



# APPENDIX D

## Environmental Destination

In this appendix we set out how our approach aligns with Environment Agency (EA) expectations, and following that the scenarios we are using for abstraction reduction. The National Framework data covers abstraction licences in England only. Natural Resources Wales has provided guidance for Wales, which asks companies to consider all pressures on the environment, in a holistic way, not just for water resources, in-line with Welsh environmental legislation.

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### D.1. Environmental destination summary

Our environmental destination, will help us deliver our long-term ambition to improve the water environment in our region. It is one of the largest areas of our work programme. We want to see our rivers and lakes thrive and we want to create natural spaces that people can enjoy.

Previous work undertaken in England via the Water Industry National Environment Programme (WINEP) and the National Environment Programme (NEP) in Wales, has improved the water environment but we now need to take a broader approach.

We have adopted a vision for environmental destination that describes this ambition:

*“Our vision is for an enhanced water environment, with abundant native species and functioning habitats, supporting wellbeing and the regional economy. To deliver this vision, WRW will champion the necessary actions for our water resources and facilitate multi sector working to achieve them. Our plan will describe actions by our members, stakeholders and regulators to deliver net gain, deliver environmental resilience and avoid deterioration.”*

Our work on environmental destination is spread across four strands:

1. Creating catchment solutions to gain more immediate benefits in priority catchments (in England) and opportunity catchments (in Wales).



2. Including environmental protections in our supply availability forecasts.
3. Undertaking investigations to firm up opportunities for further improvement.
4. Developing scenarios and testing our plans against these, to recognise long term uncertainty in future environmental needs for water.

This builds on the starting point that was set out in the National Framework for water resources in England. However, we are equally conscious that investment in infrastructure to provide alternative sources of supply could itself cause environmental harm, and result in customers paying more for their water but not delivering environmental benefit.

The main document of this plan gives an overview of our approach to prioritisation. This is supported by a detailed methodology and supplementary note which was developed collaboratively, and has been shared with our regulators. Appendix E summarises what has been included in the baseline tables.

## D.2. Environmental Destination for Wales

The Environment (Wales) Act 2016 and the Well-being of Future Generations (Wales) Act 2015 work together to create modern legislation for managing Wales' natural resources and improve its social, economic, environmental and cultural well-being. Together with the Planning (Wales) Act 2015, they form part of a wider initiative to create a legislative framework for sustainable development to secure the long-term well-being of Wales. The Environment (Wales) Act establishes the principles of Sustainable Management of Natural Resources (SMNR). SMNR is defined as: *“using natural resources in a way and at a rate that maintains and enhances the resilience of ecosystems and the benefits they provide ... and contributing to the achievement of the well-being goals in the Well-being of Future Generations Act.”* Water companies are included in the list of over 200 public authorities defined in Section 6 of the Environment (Wales) Act, 2016, as having a duty to seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.

The Water Resources Planning Guidance covers both England and Wales and Welsh Government have renewed and re-published their Guiding Principles for Water Companies Developing WRMPs for this round of water resources planning. There are specific elements for consideration in Wales that are pertinent to Environmental Destination. This includes supplementary guidance for Environmental Destination in Wales: *“Setting an environmental destination for water resources: Enhancing ecosystems in Wales”*. Welsh Government has declared both a climate and nature emergency and wants water companies to work with regulators to help enhance biodiversity through their water resources activities whilst ensuring a plentiful supply to customers. The flexible framework in Wales allows for the development of a long-term environmental destination that reflects local, regional and national priorities. This includes the development of the innovative Area Statements which outline the key challenges facing each locality, what we can all do to meet those challenges, and how we can better manage our natural resources for the benefit of future generations. We can use these Area Statements to identify priorities in the Welsh area of WRW and potential delivery partners for environmental destination projects.

Environmental destination in Wales seeks to achieve a holistic outcome for catchments across the country including abstraction reductions if required. The delivery of wider catchment actions set out in water companies PR24 business plans related to drinking water catchments and waste water discharges will support the achievement of this.



To understand the water resources pressures in the Welsh catchments that support downstream abstraction for WRW companies we undertook an evaluation utilising environmental datasets and information from Welsh Area Statements. For the purposes of Environmental Destination, we also included three Welsh upstream catchments that are within the WRW boundary (Severn Uplands, Wye, Dee). Stakeholder engagement was undertaken to inform the prioritisation process. The River Dee and the Upper Severn catchments were identified as the highest priority areas. Within the PR24 NEP there are a number of drivers that can be utilised to promote further action in the Welsh catchments including: Biodiversity & Ecosystem Resilience and Driver code W\_BIOD\_INV1 - Investigations and/or options appraisal for changes to permits or licences, and/or other action that contributes towards Welsh biodiversity duties, requirements, and priorities.

The current position for each of the WRW companies is set out below.

### **Severn Trent Water**

Severn Trent Water do not own or operate any abstractions in Wales. The Welsh catchments do however support abstractions for Severn Trent's customers from the Elan Valley Reservoirs in Wales, which are owned and operated by Welsh Water (DCWW), the River Dee at Chester and the River Wye in England. Severn Trent, along with other public and non-public water supply abstractions also abstract water from the River Severn; the River Severn is a regulated river operated by the Environment Agency in consultation with Natural Resources Wales (NRW) which releases water from upstream reservoirs in Wales (Clywedog and Vyrnwy) and the Shropshire Groundwater Scheme in England. Many of the assets and catchments in these reservoirs are owned by Hafren Dyfrdwy and United Utilities (UU). Flows are also naturally supported by the wider River Severn catchment in both the headwaters in Wales and downstream in England.

From a WRW perspective we have identified the upper reaches of the River Severn as a priority area as it supports regional significant abstractions for both PWS and non-PWS abstractors and is the location for a number of Strategic Resource Options. The Upper Severn Catchment is also upstream of a European designated SAC and enhancement of functionally linked habitats will benefit our region. The potential future development of the Vyrnwy SRO brings future opportunities for the associated Welsh catchments.

### **South Staffs Water**

South Staffs Water do not own or operate any abstractions in Wales. The Welsh catchments do however support abstractions for South Staffs, along with other public and non-public water supply abstractions from the River Severn. As noted above for Severn Trent, the River Severn is a regulated river operated by the EA and NRW and flows are also naturally supported by the wider River Severn catchment in both the headwaters in Wales and downstream in England.

### **United Utilities**

Water abstracted from the River Dee, which originates in Wales, and Lake Vyrnwy comprise two of the top four most important sources of water for United Utilities (the other two are Haweswater and Thirlmere in Cumbria). In the Dee River Basin Management Plan 2021, Natural Resources Wales advocated a place-based planning approach to best align stakeholders' priorities. United Utilities will work with partners to identify where the greatest environmental improvements can be made, which will provide the most benefit to everyone. This is in line with the aims for Environmental Destination in Wales.



Through catchment management delivered to date we have enjoyed a good working relationship with stakeholders in Wales at all levels, from a strategic relationship through the River Dee River Basin liaison panel, to working with Farming Connect and the Welsh Dee Trust to engage with farmers on an individual basis. We support Hafren Dyfdrwy, RSPB Wales and the stakeholders involved with the management of the Vyrnwy catchment, We are committed to working in partnership in Wales and cross-border to England with the Environment Agency, Natural Resources Wales and wider partners, including Rivers Trusts, Wildlife Trusts, Farming Unions and local colleges, to deliver the broad range of social and environmental benefits (i.e. public goods) that are generated from a cleaner water environment.

We have recently completed a natural capital baseline for the North West region, including the water supplied from sources originating in Wales. For the River Dee and Lake Vyrnwy, this equates to 28% of the total amount of water abstracted by United Utilities. We hope to use this baseline as a point of engagement with stakeholders and to inform a target for a national natural capital baseline, with an ambition to increase overall natural capital. The baseline will help to form a basis against which change can be tracked, as we believe measuring benefits in terms of natural capital is key if we are to ensure our plans in the future are optimised across ecosystem services.

United Utilities is represented on many forums associated with water management in Wales, and many of our investments in improving the water quality in the River Dee are referenced in the River Basin Management Plan 2021-2027. In addition, we work in partnership with RSPB Wales and Hafren Dyfdrwy at Vyrnwy to ensure the protection of drinking water quality is considered in the management of site. We will continue to actively participate in the existing forums and partnerships, as well as new partnerships, and we will continue to help improve the water environment in line with the objectives of the Environmental Destination.

