information:

- The title, author and publication date of the specific PPP being reviewed;
- Whether the PPP could assist in the delivery of the RBMP;
- A summary of the aims, objectives and issues within the PPP that were considered to be relevant to the draft Plan;
- A discussion of any influence the PPP could have on the draft Plan;
- A discussion of any influence the draft Plan could have on the PPP;
- A discussion of how the PPP should be factored into the SEA process.

**Summary of review of relevant PPPs**

Title, author, date	Objectives	Areas of synergy and conflict with respect to the RBMP
<b>National PPPs</b>		
<i>Water</i>		
Welsh Government (2011) Understanding the risks, empowering communities, building resilience: The national flood and coastal erosion risk management strategy for Wales	Provides the national framework for flood and erosion risk management setting out four overarching objectives: <ul style="list-style-type: none"> <li>• reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion</li> <li>• raising awareness of and engaging people in the response to flood and coastal erosion risk;</li> <li>• providing an effective and sustained response to flood and coastal erosion events;</li> </ul>	There could be potential conflicts with river basin planning as the primary intention of the strategy is to reduce the consequences of flooding on people and the environment, which could compromise river basin planning objectives.  River basin planning will drive environmental improvements through works delivered to reduce flood risk.

	<ul style="list-style-type: none"> <li>prioritising investment in the most at risk communities.</li> </ul>	
Welsh Government (2011) Strategic Policy Position on Water	Provides Ofwat, the water companies, regulators and other interested parties a clear steer on the Welsh Government's priorities for water. Highlights areas that will be a priority in the future including drinking water quality, protecting the environment and secure supplies and improving resilience.	The policy statement is largely aligned with river basin planning. The intention is to maintain high quality water and provide this to the people of Wales sustainably, efficiently and economically, whilst protected the surrounding environment.
Welsh Government (2007) Making the Most of Wales' Coast: The ICZ Management Strategy for Wales	Concerned with managing coastal resources in Wales in an integrated and informed way, ensuring that these assets are maintained and enhanced for the benefit of present and future generations.	The strategy aligns with river basin planning in delivering environmental improvements to the marine and coastal water environment.  River basin planning will also deliver improvements to the coastal assets and management.
<i>Spatial Planning / Population</i>		
Welsh Government (2012) Planning Policy Wales (including Technical advice Notes: Nature Conservation and Planning, Design, Tourism, Development and Flood Risk, Transport, Waste, Renewable Energy, Coastal Planning )	Sets out the land use planning policies of the Welsh Government and key policy objectives for Local Development Plans (LDPs) in Wales, both reflecting the sustainable development agenda	Policy is aligned with river basin planning as it sets out requirements for the integrated planning and management of water which have implications for land use planning in both urban and rural areas. Where pollution considerations affect the use and development of land they can be material planning considerations.
Welsh Government (2013) The Welsh Government Strategy for Tourism 2013 –	Identifies the priorities to deliver a prosperous and competitive tourism industry in Wales. It sets out how Welsh tourism will be promoted and communicated more effectively and how investment will be directed to	River basin planning will ensure a healthy, safe and attractive water environment for the enjoyment of people. River basin planning needs to take into account the use of Wales' rivers, lakes and