We will build on the success of our catchment management activities in the Dee and at Vyrnwy. We already share our raw water quality monitoring data, much of which is collected in collaboration with Natural Resources Wales and the EA in relation to the River Dee pollution protocol. Based on our water quality monitoring data the priorities for action are related to diffuse and point source pollution including the usage of chemicals (pesticides), suspended sediment and nutrients. We will continue our approach of working in partnership with organisations such as the Welsh Dee Trust and RSPB Wales to deliver activities in the catchment to improve raw water quality, and identify where these activities may offer a longer-term benefit to water resources. For instance, working with farmers in the Dee catchment to reduce sediment inputs to land to address turbidity spikes in raw water. A reduction in sediment will help to increase the resilience of the water treatment works, particularly following storm events. There are many nature-based solutions to reducing sediment inputs including riparian woodland. There are expected to be long term resilience benefits of this both for water quality and water availability because trees establish roots which help to slow the flow of water. Woodland corridors are important for biodiversity, nature connectivity, carbon storage and reducing erosion and improving water quality. Similarly, we will work with Hafren Dyfdrwy and partners at Vyrnwy to support measures that will help to increase the resilience of the catchment. Short-medium-long term activities in the Dee and Vyrnwy will feature in the AMP8 WINEP and beyond.

From a WRW perspective we have identified the upper reaches of the River Severn as a priority area as it supports regional significant abstractions for both PWS and non-PWS abstractors and is the location for a number of Strategic Resource Options. The Upper Severn Catchment is also



upstream of a European designated SAC and enhancement of functionally linked habitats will benefit our region. We will work with stakeholders, including Welsh facing partners in the Upper Severn to promote catchment resilience solutions in this area.

### ***Dŵr Cymru/Welsh Water (DCWW)***

We are proposing to deliver an AMP8 programme of investigations designed to improve our understanding of how to achieve long term sustainable abstraction to meet the requirements of the Environment (Wales) Act 2016.

Within the PR24 NEP we propose using the Driver: Biodiversity & Ecosystem Resilience and Driver code W\_BIOD\_INV1 - Investigations and/or options appraisal for changes to permits or licences, and/or other action that contributes towards Welsh biodiversity duties, requirements, and priorities.

Water companies are included in the list of over 200 public authorities defined in Section 6 of the Environment (Wales) Act, 2016, as having a duty to seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.

This is an enhanced duty compared to that set out in the Natural Environment and Rural Communities Act 2006 (which the Environment (Wales) Act replaces) as Section 6 duty requires public authorities (including Water Companies) to 'seek to' maintain and enhance biodiversity rather than just 'have regard' to its conservation. To meet that objective, we therefore need to be proactive in understanding the potential impacts of our operations in the medium to long term so we can prepare and mitigate accordingly.

Environmental Destination guidance from Natural Resources Wales (NRW) seeks a more holistic catchment approach which aligns well with initiatives we already have underway such as the Brecon Beacons Mega Catchment collaboration in South Wales and the Dee LIFE project in North Wales, both of which will deliver wider environmental and social benefits.

### ***Hafren Dyfrdwy (HD)***

Hafren Dyfrdwy have abstractions in the Dee catchment and Upper Severn catchment, as well as being the owners and custodians of Lake Vyrnwy and surrounding estate, and Clywedog Reservoir. The majority of our customers in Wrexham and surrounding areas are supplied via surface water abstractions from the River Dee and a series of upland reservoirs, situated in or near to the Clwyd Range and Dee Valley AONB. We have groundwater abstractions in Powys, situated within the Upper Severn catchment as well as benefiting from a bulk supply agreement with Severn Trent Water which provides River Severn water to some of our Powys customers.

There are no abstraction reductions proposed for our supply area. However, the River Dee is a SAC river and significant proportions of the Upper Severn catchment are covered by various designations including SSSI and SAC. Therefore, our environmental destination approach will be focused on catchment level investigations (e.g. for colour / taste & odour issues at our upland reservoirs) and biodiversity improvements which will bring water quality benefits and improve resilience of our water sources, and contribute to our response to the section 6 biodiversity duty as set out in the Environment (Wales) Act 2016. We are part of the Dee Catchment Protection



Group – a sub group of the Dee Steering Committee, made up of representatives from each of the water companies who abstract from the Dee and the environmental regulators for England and Wales – who are working to identify opportunities to jointly deliver catchment level water quality protection measures in the Dee catchment. Where proposals align with NEP drivers, we will seek to have investigations or interventions included on the AMP8 NEP; drivers could include those for Environment (Wales) Act (addressing locally significant environmental issues); SSSIs; biodiversity & ecosystem resilience; invasive non-native species (INNS) ; enabling and enhancing fish passage.

As part of WRW, we are exploring a number of opportunities for working in collaboration with other members – in the Upper Severn catchment, we will work with United Utilities to identify options for joint projects across the Vyrnwy estate; this could include accelerating the peatland restoration programme, targeting INNS around the reservoir edges, or undertaking a grazing regime study (in partnership with RSPB) to achieve biodiversity and water quality benefits. NRW have indicated that NEP investigations are needed at Vyrnwy and Clywedog focused on impacts of regulatory releases on fish spawning gravels. Although HD owns both of these reservoirs, the releases and abstractions from both sources actually provide benefit to English customers (United Utilities, Severn Trent Water and South Staffs) so these also present an opportunity for joint projects, funded through the NEP.

### Potential options for Wales

Options under consideration are summarised in the Table 1 below.

ID	Option Description	Benefits	Risks
<b>Dee_1_UU</b> <b>(UU)</b>	A collaborative catchment scheme with HD, STW, DCWW to work together with NRW and EA through the existing River Dee Catchment Group to deliver catchment interventions to protect and improve raw water quality and quantity.	Improves water quality, flood management, biodiversity. Improved water quality, flood management, biodiversity	Water resources benefit uncertain.
<b>Severn_1_UU</b> <b>(UU)</b>	Working with HD, RSPB and stakeholders at Lake Vyrnwy to continue to manage the catchment for the benefit of raw water quality.	Improves water quality, biodiversity.	
<b>Severn_2_UU</b> <b>(UU)</b>	Working with Welsh stakeholders in the Upper Severn to deliver natural flood management interventions in the catchment as part of the proposed water transfer scheme.	Flood management, biodiversity, water quality.	
<b>SEW-01 to 16</b> <b>(WSH)</b>	WFD sediment management. WFD downstream flows, catchment based solutions and investigations into long term sustainable abstractions	Improved fisheries habitat, geomorphology and flow regime.	Actual need uncertain, benefits unclear.



<b>Dee_1_HD (HD)</b>	Partnership with UU, DCWW and STW to carry out catchment based interventions with farmers / landowners to reduce turbidity, nutrient and pesticide run-off into waterbodies	Improves water quality, phosphate reduction in SAC river (Welsh Government priority)	Cost contribution will be limited to how much HD can contribute in light of other ED priorities across supply area
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Table 1: Options under consideration for Welsh catchments

In addition to these options the WRW plan also includes two water resource supply options and one Strategic Resource Option (SRO) in Wales. The options are included in Section 7.1 of the draft plan.

The two water resource options, the SEWCUS network upgrade and **XX** WTWs loss recovery are subject to assessment using SEA and NCA metrics which are presented in regional data table in Options Appraisal Summary tab.

The SRO for Vyrnwy has been selected in the draft plan and provides future opportunities to bring Environmental Destination enhancement in Wales. The development of this option includes a wider benefit study. The benefit assessments and specific opportunities will be refined over time and will be evaluated to ensure they support the achievement of the long-term aims of sustainable management of natural resources (SMNR) and the Well-Being goals within Wales.

### D.3. Alignment with Environment Agency expectations

The EA has set out their expectations in relation to what regional plans should include from an environmental destination perspective (see **Error! Reference source not found.**).

Describe your environmental destination	Plan to address current regulatory requirements	long term plan to address environment needs in our region	Deal with uncertainty in environmental destination scenarios
<p>What abstraction deficits do you need to address &amp; how have you identified these?</p> <ul style="list-style-type: none"> <li>• What regional environmental scenario have you used to assess your future WR needs?</li> <li>• Does this differ across catchments?</li> <li>• Does it include requirements to meet current targets for</li> </ul>	<p>Take account of actions we plan to take to address current unsustainable abstraction by 2027</p> <ul style="list-style-type: none"> <li>• Detail short term changes in your plan; less so for longer term</li> <li>• Consider current requirements for all catchments even if your plan has only gone into detail for some</li> </ul>	<p>Set out long-term priorities to manage future risk of deterioration from growth or climate change impacts</p> <ul style="list-style-type: none"> <li>• Make sure your plan is viable to 2050+</li> <li>• Will your proposed actions achieve your long-term destination?</li> <li>• Will supply-side options be sustainable if environmental WR needs become greater?</li> </ul>	<p>What are the uncertainties and how you plan to reduce them?</p> <ul style="list-style-type: none"> <li>• What are the uncertainties?</li> <li>• What further work is needed to help reduce these?</li> <li>• We expect your plan will evolve – what info do you need to do this?</li> <li>• Take an adaptive planning approach</li> </ul>



<p>2027 and in 2050 plus provisions for ES?</p> <ul style="list-style-type: none"><li>• If your environmental scenario differs from ours, why did you choose it and what are your assumptions?</li><li>• Have you considered all catchments? If not how has uncertainty on this been incorporated into your assessment?</li></ul>	<ul style="list-style-type: none"><li>• If you have low confidence in meeting 2027, how do you plan to do this going forward?</li><li>• Explain what you have not included in your plan and why</li></ul>	<ul style="list-style-type: none"><li>• Link to reconciliation stress tests?</li><li>• Plan to deliver actions in short, medium, long term not just for 2050 and set out when changes need to happen over next 30+ years</li></ul>	
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Figure 2: Environment Agency's expectations for Environmental Destination information contained in regional plans (from the Environment Advisory Group meeting, November 2021).