2020. Partnership for Growth	improve quality and choice for the consumer.	coastal waters as a recreation and tourist resource. Access to these waters should not be compromised, and their sense of place maintained.
Welsh Government (2010) Rural Development Plan for Wales (2007-2013 and 2014-2020)	Sets out measures for rural areas in Wales, including promoting knowledge and improving human potential; restructuring and developing physical potential and promoting innovation; targeting the sustainable use of agricultural land; targeting the sustainable use of forestry land; diversifying the rural economy; and improving the quality of life in rural areas.	This plan aligns with river basin planning as it promotes sustainable land use and management of agricultural land. By managing agricultural land sustainably, the water environment will be protected and enhanced.
Welsh Government (2008) People, Places, Future – The Wales Spatial Plan	Integrates the spatial aspects of national strategies for social inclusion and economic development, health, transport and environment, translating the Welsh Government’s sustainable development duty into practice.	The plan largely aligns with river basin planning, which will protect Wales' natural assets, and promote measures to ensure resilience to challenges such as climate change and biodiversity loss.
Welsh Government (2008) One Wales One Planet: The Sustainable Development Scheme for Wales	Sets out proposals to promote sustainable development, how the Welsh Government will make sustainable development a reality for people in Wales, and the benefits that people will see from this, particularly in less well-off communities.	River basin planning broadly aligns with this plan through their joint aims of sustaining the environment, with the Sustainable Development Scheme for Wales specifically referencing the management of the freshwater and marine environment.
Welsh Government (2005) Climbing Higher – The Welsh Government’s 20 year strategy for sport and physical activity in Wales	Seeks to maximise the contribution of sport and physical activity to wellbeing in Wales, with one target to increase the percentage of the people in Wales using the Welsh natural environment for outdoor activities from 36% to 60%.	River basin planning will ensure a healthy, safe and attractive water environment for the enjoyment of people which aligns with this strategy as Wales' rivers, lakes and coastal waters are recognised as outstanding environments for a range of outdoor activities. Access to these waters should not be compromised through the

		achievement of the plans so that they remain active tourist attractions
<i>Biodiversity</i>		
Wales Biodiversity Partnership (2010) Wales Biodiversity Framework	Identifies the key practical, policy and legislative drivers for protecting, restoring and enhancing biodiversity in Wales; outlining the mechanisms for promoting positive action and explaining the roles and remit of those responsible for undertaking biodiversity action.	One of the legislative drivers of this framework is the Water Framework Directive. The framework identifies the freshwater and marine as two of the nine ecosystem groups within Wales, and affords protection to these ecosystems with the aim of improving biodiversity. This largely aligns with the river basin plans. River basin planning need to ensure that biodiversity in Wales is not affected by any measures to achieve WFD compliance.
Forestry Commission Wales (now Natural Resources Wales) (2009) Woodland Strategy for Wales	The Strategy sets out aims and objectives for all woodlands and trees in Wales and the role of woodlands and trees in delivering social economic and environmental benefits and also the contribution they can make towards addressing the impacts of climate change.	This strategy aligns with the river basin plans as it aims to provide environmental enhancements, sustainable development, sustainable land management and climate change adaptation and mitigation within a forestry context. Management of forestry sustainably will have direct benefits to the river basin plans
Welsh Government (2008) Wales Fisheries Strategy	Strategy for the management and development of fisheries in Wales covering aquaculture, commercial fisheries, and recreational fisheries for 2020.	The strategy is broadly aligned with the river basin planning process as they both endeavour to manage and develop fisheries in a sustainable way, contributing positively to environmental policies in Wales. River basin planning will help to identify measures necessary to protect and improve water bodies for fish.
Welsh Government (2006)	Provides the framework to achieve an environment which is clean, healthy, biologically	There is close synergy between the Environment Strategy policies and river

Environment Strategy for Wales	diverse and valued by the people of Wales.	basin planning, both aiming to deliver environmental benefits. River basin planning should seek to deliver benefits to the wider environment where possible.
Welsh Government (2012) Sustaining a Living Wales: A Green Paper on a New Approach to Natural Resource Management in Wales	This consultation resulted in policy commitments that are being taken forward under the Natural Resource management programme. The programme includes natural resource management policy, the Environment Bill, embedding the Ecosystems approach.	River basin planning aligns with the policy commitments being taken forward, to manage the water resource of Wales sustainably into the future and to improve water quality and the health of the river and marine ecosystems.
<i>Recreation</i>		
<i>Geology, Soils and Agriculture</i>		
Welsh Government (2009) Farming, Food and Countryside: Building a Secure future – A New Strategy for Farming	The objective of the strategy is to achieve a sustainable and profitable future for farming families and businesses through the production and processing of farm and forestry products whilst safeguarding the environment	This strategy promotes sustainable land use and management of agricultural land. By managing land sustainably, the water environment will be protected and enhanced supporting the aims of the river basin plans,
Welsh Government (2008) Wales Soils Action Plan - Consultation	Sets out the case for developing a plan to adapt to future pressures on soils including climate change related effects such as changes to soil carbon and soil structure	The action plan broadly aligns with river basin planning through recognition that good quality soils can improve water quality, and also that reducing the contaminants within soils will also improve water quality.
Environment Agency Wales (now Natural Resources Wales) (2002) Metal Mines Strategy for Wales	Strategy developed to assess all the issues at the most polluting historic metal mines in Wales, with the aim of developing remediation options.	The strategy aligns with the river basin plans as they both target the remediation of historic metal mines in Wales, to reduce their pollution impact on the water environment.
Welsh Government (2001) Minerals Planning Policy Wales	Sets out the land use planning policy guidance in relation to mineral extraction and related development in Wales.	River basin planning can drive improvements in minerals planning through ensuring sustainable use of mineral resources and