To this end, we have endeavoured to provide information which addresses these four main areas. **Error! Reference source not found.** below presents the overall view of our regional group. Table for individual water companies are also presented later in the document.





EA expectation	WRW response
<p><b>Describe your environmental destination</b></p>	<p><b>ENGLAND</b></p> <p>We have used the EA National Framework BAU and Enhanced scenarios to examine the scale of potential abstraction changes needed to deliver a high environmental protection scenario by 2050. We have reviewed the needs of our European Protected areas (+). This has been applied to all catchments following some sense checking by water companies and EA input.</p> <p>We have included early PWS licence reductions related to WFD improvements and no deterioration risk (see ‘Plan for current regulatory requirements’ below). Each company has taken the common scenario objectives, to achieve the deployable output reductions by 2050, and used the dWRMP development to consider how and when they can achieve them.</p> <p>We are seeking opportunities to explore further opportunities for catchment measures with stakeholders to bring improvements to our catchment and provide ecological resilience without destabilising public water supplies. We are initially undertaking this evaluation in three priority catchments, the Idle, the Wyre and the Worcestershire Middle Severn. This has identified catchment options that would contribute to achieving the Environmental Destination outcome. We are taking a number of options forwards for cost benefit assessment and will consider promoting them in the water company AMP8 WINEP as implementation schemes to deliver early benefits in these catchments. Complementary catchment initiatives are also likely to be included in water company business plans though other WINEP divers which will improve the resilience of the catchments.</p>
<p><b>Plan for current regulatory requirements</b></p>	<p><b>WFD IMPROVEMENT</b></p> <p>For 2027 targets we have taken account of our time limited licences and have included agreed PWS licence reductions and flow compensation changes to achieve WFD improvements (see Appendix E for company supply-demand balance table commentary and forecast assumptions).</p> <p><b>WFD ‘NO DETERIORATION’</b></p> <p>Our plan takes a proactive approach to managing future abstraction to prevent WFD status deterioration. We have made ambitious commitments to prevent future PWS abstraction growth where it is likely to cause WFD status deterioration. We have taken on board the latest EA guidance actions to prevent WFD no deterioration and included assumptions to cap our average abstraction in PWS licences, and hence deployable output, between 2025 and 2040. We have made assumptions for planning; however, further evaluation will be needed</p>



EA expectation	WRW response
	<p>ahead of agreeing licence changes for individual sources. Some investigations are now completed and licence changes agreed.</p> <p>Specific information on screening out assumptions (i.e. for sources with hands off flows) can be found in the relevant company WRMP24 technical reports.</p> <p>The 2020-2025 (AMP7) WINEP includes both investigations and adaptive planning. Regulatory outputs will be delivered by March 2022 and 2024/25. Assumptions have been made ahead of the completion of this work.</p> <p>Currently rivers restoration measures are being implemented ahead of licence change in higher risk catchments. We anticipate that similar work will be required in the next plan but details are not yet available.</p> <p>An adaptive management and monitoring approach will be taken for lower risk PWS sources allowing abstraction licences to be retained for longer, unless the risk of deterioration changes and requires alternative measures.</p> <p><b>DISUSED SOURCES</b></p> <p>Unused licences have been catalogued as part of the non-PWS workstream, however we believe the reliability of this data to be poor, due mainly to the age of the data (2010 to 2015 in England and 2015-2019 in Wales). Details are in section J.2. of the non-PWS appendix.</p>
<p><b>Plan for long-term needs</b></p>	<p><b>POTENTIAL LICENCE CHANGES</b></p> <p>We have used the EA National Framework data to generate an Enhanced (Ofwat High), BAU+ and Ofwat Low scenarios to examine the full range of potential environmental protection scenario for 2050. We have included the BAU+ scenario in our baseline PWS data tables. (See Appendix E company supply-demand balance table commentary and forecast assumptions and see below for scenario analysis).</p> <p>We are using these scenarios to inform our adaptive management plan for Environmental Destination and long-term water supply / demand investment needs.</p> <p><b>CATCHMENT APPROACH</b></p> <p>We have produced a prioritised investigation plan focusing on higher priority catchments initially. We will work with stakeholders to understand current and future pressures in those catchments and seek collaborative solutions, building on the experience if the first three priority catchments we are progressing with at this time.</p>



EA expectation	WRW response
	<p>The environmental destination will be refined based on bottom-up catchment scale analysis and latest available data and benefit assessment in AMP8 and beyond.</p> <p>Both public water supply (PWS) and non-PWS has been taken into account at localised catchment scale.</p> <p><b>WFD ‘NO DETERIORATION’</b></p> <p>For WFD ‘no deterioration’, we are taking steps to prevent long term growth in PWS abstraction in those water bodies most vulnerable to the impacts of climate change. We have made conservative assumptions based on licence capping guidance.</p> <p>We will seek to align ‘no deterioration’ risk and environmental destination opportunities to bring catchment improvements to higher risk areas while extending the time frame for improvement in lower risk areas.</p> <p>The Environment Agency have said that they will review non-Public Water Supply licences for deterioration risk beginning in 2028.</p>
<p><b>Deal with uncertainty</b></p>	<p><b>NATIONAL FRAMEWORK SCENARIOS</b></p> <p>The National Framework scenarios have high uncertainty including climate change and local hydro-ecology needs. We have therefore tested our plan using Enhanced, BAU+ and a low scenario. These scenarios will inform our adaptive planning approach to demand management and water resource scheme delivery.</p> <p>The National Framework data does not consider all flow related issues e.g., the need for high spate flow release from reservoirs. We anticipate these to be identified through the WINEP &amp; NEP and stakeholder engagement.</p> <p>We are proposing an extensive investigation programme for PWS abstractions through the water company WINEP programme, between 2025 to 2030 (AMP8), to reduce the uncertainty on abstraction licence needs and to develop holistic catchment approaches.</p> <p><b>LINKS TO OTHER PROGRAMMES</b></p> <p>Other evaluation programmes are being undertaken e.g., River Severn Regulation review and the River Dee LIFE project. We have a collaborative plan to understand when outputs may feed into the WRW Environmental Destination evaluation process.</p> <p><b>CATCHMENT SCALE EVALUATION</b></p> <p>Collaboration at catchment scale and opportunities for joining with other sectors to achieve multiple benefits. We are prioritising</p>



EA expectation	WRW response
	<p>catchment engagement with other sectors and seeking to join up water company plan drivers to maximise catchment benefits.</p> <p>We will factor uncertainty and the ranges of pressures on catchments into our decision-making process.</p> <p>Tools and data used in the evaluation will include groundwater models, hydro-ecological models, and UKCP18 climate data.</p>

Table 2: Water Resources West Environmental Destination summary approach.

### D.4. Catchment solutions

We have worked with stakeholders and customers across our region to identify potential environmental improvements that would provide benefits to nature and be valued by our customers.

To understand the water resources pressures in the catchments upstream of WRW we undertook an evaluation of English catchments utilising environmental datasets. Stakeholder engagement was undertaken to inform the prioritisation process. The outcomes of this prioritisation are summarised in the main plan.

We have aimed to identify short to medium term no regret actions to benefit the water environment, with identifiably linked water resource benefit, in our region along with areas to focus further investigations.

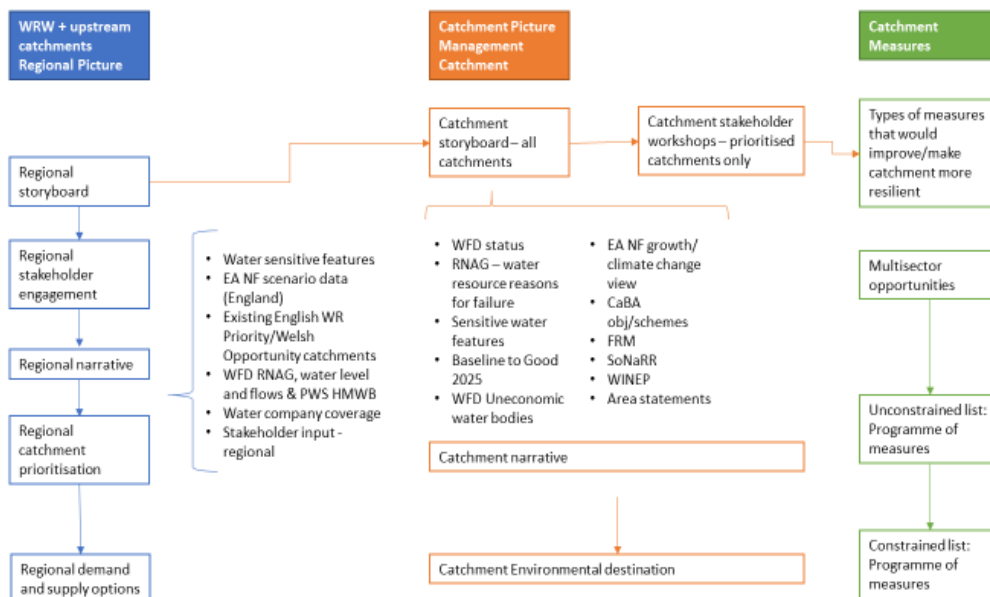


Figure 2: Initial catchment characterisation datasets.



All catchments have had an initial characterisation assessment undertaken to characterise them by the features listed in Figure 2 above. A generic set of actions has also been generated as a starting point for an action plan.

The Wyre, Idle and Worcestershire Middle Severn were taken forward for more detailed assessment including stakeholder engagement in the catchments, the process is illustrated in Figure 3. This assessment had a number of objectives:

- To trial an approach of working with stakeholders to develop a first version of a catchment specific action plan to support Environmental Destination objectives;
- To potentially include some no regrets early catchment resilience type options in our next business plan / AMP8 WINEP;
- To have a water resource focused catchment action plan for all stakeholders to consider in their development and implementation of catchment improvements in the future.

The constrained list from this process is tabulated at the end of this appendix. At the moment there is no identified funding stream for these measures, but we are seeking interest and support from regulators and stakeholders to develop a funded delivery plan.

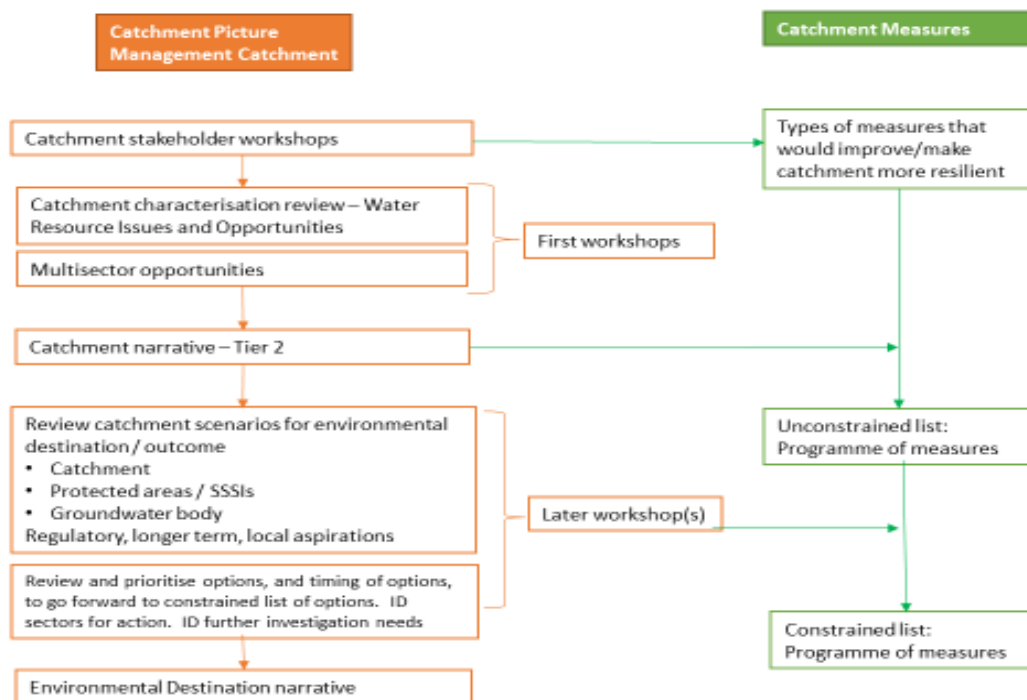


Figure 3: More detailed catchment evaluation process.

The options being taken forwards for further consideration by water companies are listed in Table 2. Further information on the potential schemes, the costs and the benefits are being gathered and these will potentially be included in the AMP8 WINEP submission under the Environmental Destination implementation driver or other relevant driver if more suitable.



ID	Option Description	Benefits	Risks
Idle_43 (SVT)	Poulter & Clumber wetland and flood meadow restoration with natural flood risk management and aquifer recharge	Improves water quality, flood management, biodiversity. Enhanced recharge - trade off against future reductions.	Water resources benefit uncertain: how much could recharge be enhanced? GW body will remain poor.
Idle_19 (AW)	Retford links to existing flood risk management programme to enhance recharge		
Idle_07 (AW)	Wetland creation in Bawtry & Idle Washlands to support SSSI restoration and store winter flows	As above. Also benefits SSSIs and potentially aids drainage	This area may be too far distant from STWL sources to have an appreciable benefit for STWL. Closer to Anglian Water sources
Idle_41 (SVT)	Rainworth Water wetland creation as part of local masterplan	Improved water quality, habitat, hydromorphology. Enhanced recharge - trade off against future reductions. Improved flow regime in Rainworth Water.	Landowner permission required. May require protected species and archaeological surveys
WMS_02 (SVT)	Worfe on the Wildside extension and Worfe Water Environmental Improvement Fund for sedimentation control, fish barrier removal and , tree planting	Improve ecological resilience, Reduced sedimentation, Improved access for fish, Improved water quality.	None known
WMS_39 (SVT)	Bromsgrove Brooks building on the Love Your River work, STWs Sanders Park restoration and the work of NWWM. Bromsgrove is important as one of the last breeding locations of water voles, it also suffers flooding and low flow issues.	Improved hydromorphology, Improved ecological resilience, Flood alleviation, Wetland creation – biodiversity, water vole habitat. Flow enhancement, groundwater recharge	None known
WMS_09 (SSW)	Collaborate with/expand on existing Salmon in the Stour project (Severn Rivers Trust/EA). Remove barriers or create fish passes in Smestow and/or Stour catchment. Opportunities to improve WFD failings including habitat, water quality and fish passage.	Improved habitat for salmonids and access to tributaries at lower flows. Improving fish access could reduce requirement for future abstraction reductions Improved habitat and water quality.	WR benefit uncertain



Table 3: Options take forwards for further development for Environmental Destination catchment resilience.

In addition other catchment measures are being developed in water company PR24 business plans under other regulatory environmental drivers. These are in development and will be submitted to the EA for consideration via the AMP8 WINEP process. Early sight of some of the schemes in the Wyre catchment are in the Table 4.

ID	Option Description	Benefits	Risks
Wyre farmer engagement (not ED driven) (UU)	Farmer engagement project in partnership with the Wyre Rivers Trust, building on AMP6 and 7 activity in the safeguard zone. Raise awareness, offer advice, educate, monitor demonstrate and intervene to improve raw water quality.	Improved water quality, flood management, biodiversity, infiltration.	Proposed WINEP scheme. Not yet agreed. Water resources benefit is uncertain.
Natural Course Fylde Hub (not ED driven) (UU)	Develop a cohesive 'placed based' delivery plan for the Fylde catchment area with all stakeholders to drive joint decision making on catchment interventions to meet flooding and water quality needs.	Improved water quality, flood management.	Water resources benefit is uncertain.
Wyre Natural Flood Management (not ED driven) (UU)	A partnership project to unlock a new innovative funding model for nature based solutions to build flood resilience.	Reduction in river and soil erosion, improvement in water quality, biodiversity, climate change mitigation.	Water resources benefit is uncertain.

Table 4: Options being considered in the Wyre catchment under other regulatory drivers

## D.5. Environmental enhancement

Some of our existing PWS abstractions may be having a detrimental effect on the environment, particularly during dry weather periods when river flows are low. The EA ran the RSA programme to investigate potentially environmentally damaging licences and has been the subject of investigation and solution implementation over the last 20 years or so. Throughout AMP6 (2015 – 2020) water companies investigated the impacts of those abstractions identified by the Environment Agency as possibly causing harm to the environment.

Where our abstractions are identified to be the cause of the problem, we acknowledge that we need to find and implement solutions. These solutions might include revoking or reducing PWS abstraction licences at the affected sites and possibly finding an alternative source of supply.

Sustainability reductions to licences may be required to protect international or national designated conservation sites (Habitats Directive, Sites of Special Scientific Interest or Biodiversity 2020 sites), to protect locally important sites or to deliver Water Framework



Directive (WFD) objectives. Where water companies have agreed to make licence changes these are included in company plans, included in baseline and described in Appendix E.