		<p>minimising any polluting effects of their exploitation. Protection of surface and groundwaters, ecological and landscape features are specifically referenced within the policy which are also key factors in river basin planning.</p>
<i>Material Assets</i>		
<p>Welsh Government (2008) Wales Transport Strategy</p>	<p>Promotes sustainable transport networks that safeguard the environment and strengthen Wales' economic and social life.</p>	<p>There may be divergences here however, where transportation projects could compromise the aims of river basin planning, however other aims of the strategy e.g. minimising environmental effects, reducing climate change effects and emissions, reducing waste and reducing pollution align broadly with the aims of river basin planning.</p>
<i>Waste</i>		
<p>Welsh Government (2010) National Waste Strategy for Wales: Towards Zero Waste 2009-2050</p>	<p>The strategy sets out a long-term aim of zero waste by 2050 and a medium term aim of achieving a high recycling society by 2025. This is supported by a range of recycling and other waste management targets including in relation to commercial and industrial waste.</p>	<p>A reduction in waste can deliver environmental enhancements, reduce pollution and reduce climate change in the long-term, which aligns with key principles of river basin planning.</p>
<i>Climate</i>		
<p>Welsh Government (2010) Low Carbon Wales</p>	<p>Details the process through which the Wales Spatial Plan can serve as a vehicle for transition to a low carbon energy whilst also providing background information and suggestions to enable regions in Wales to select carbon reduction priorities for action.</p>	<p>This plan broadly aligns with river basin planning but needs to ensure that low carbon infrastructure is developed in a sustainable way to minimise environmental effects and effects on the water environment.</p>
<p>Welsh Government (2010) Climate</p>	<p>States the Welsh Government's policy intentions in relation to climate change and expands on the commitments set out in One</p>	<p>This plan broadly aligns with river basin planning but needs to ensure that low carbon infrastructure is</p>

Change Strategy for Wales	Wales. The strategy re-iterates the One Wales commitments to 3 per cent annual carbon reductions and sets out expectations for businesses and society for 2020.	developed in a sustainable way to minimise environmental effects and effects on the water environment.
Welsh Government (2010) Low Carbon Revolution – the Welsh Government Energy Policy Statement	Sets out the Welsh Government’s ambitions for low carbon energy in Wales, with aims including improvements in housing energy efficiency improvements, local energy generation, capturing of offshore and onshore wind, stream and tidal, hydropower, geothermal and biomass energy and installing carbon capture technology on all new fossil fuel power plants	This plan broadly aligns with river basin planning but needs to ensure that low carbon infrastructure is developed in a sustainable way to minimise environmental effects and effects on the water environment.
Welsh Government (2012) Preparing Wales for Climate Change. Energy Wales A Low Carbon Transition	Aims to enhance the economic, social and environmental wellbeing of the people and communities of Wales – to achieve a better quality of life for this and future generations by creating a sustainable, low carbon economy for Wales.	This plan broadly aligns with river basin planning but needs to ensure that low carbon infrastructure is developed in a sustainable way to minimise environmental effects and effects on the water environment.
<i>Landscape</i>		
<i>Cultural Heritage</i>		
Valuing our Environment Partnership (2010) Valuing the Welsh Historic Environment	The report presents an economic argument that the environment (specifically the historic environment) is fundamental to prosperity in Wales	The document provides background evidence to support the preservation of the historic environment, which can be divergent from river basin planning which aims to deliver improvements to the water environment.
<b>Dee Regional PPPs</b>		
<i>Water</i>		
North West and North Wales Coastal Group (2009) North West England and North Wales Shoreline	This plan makes provision for management of the coastline within the Dee River Basin District and beyond, to minimise coastal erosion and flooding whilst also considering coastal communities, existing	River basin planning must ensure conflicting objectives and measures are not set between improving chemical and ecological status, and managing flood risk and coastal erosion. Measures