## D.6. Environmental protection

Under the Water Framework Directive<sup>1</sup> (WFD) the Environment Agency has a duty to prevent the deterioration of the status of a waterbody. Deterioration of the quantitative status of a groundwater could arise if abstractions increase in the future due to increased use within licenced capacity.

The latest Water Resources planning supplementary guidance indicates that there are likely to be different levels of reduction applied to licences depending on the risk of deterioration. The EA will either cap licences at maximum peak abstraction or recent actual average abstraction depending on the environmental risk. A summary of the licence capping assumptions proposed by the Agency is provided in Figure 4 below.

Environmental scenario	Licence change
<ul style="list-style-type: none"> <li>flows in a water body do not support good ecological status (GES); or</li> <li>a groundwater body is at poor quantitative status; and</li> <li>there is evidence that the ecology is damaged by abstraction; and</li> <li>there is planned growth</li> </ul>	<ul style="list-style-type: none"> <li>cap licences at recent actual average abstraction rates</li> </ul>
<ul style="list-style-type: none"> <li>flows in a water body do not support good ecological status; or</li> <li>a groundwater body is at poor quantitative status; but</li> <li>there is no planned growth</li> </ul>	<ul style="list-style-type: none"> <li>cap licences at maximum peak abstraction rates</li> </ul>
<ul style="list-style-type: none"> <li>flows in a water body support good ecological status; or</li> <li>a groundwater body is at good quantitative status; and</li> <li>planned growth is likely to cause deterioration to poor status</li> </ul>	<ul style="list-style-type: none"> <li>cap licences at maximum peak abstraction rates</li> </ul>

Figure 4: Licence capping summary table source: EA 15 Nov 21 information letter.

The impacts of environmental improvements and no-deterioration licence capping for each water company in WRW are summarised in Table 5 below (data tables line BL7.2).

We understand that the Environment Agency will bring forward proposals to address no-deterioration risk from non-PWS abstractions in due course. In many cases the removal of deterioration risk will be dependent upon PWS and non-PWS abstractions being assessed together.

<sup>1</sup> Implemented as The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017





Water Co.	WRZ (Sheet Name)	Resource Zone	2025-26	2030-31	2035-36	2040-41
DCWW	WRZ1	Alwen Dee	0.00	0.00	0.00	0.00
DCWW	WRZ2	SEWCUS	0.00	0.00	0.00	0.00
DCWW	WRZ3	Hereford	0.00	0.00	0.00	0.00
DCWW	WRZ4	Pilleth	0.00	0.00	0.00	0.00
DCWW	WRZ5	Ross-on-Wye	0.00	0.00	0.00	0.00
DCWW	WRZ6	Vowchurch	0.00	0.00	0.00	0.00
DCWW	WRZ7	Whitbourne	0.00	0.00	0.00	0.00
STW	WRZ8	Bishops Castle	0.00	0.00	0.00	-1.22
STW	WRZ9	Chester	0.00	0.00	-0.08	-0.08
STW	WRZ10	Forest and Stroud	0.00	-0.36	-0.36	-0.25
STW	WRZ11	Kinsall	0.00	-0.49	-0.49	-0.49
STW	WRZ12	Mardy	0.00	-0.74	-0.74	-0.74
STW	WRZ13	North Staffordshire	0.00	-22.58	-22.58	-43.91
STW	WRZ14	Ruyton	0.00	0.00	0.00	-0.78
STW	WRZ15	Shelton	0.00	-27.00	-27.00	-45.00



Water Co.	WRZ (Sheet Name)	Resource Zone	2025-26	2030-31	2035-36	2040-41
STW	WRZ16	Stafford	0.00	0.00	-3.45	-3.45
STW	WRZ17	Strategic Grid	0.00	-34.66	-34.66	-31.70
STW	WRZ18	Whitchurch and Wem	0.00	-3.73	-3.73	-3.73
STW	WRZ19	Wolverhampton	0.00	-1.93	-1.93	-3.58
STW	WRZ20	Newark	0.00	0.00	0.00	0.00
STW	WRZ21	Nottinghamshire	0.00	-48.59	-48.59	-44.45
STW	WRZ22	Rutland	0.00	0.00	0.00	0.00
SSW	WRZ23	South Staffs WWRZ	0.00	-9.29	-9.29	-9.29
UU	WRZ24	Strategic	0.00	-15.00	-23.00	-23.00
UU	WRZ25	Carlisle	0.00	0.00	0.00	0.00
UU	WRZ26	North Eden	0.00	0.00	0.00	0.00
HD	WRZ27	Saltney	0.00	0.00	0.00	0.00
HD	WRZ28	Llanfyllin	0.00	0.00	0.00	0.00
HD	WRZ29	Llandinam & Llanwrin	0.00	0.00	0.00	0.00
HD	WRZ30	Wrexham	0.00	0.00	0.00	0.00
	<b>Total</b>		<b>0.00</b>	<b>-164.37</b>	<b>-175.90</b>	<b>-211.66</b>

Table 5: Deployable output reductions (Ml/d) for environmental enhancements and environmental protection, (Table Line BL7.2).

## D.7. Environmental destination abstraction scenarios

A number of environmental destination scenarios are being used to test the sensitivity of our water resources options to potential future sustainability reductions and inform our plan.

Scenarios of abstraction reductions were provided by the Environment Agency, and water companies have assessed these. In addition, a low scenario has been generated by removing reductions with the greatest uncertainty.



As part of our work we have also calculated licence reductions for non-Public Water Supply. It is important to note that the EA Waterbody Abstraction Tool calculates licence reductions proportionately across a waterbody and as such, delivery of the environmental outcome – the achievement of EFI’s in 2050, will be dependent upon complementary licence modifications to be undertaken by the Environment Agency from 2030 onwards.

Table 6 below shows the range of Environmental Destination scenarios relative to any baseline reductions (see Appendix E for company supply-demand balance table commentary and forecast assumptions). A positive number shows a reduction in the deployable output relative to the baseline scenario. The BAU+ scenario has been included in the baseline tables.

Water companies in WRW have collaborated to develop scenarios to deliver potential licence reductions to achieve the flows to support the environmental destination objectives by 2050. Each company has taken this common objective and used the dWRMP development to consider how and when they can achieve these ED objectives. The delivery profiles assumed in their plan and any additional scenarios considered are summarised in the individual company summary tables in section D8 below.



Water Co.	WRZ (Sheet Name)	Resource Zone	Current regulatory needs	BAU+		OFWAT Low		Enhanced	
			7.2BL (MI/d)	7.3BL (MI/d)	Total (MI/d)	ED reduction in addition to earlier reg needs	Total (MI/d)	ED reduction in addition to earlier reg needs	Total (MI/d)
DCWW	WRZ1	Alwen Dee	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DCWW	WRZ2	SEWCUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DCWW	WRZ3	Hereford	0.00	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30
DCWW	WRZ4	Pilleth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DCWW	WRZ5	Ross-on-Wye	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DCWW	WRZ6	Vowchurch	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DCWW	WRZ7	Whitbourne	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STW	WRZ8	Bishops Castle	-1.22	-0.94	-2.16	0.00	-1.22	-1.06	-2.28
STW	WRZ9	Chester*	-0.08	0.00	-0.08	0.00	-0.08	0.00	-0.08
STW	WRZ10	Forest and Stroud	-0.25	-4.71	-4.96	0.00	-0.25	-7.03	-7.28
STW	WRZ11	Kinsall*	-0.49	0.00	-0.49	0.00	-0.49	-4.29	-4.78
STW	WRZ12	Mardy	-0.74	-2.57	-3.31	0.00	-0.74	-2.38	-3.12
STW	WRZ13	North Staffordshire	-43.91	-72.86	-116.77	-46.84	-90.75	-72.86	-116.77
STW	WRZ14	Ruyton	-0.78	-0.49	-1.27	0.00	-0.78	-0.49	-1.27
STW	WRZ15	Shelton	-45.00	-42.22	-87.22	-34.45	-79.45	-44.1	-89.1
STW	WRZ16	Stafford	-3.45	-13.51	-16.96	-13.51	-16.96	-13.74	-17.19



Water Co.	WRZ (Sheet Name)	Resource Zone	Current regulatory needs	BAU+		OFWAT Low		Enhanced	
			7.2BL (MI/d)	7.3BL (MI/d)	Total (MI/d)	ED reduction in addition to earlier reg needs	Total (MI/d)	ED reduction in addition to earlier reg needs	Total (MI/d)
STW	WRZ17	Strategic Grid	-31.7	-48.23	-79.93	-18.19	-49.89	-47.67	-79.37
STW	WRZ18	Whitchurch and Wem*	-3.73	-0.36	-4.09	-0.36	-4.09	-1.64	-5.37
STW	WRZ19	Wolverhampton	-3.58	-15.74	-19.32	-15.74	-19.32	-15.74	-19.32
STW	WRZ20	Newark	0.00	-1.44	-1.44	-0.94	-0.94	-1.44	-1.44
STW	WRZ21	Nottinghamshire	-44.45	-59.58	-104.03	-28.46	-72.91	-79.45	-123.9
STW	WRZ22	Rutland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSW	WRZ23	South Staffs WWRZ	-9.29	-38.72	-48.01	-38.72	-48.01	-50.33	-59.62
UU	WRZ24	Strategic	-23	-108	-131	-108	-131	-110	-133
UU	WRZ25	Carlisle	0.00	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06
UU	WRZ26	North Eden	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HD	WRZ27	Saltney	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HD	WRZ28	Llanfyllin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HD	WRZ29	Llandinam & Llanwrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HD	WRZ30	Wrexham	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>			-211.67	-409.73	-621.39	-305.57	-517.23	-452.58	-664.24

Table 6: Scenarios showing additional deployable output reductions (MI/d) per WRZ for environmental destination.

(\* Early WINEP WFD no deterioration investigations were finalised after the draft plan assumptions were developed; final numbers will be included in the final WRMP).



## D.8. Company Summaries for Environmental Destination.

Hafren Dyfrdwy Environmental Destination
<p><b>ENGLAND</b></p> <p>Not applicable</p> <p><b>WALES</b></p> <p>Environmental Destination guidance from Natural Resources Wales (NRW) requires Welsh water companies to set an ambitious strategy for ecosystem resilience which helps to enhance biodiversity through our water resource activities. This aligns with our wider environmental ambitions and current AMP7 programme of biodiversity improvements across the Vyrnwy estate and our supply area.</p>
<p><b>Plan for current regulatory requirements</b></p>
<p><b>IMPROVEMENT</b></p> <p>Our AMP7 environmental improvement activities have been focused on WFD / UWWTD improvements on our wastewater assets and responding to the biodiversity duty introduced by the Environment (Wales) Act 2016. We have worked with the RSPB to undertake an ambitious programme of peatland restoration across the Vyrnwy estate uplands, with the objective of bringing the SSSI back to satisfactory condition while also contributing to mitigation of climate change through carbon sequestration and reversing biodiversity decline through habitat improvement / creation.</p> <p><b>WFD NO DETERIORATION</b></p> <p>We will ensure that future population growth or climate change does not result in an increase in water abstraction in the areas where water availability is already restricted, taking into account non-public water supply needs. We will assess any planned infrastructure development arising from our WRMP24 under the SEA, HRA and WFD frameworks to maximise beneficial outcomes and prevent deterioration of the natural environment.</p>
<p><b>Planning for long term needs</b></p>
<p>Our WRMP24 modelling has indicated that we will continue with a surplus in all WRZs until at least 2080. Therefore, we will continue to focus on increasing resilience supply by maximising run-off in our reservoir catchments, minimising water quality risks at a catchment level and work with our customers to understand the value of our water and how they can use it more efficiently, resulting in affordability and environmental benefits.</p> <p>Our long-term environmental ambition will continue to focus on biodiversity improvements across our estate and wider supply area, working in partnership with RSPB, Wildlife Trusts, Rivers Trusts and other water companies.</p>
<p><b>Uncertainty N/A</b></p>

Table 7: Hafren Dyfrdwy Environmental Destination Approach Summary.



**Dŵr Cymru Welsh Water Environmental Destination**

**ENGLAND**

We will assess the EA National Framework (BAU+ and Enhanced) scenarios within our WRMP24 to establish whether the abstraction licence reductions proposed for our Leintwardine groundwater source will impact the level of service to our customers in the Hereford WRZ. This reduction is assumed to be delivered by 2030.

Under the WINEP programme we are currently investigating the potential impact of our Leintwardine abstraction upon flows in the River Teme and the achievement of ‘good’ ecological status.

**WALES**

NRW are taking a different approach in Wales, and we are committed to work with them to develop an Environmental Destination programme that will incorporate the requirements and ambitions of the Environment (Wales) Act 2016 and Well-being of Future Generations (Wales) Act 2015. We are proposing a substantive piece of work through the NEP for AMP8, to understand the potential future impact on river flows under climate change and how this may affect ecological needs. This work is currently in progress through dialogue with the local NRW teams. We are aiming to develop catchment wide and nature-based solutions that will form the base of our Environmental Destination. The programme will also be focussed on providing benefits to society and carbon reduction to enhance the environment of Wales.

**Plan for current regulatory requirements**

**IMPROVEMENT**

We are delivering the required AMP7 programme of voluntary licence amendments to support the achievement of ‘good’ status across a number of heavily modified waterbodies.

**WFD NO DETERIORATION**

We will ensure that future population growth or climate change does not result in an increase in water abstraction in the areas where water availability is already restricted, taking into account non-public water supply needs. We will assess any planned infrastructure development arising from our WRMP24 under the SEA, HRA and WFD frameworks to maximise beneficial outcomes and prevent deterioration of the natural environment.

**Planning for long term needs**

We propose to undertake a range of investigations in 2025-2030 (AMP8) to help understand any risks to the long-term sustainability of our abstraction licences.

**Uncertainty**

Welsh Water has identified one minor ‘uncertain’ sustainability reduction on the River Teme from the National Framework data. This is used as a scenario which is not expected to significantly change the supply demand balance of the Hereford Zone.

Table 8: Dŵr Cymru Welsh Water Environmental Destination Approach Summary.

We already have an ambitious set of environmental improvement actions in train that will deliver by 2030, and which will continue and grow into the next phase of Water Resource Planning. Severn Trent's plan will deliver a deployable output (DO) reduction of c.140MI/d by 2030 and c.179MI/d by 2040, which will bring environmental improvement and will protect against environmental deterioration by preventing further abstraction growth from these water bodies. This in itself represents early delivery of the EA's environmental destination objectives. By 2050 the BAU+ deployable output reductions equate to a total of c.442MI/d.

To put this into context, STW is contributing 71% of the planned DO reductions across the WRW region to deliver environmental improvement and prevent future deterioration by 2050. The remaining 29% is made up 21% United Utilities and 8% South Staffs Water.

Our waste and water operation alongside broader catchment partnerships and collaboration activities provide us with much further reaching environmental improvement solutions beyond that of just abstraction control. In addition to the c.140MI/d of DO reduction we are committed to in the short term, we have also identified two priority catchments in England where we will focus on delivering wider water quality and environmental improvements that are informed by local stakeholders' priorities.

We have also committed to a continuation of our extensive abstraction monitoring and investigation programme in sensitive water bodies to gain better understanding of challenges going forward and shape longer term solutions from a more informed basis and will be proposing an extensive investigation programme in the AMP8 WINEP to reduce the uncertainty in the assessment of future water needs for the environment and the range of solutions to achieve the outcomes required.

To summarise what features in the draft WRW plan:

- we have an accelerated plan to deliver c.140MI/d deployable output reduction by 2030
- We have alternative proposals for two priority catchments where we will look at catchment measures to enhance resilience
- To build confidence in sustainability of operation and holistic betterment of the environment we will continue to monitor and investigate the remaining areas over the course of the next planning cycle to inform thinking for activities beyond 2030

## Severn Trent Water Environmental Destination

### ENGLAND

By 2050 the BAU+ deployable output reductions increase to a total of c.442MI/d. This includes our shorter term regulatory needs (2030 – 2040) and further deployable reductions in our longer term environmental destination scenario (by 2050).

Measuring progress against the STW BAU+ environmental scenario deployable output reductions our plan presents ~30% of the **deployable output** reductions delivered by 2030 rising to ~40% by 2040. Given the scale of the reductions and lead in time to develop the scale of solutions the remaining 60% of the reductions are planned by 2050. To put this into context, Severn Trent is contributing 71% of the planned DO reductions across the WRW region to deliver environmental improvement and prevent future deterioration. We have tested multiple scenarios that would accommodate changes by 2050. We will continue to explore the opportunity to deliver this earlier, without putting security of supply at risk, and we are proposing to undertake a large AMP8 WINEP investigation and options appraisal programme to refine the plan.





For the draft WRMP we have used the BAU+ scenario in our baseline plan and are using the High (Enhanced) and low scenarios to develop an adaptive plan. We have not used the Enhanced scenario in our preferred plan as we consider the differentiation small (29MI/d ~6%) and outweighed by other uncertainties in the assessment at this time. The Idle catchment has the largest differentiation between the BAU and Enhanced reductions (~20MI/d). We consider the BAU+ scenario to represent a high ambition for the water resources in our region. More detailed investigations proposed for AMP8 will reduce the uncertainty and allow more detailed evaluation of the designated features for our region.

We have developed a low scenario where we have removed or reduced the reductions that are have higher uncertainty to test the plan against a lower scenario and build an adaptive plan.

We are seeking opportunities to explore further opportunities for catchment measures with stakeholders to bring catchment improvements and ecological resilience without destabilising public water supplies. We are initially undertaking this evaluation in two priority catchments, the Idle and the Worcestershire Middle Severn.