Management Plan (SMP2)	infrastructure, tourist and amenity areas and the natural environment	should be set appropriately to ensure they would not increase flood risk in an area.
Environment Agency (2013) River Dee Catchment Abstraction Management Strategies (CAMS)	This is a six-year plans detailing how water resources in the River Dee catchment will be managed. CAMS documents set out how much water is available for licensing in each catchment and indicates where catchments are over-abstracted or over-licensed during periods of low flow.	This strategy supports river basin planning objectives and will protect the water environment by ensuring that water resources are protected and abstractions that are potentially damaging are avoided.
Environment Agency Wales (now Natural Resources Wales) (2013) Tidal Dee Flood Risk Management Strategy	This strategy provides details of the proposed flood risk management approaches for the Dee Estuary from Abergele, around the Point of Ayr and down the Dee estuary. This area is home to tens of thousands of people and a large number of businesses, vital to the local economy.	One of the objectives of the strategy is to deliver environmental enhancements through flood risk management which aligns with river basin planning, however there could be divergences by projects from the strategy, for example by introducing hardbank reinforcements along the coast. Measures should be set appropriately to ensure they would not increase flood risk in an area.
Environment Agency Wales (now Natural Resources Wales) (2010) River Dee Catchment Flood Risk Management Plans	This plan gives an overview of the flood risk (except coastal) across the River Dee catchment., taking into account changes to climate and land management. It recommends ways of managing those risks now and over the next 50-100 years	River basin planning must ensure conflicting objectives and measures are not set between improving chemical and ecological status, and managing flood risk and river bank erosion. Measures should be set appropriately to ensure they would not increase flood risk in an area.
Local Authorities – Various (Various) Surface Water Management Strategies	Outline the preferred surface water management strategy in a given location. In this context surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and	River basin planning must ensure conflicting objectives and measures are not set between improving chemical and ecological status, and managing surface water flood risk.

	ditches that occurs as a result of heavy rainfall.	Measures should be set appropriately to ensure they would not increase flood risk in an area.
Dwr Cymru Welsh Water (DCWW) (2013) Draft Water Resources Management Plan	Provides details how DCWW will ensure that adequate water is available to meet the planned growth in population, housing and economic activity in its supply area, while taking account of climate change and minimising impacts on customers' bills and the environment.	This plan considers how to manage water resources whilst maintaining and enhancing the water environment, so can actively support the River Basin Management Plans objectives by ensuring that water resources are protected and abstractions that are potentially damaging from leaving too little flow in rivers, streams or aquifers are avoided.
DCWW (Unpublished) Drought Plan	This plan sets out the steps that DCWW will take through the stages of developing drought, drought, severe drought and recovery from drought to ensure their supply of water resources	This plan largely aligns with the River Basin Management Plans as will set out measures to protect water resources. This will ensure adequate water is maintained in catchments and aquifers and will thus minimise effects on the water environment from droughts.
<i>Spatial Planning / Population</i>		
Local Planning Authorities – Various (Various Dates) Development Planning Policy	The plans set out policies to guide the development and use of land. They direct development to appropriate locations, whilst outlining a desire to conserve the natural, built and historic environment. Land is generally allocated for employment, residential or open space purposes.	The plans generally encourage enhancements to the natural environment, water quality, biodiversity, cultural heritage and landscape, all of which can be driven by the RBMPs, so there is a broad alignment between these plans in this respect. However, there are potential divergences where development supported by the plans may cause detriment to the water environment.
Tourism Partnership North Wales (2010)	The strategy identifies the priorities to deliver a prosperous and competitive tourism industry in Wales. It sets out how Welsh	River basin planning will ensure a healthy, safe and attractive water environment for the enjoyment of people.