### **Plan for current regulatory requirements**

The early reductions between 2030 and 2040 relate to our current estimate of reductions needed to delivery our planned environmental improvements and an estimate of total licence capping to prevent environmental deterioration. Our ambitious commitments to protecting the future water environment result in a loss of c.140MI/d in public water supply deployable output by 2030 and increases to c.179MI/d by 2040.

#### **IMPROVEMENT**

For AMP7 we have included agreed licence reductions and flow compensation changes to achieve WFD improvements. This includes c.30MI/d reduction in abstraction from groundwater sources and changes to the operation or hands-off flow at four surface water abstractions. Licence changes will be implemented between 2025 and 2030.

#### **NO DETERIORATION**

There are a number of groundwater sources in AMP7 WINEP where we have already committed to take the average deployable output down to recent actual abstraction by 2030.

The AMP7 WINEP includes both investigations and adaptive planning. Regulatory outputs will be delivered by 2022 and 2024/25. Despite the uncertainty around these investigations, we have assumed licensed abstraction will be reduced in those water bodies most at risk of future deterioration.

For WRMP planning purposes, those sources that are at a lower risk of deterioration, we have assumed a potential loss of 50% of the difference between our current deployable output and recent actual abstractions by 2030, in our central best estimate for all sources in this category. We have assumed a worst-case average licence reduction to recent actual by 2040. Unless we have confirmed licence changes / reductions with the EA via the WINEP, these are planning assumptions and subject to modification taking into account source specific evidence.

It is possible, when we have undertaken updated WFD no deterioration risk assessments considering the risk of growth in abstraction from our sources, that the timing of the implementation of any sustainability reduction changes. To evaluate this risk, we are also running additional scenarios where we are assuming all licence capping delivered by 2030 and 2035, this will inform our adaptive plan for this requirement. We will update the reduction profile based on the latest information in our final plan.



Currently river restoration measures are being implemented as well as licence changes in higher risk catchments. We anticipate that similar work will be required in the next plan but details are not yet available.

### **Planning for long term needs**

#### **POTENTIAL LICENCE CHANGES**

We have used scenarios, based on the EA National Framework, to examine the full range of potential environmental protection scenarios for 2050. We are using these scenarios to inform our adaptive management plan for Environmental Destination and long-term water supply / demand investment needs.

#### **CATCHMENT APPROACH**

We are producing a prioritised investigation plan the AMP8 WINEP which will aim to reduce the uncertainty in the assessment of abstraction licence reductions and consider a range of holistic solutions to build catchment resilience. We will work with stakeholders to understand current and future pressures and seek collaborative solutions, building on the experience of the first 3 WRW priority catchments that have had an initial evaluation.

For future plans the environmental destination will be refined based on bottom-up catchment scale analysis and latest available data and benefit assessment. Both PWS and Non PWS will need be taken into account at localised catchment scale.

#### **WFD NO DETERIORATION**

For WFD no deterioration, we are taking steps between now and 2040 that will prevent long term growth in abstraction in those water bodies most vulnerable to the impacts of climate change. We are taking an adaptive management approach for lower risk sources, our approach means that abstraction licences will be retained for longer, to allow time for solutions to be implemented, unless the risk of deterioration changes and requires alternative measures.

We will seek to align no-deterioration risk and environmental destination opportunities to bring catchment improvements to higher risk areas while extending the time frame for improvement in lower risk areas.

### **Uncertainty**

See Table 1 above for WRW.

We are in early discussion with the EA to the required AMP8 WINEP investigation programme that will need to include further climate change evaluation for Environmental Destination.

*Table 7: Severn Trent Water Environmental Destination Approach Summary.*

Insights into the evaluation and approach to date are summarised as follows:

- While these environmental destination scenarios are helpful to inform our thinking about long term environmental goals, they go beyond the traditional WINEP approach, they do not consider a cost / benefit or cost / effectiveness test in the assumed reductions. They



also go beyond the Government's 25-year Environment Plan which sets a target of getting "... 75% of water bodies to near natural status as soon as is practically possible."

- For SVT the effect of these scenarios is felt largely on our groundwater sources – the scenarios seek to reduce abstraction from failing groundwater bodies and have the objective of returning groundwater to more natural levels in the primary aquifers from which we abstract. For Severn Trent the effect of adopting the BAU+ scenario would be a reduction of a further c.442MI/d deployable output from our sources including the loss of licensed abstraction headroom across many of our sites. On a system wide scale, the effects would be even greater, our reservoir and river abstraction sources are designed to operate conjunctively with our groundwater sources and so the overall effect on our integrated system would be a material loss of supply resilience.
- The scale of abstraction reductions identified in these scenarios means that our water resource model outputs are not likely to be representative of a realistic scenario. Our water supply network and infrastructure is not designed to operate under such a scenario, and simply reporting the model outputs gives a false impression of the scale of impact on our supply / demand and resilience; the impact on modelled DO is much greater than the individual source reductions entered into the model. We have used non modelled reductions in our analysis.
- We do not yet have appropriate solutions to address the potential scale and location of the potential reductions, we have identified the water resource solutions but not all of the water network and treatment works investment needed to accommodate such changes to how we would manage water supply. This will need to be considered for the next regional plan.
- We are then using the EA's Enhanced environmental destination scenario to inform our WRMP24 longer term planning and the emerging adaptive pathways investment plan. Our investment modelling considers a wide range of potential future scenarios covering climate change impacts, growth projections and explicitly considers scenarios where we deliver the Environmental Destination scenario by 2050. We are using these scenarios to identify the best value options that we will promote in our WRMP24. However, we will also use them to show that the scale of further abstraction reductions needed will put public water security of supply at risk and will require significant investment to accommodate. Therefore, the costs and benefits of making these reductions and the pace of change need careful consideration and we will need to demonstrate evidence to secure customer support.
- We also need to take account of the environmental impacts of implementing abstraction reductions. While the scenario objective is to return groundwater levels to near natural levels, this could lead to increasing groundwater flooding across large parts of our urban and agricultural geography. Under the BAU+ scenario, the scale of new water supplies needed to replace the groundwater reductions mean that we would need to deploy alternative schemes that will have material environmental impacts of their own e.g., raising reservoirs, enhanced waste water treatment for reuse, pumping water over large distances etc. Therefore, the net environmental costs and benefits of the scenario need to be weighed up before making any further long-term commitments. To do this, our PR24 business plan will include significant expenditure on environmental investigation and appraisal to inform the evidence base for a PR29 investment plan.

South Staffs Water has committed to improving the environment through abstraction licence reductions alongside demand reductions through leakage and PCC reduction mechanisms. We have agreed sustainability reductions with the Environment Agency following our AMP7 ‘no deterioration’ WINEP investigations. These reductions total 9.29 MI/d for the South Staffs water resource zone and will be delivered during AMP8.

We will continue to work with the EA as we develop our AMP8 WINEP programme which will include investigations relating to environmental destinations to confirm the reductions required on a source-by-source basis. The outputs of these investigations will feature in our WRMP29 and our AMP9 WINEP programme.

We are also looking to include wider catchment measures in our AMP8 WINEP programme that have been developed in the WRW priority catchment workstream. These will supplement and enhance the environmental destination investigations as we look to ensure actions are undertaken in these catchments prior to the outcome of the environmental destination WINEP AMP8 investigations.

### South Staffs Water Environmental Destination

#### ENGLAND

South Staffs Water have included BAU+ as our environmental destination. This equates to an abstraction reduction of 48.01 MI/d, which our sustainability reductions in AMP8 will contribute towards.

Our Ofwat low scenario and BAU+ locally verified provide the same abstraction reduction of 48.01 MI/d as we have no SAC’s within our abstraction area. The enhanced scenario equates to an abstraction reduction of 59.62 MI/d.

A phased implementation of the reductions have been assumed from 2030 to 2050 with an increasing annual straight line profile. At this stage, we have applied the reductions in a linear fashion to represent the progressive need for reductions and to manage the impact of these reductions through our general operations in the most efficient way.

#### Plan for current regulatory requirements

#### IMPROVEMENT

At WRMP19 we committed to a 6 MI/d reduction in abstraction and we are progressing with this throughout AMP7.

#### NO DETERIORATION

In the shorter term, licence reductions to prevent waterbody deterioration is underpinned by the AMP7 WINEP investigations (completed in March 2022). These changes will be implemented before the end of AMP8 (2030).

South Staffs Water has committed to improving the environment through abstraction licence reductions alongside demand reductions through leakage and PCC reduction mechanisms. We have agreed sustainability reductions with the Environment Agency following our AMP7 ‘no deterioration’ WINEP investigations. These reductions total 9.29 MI/d for the South Staffs water resource zone and will be delivered during AMP8.