Tourism Strategy for North Wales	tourism will be promoted and communicated more effectively and how investment will be directed to improve quality and choice for the consumer.	This aligns with the Strategy for Tourism. Access to these waters should not be compromised, and their sense of place maintained, through the achievement of the plans so that they remain active tourist attractions.
<i>Biodiversity</i>		
Environment Agency Wales (now Natural Resources Wales) (Various Dates) Salmon Action Plans	The aim of the action plans is to ensure the objectives set out in the National Salmon Strategy are met. They set out what needs to be done to support and restore salmon populations.	These plans align with river basin planning and will drive the achievement of objectives directly related to fish. The achievement of good ecological status, which is supported by biological quality and more specifically, fish, is required by legislation.
Defra (2010) Eel Management plans for the United Kingdom: Dee River Basin District	Eel management plans describe the current status of Eel populations across river basin districts and assesses compliance with targets set out in EU Council Regs 110/2207.	These plans align with river basin planning and will drive the achievement of objectives directly related to fish. The achievement of good ecological status, which is supported by biological quality and more specifically, fish, is required by legislation.
Natural Resources Wales / Natural England (2013) The River Dee / Afon Dyfrydwy Site of Special Scientific Interest Restoration Plan	The River Dee SSSI Restoration Plan has developed a restoration vision of the whole river catchment identifying where the main pressures are and outlining restoration measures to help achieve favourable condition	River basin planning will directly aim to deliver improvements specified within the restoration plan (for example weir removal etc.), so the two plans are well aligned.
<i>Recreation</i>		
<i>Geology, Soils and Agriculture</i>		
<i>Material Assets</i>		
<i>Waste</i>		
North Wales Regional Waste Group (2008) North Wales	The visions and aims of this plan are to provide a land use planning framework for the sustainable management of	Reductions in waste can deliver environmental enhancements, reduce pollution and reduce climate

Regional Waste Plan 1 <sup>st</sup> Review Recommended Draft	wastes and recovery of resources in North Wales, to minimise adverse impacts on the environment, human health, the economy and society whilst maximising opportunities.	change in the long-term, which aligns with key principles of river basin planning.
<i>Climate</i>		
<i>Landscape</i>		
Various (2010) Clwydian Range AONB Management Plan 2009-2014	This management plan for the AONB contains actions to ensure the protection and enhancement of the landscape quality of these areas.	These plans are largely aligned, however river basin planning should seek to deliver benefits to the wider environment where possible and ensure objectives set do not compromise the wider visual, historic or cultural landscapes of the AONB.
Snowdonia National Park Authority (2012) Snowdonia National Park Management Plan 2010-2015	The management plan for Snowdonia National Park contains actions to ensure the protection and enhancement of the landscape and natural environment of the area, conserve and enhance the natural beauty, wildlife and cultural heritage of the area; and to promote opportunities for the understanding and enjoyment of the special qualities of the area by the public	This plan is largely aligned, however river basin planning should seek to deliver benefits to the wider environment where possible and ensure objectives set do not compromise the wider visual, historic or cultural landscapes of the National Park.
<i>Cultural Heritage</i>		
English Heritage (2013) Heritage at Risk Register North West	Provides an integrated list of all historic sites in need of help to secure their future. The Register includes details on what is being done to reduce the risks to the sites included in it as well as information specific to the area covered by the individual Registers.	This register supports the preservation of the historic environment, which can be divergent from river basin planning which aims to deliver improvements to the water environment. Care should be taken in river basin planning to ensure impacts on the historic environment are minimised.



**Cyfoeth  
Naturiol**  
Cymru  
**Natural  
Resources**  
Wales

Published by:  
Natural Resources Wales  
Cambria House  
29 Newport Road  
Cardiff  
CF24 0TP

0300 065 3000 (Mon-Fri, 8am - 6pm)

[enquiries@naturalresourceswales.gov.uk](mailto:enquiries@naturalresourceswales.gov.uk)  
[www.naturalresourceswales.gov.uk](http://www.naturalresourceswales.gov.uk)

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