#### Planning for long term needs



South Staffs Water have included BAU+ as our environmental destination. This equates to an abstraction reduction of 48.01 MI/d, which our sustainability reductions in AMP8 will contribute towards.

Our Ofwat low scenario and BAU+ locally verified provide the same abstraction reduction of 48.01 MI/d as we have no SAC's within our abstraction area. The enhanced scenario is also our Ofwat high scenario, and equates to an abstraction reduction of 59.62 MI/d.

We will continue to work with the EA as we develop our AMP8 WINEP programme which will include investigations relating to environmental destinations to confirm the reductions required on a source-by-source basis. The outputs of these investigations will feature in our WRMP29 and our AMP9 WINEP programme.

We are also looking to include wider catchment measures in our AMP8 WINEP programme that have been developed in the WRW priority catchment workstream. These will supplement and enhance the environmental destination investigations as we look to ensure actions are undertaken in these catchments.

#### **Uncertainty**

See Table 2 for WRW.

*Table 8: South Staffs Water Environmental Destination Approach Summary.*

Further insights into the evaluation and approach to date are summarised as follows:

- South Staffs continues to follow as consistent approach as possible with the other WRW water companies, working with non-PWS members.
- We have tested our plan against the Ofwat scenarios and this has formed the basis for our adaptive planning.
- We will continue our WRMP24 and PR24 customer engagement work where we have proactively gained customer opinion on our current environment programme discussing our resilience and the potential impact future supply options may have on the catchments in which our customers live.

#### **United Utilities**

United Utilities has committed to improving the environment through abstraction licence reductions alongside demand reductions through leakage and PCC reduction mechanisms. Within AMP8 (by 2030), potential reductions will be driven by the company's ongoing AMP7 no deterioration WINEP investigations which are planned to complete by March 2022, by which time we hope to have agreed the required licence changes with the Environment Agency. In 2022 we will work with the EA to agree any AMP8 WINEP investigations that are required, whose outcomes will then be implemented in AMP9 (by 2035).

We will also work in partnership with stakeholders to investigate and implement measures in the catchments to address wider environmental pressures where they impact on the abstraction. These measures will deliver wider natural and social capital benefits such as increased biodiversity, carbon storage, improved access and wellbeing.



In the longer term, we have currently assumed the BAU+’ scenario (in line with WRW) in our baseline for licence reductions for Environmental Destination which will be implemented by 2050. Informed by outputs from the EA’s Waterbody abstraction tool licence reduction estimation has equated to a drop in deployable output of 131 MI/d by 2050 (15 MI/d impact from 2030 for AMP8 sustainability reductions) in our Strategic Zone and 0.06 MI/d in our Carlisle zone. .

United Utilities’ approach to Environmental Destination is summarised in Table 8.

## United Utilities Environmental Destination

### ENGLAND

United Utilities has committed to improving the environment through abstraction licence reductions alongside demand reductions through leakage and PCC reduction mechanisms. Within AMP8 (by 2030), potential reductions will be driven by the company’s ongoing AMP7 no deterioration WINEP investigations which are planned to complete by March 2022, by which time we hope to have agreed the required licence changes with the Environment Agency. In 2022 we will work with the EA to agree any AMP8 WINEP investigations that are required, whose outcomes will then be implemented in AMP9 (by 2035).

We have used the EA Waterbody abstraction tool to examine the scale of further potential abstraction changes needed to deliver a high environmental protection scenario for 2050. We have used BAU+ for our baseline forecast along with Enhanced and Ofwat Low scenarios as part of our adaptive planning. Noting through discussion with local and national EA teams, we have screened out certain source types, i.e. Reservoirs and river abstractions with hands off flows.

We will also work in partnership with stakeholders to investigate and implement measures in the catchments to address wider environmental pressures where they impact on the abstraction. These measures will deliver wider natural and social capital benefits such as increased biodiversity, carbon storage, improved access and wellbeing.

### WALES

Natural Resources Wales has not completed a similar exercise for Wales; instead, the guidance for Wales asks companies to consider all pressures on the environment, not specifically water resources, in line with Welsh environmental legislation. Therefore, we are engaging with stakeholders in Wales to join up with existing initiatives to enhance catchments where we abstract, and also identifying new opportunities to work in partnership to investigate and implement measures in these catchments to address wider environmental issues.

## Plan for current regulatory requirements

### IMPROVEMENT

In the shorter term, licence reductions to prevent waterbody deterioration is underpinned by the AMP7 WINEP investigations (due for completion in March 2022). These changes will be implemented before the end of AMP8 (2030).

### NO DETERIORATION

We are currently working to identify licences to be taken forward for the AMP8 WINEP and will be agreed with the EA in 2022 and delivered in AMP9. We will review our existing licences and where there is a time limit and the associated water body is at moderate or high risk of deterioration, we will discuss these with the Environment Agency to whether they need to be



included in the AMP8 WINEP investigation. Ongoing work will be undertaken to review lower risk abstraction sources in order to identify whether risk of deterioration could potentially change and requires alternative measures.

### **Planning for long term needs**

In the longer term, United Utilities have used outputs from the EA Waterbody tool to examine the potential licence reductions for 2050.

For our baseline in line with WRW, we have applied the BAU+ locally verified scenario which equates to a 131 MI/d deployable input reduction for the Strategic resource zone, and 0.06 MI/d for the Carlisle resource zone by 2050. This includes all sustainability reductions from AMP7 WINEP investigations and licence capping assumptions in AMP8.

As part of our adaptive plan, we have applied the Enhanced scenario for Ofwat High and equates to 133 MI/d DO reduction. The Ofwat low scenario was developed in line with WRW to remove licence reductions with the highest uncertainties, however DO reductions by 2050 was the same as our baseline BAU+ locally verified scenario.

We will work with Natural England and the Environment Agency to help develop our AMP8 WINEP program for Environment Destination. The aim of these investigations will be to better quantify uncertainties and understand the likely long term licence reductions required at a source level. Outputs from these investigations will help feed into WRMP29 and the AMP9 WINEP program.

We are also planning to include wider catchment measures in our AMP8 WINEP programme that have been developed in the WRW priority catchment workstream and beyond. In line with UuW's Catchment Systems Thinking Approach (CaST), we are seeking multiple benefits including increasing natural capital, biodiversity and social capital.

### **Wyre**

In terms of wider risks and opportunities in the Wyre catchment, one of the key challenges is related to the flashy nature of the catchment meaning that flooding in the lower part is common following a period of heavy rain. Soil compaction from agricultural practices, impermeable land cover from development and a below-national average tree cover all contribute to the impact of flooding because the land's ability to slow the flow and increase infiltration to ground could be enhanced.

Another key challenge is diffuse pollution from sources in the catchment which increases the risk to the quality of water in the Wyre, including that abstracted for public supply. By addressing the sources of pollution through catchment management, not only will this reduce the power and chemicals needed to treat the water to potable standards, but it will also deliver benefits for the wider environment and people.

Options that have been considered comprise a range of catchment investigations and nature based solutions that build on the work already delivered by United Utilities in partnership with the Environment Agency and Wyre Rivers Trust. One of these options is an investigation into the potential for aquifer recharge. This is a concept that could be applied at a range of scales and levels of complexity; from working with farmers to improve infiltration to ground with good soil management practices, to pumped storage options of raw/treated/partially treated water. The aim is to reduce the flooding risk whilst benefiting water quality and water resources. Other options in the AMP8 WINEP for the Wyre will include a continuation of work



with the farming community to reduce agricultural pollution, investigation of the impacts of the Lune/Wyre transfer and riparian habitat improvements.

Existing stakeholder engagement in the Wyre catchment is mature and the implementation of future catchment management (whether Environmental Destination driven or otherwise) will continue to be part of the existing frameworks; including the CaBA group, Wyre Natural Flood Management Community Interest Company, Natural Course Fylde Hub and Lancashire Peat Partnership to name a few.

### **Upper Mersey**

We are engaging with stakeholders in the Upper Mersey catchment as part of an integrated approach to developing our future plans across the water, wastewater and bioresources business areas. The pressures on water resources are mainly driven by demand from population in urban areas, from modifications to the water bodies as a legacy of the industrial past, and from environmental designations in the upper reaches of the catchment. We will continue our approach of working in partnership to deliver activities in the catchment to improve raw water quality, and identify where these activities may offer a longer term benefit to water resources. For instance, working with farmers to reduce nutrient inputs to land to address taste and odour issues associated with algae in raw water. A reduction in algae will help to maintain the capacity of water treatment works to deal with demand during periods of prolonged dry weather. Similarly we will continue to work in partnership to deliver habitat restoration, such as peatland restoration. There are expected to be long term resilience benefits of this both for water quality and availability because a healthy blanket bog habitat will absorb more water in periods of heavy rainfall and hold it back, enabling reservoirs to be replenished at a slower rate. Short-medium-long term activities in the Upper Mersey will feature in the AMP8 WINEP and beyond.

### **River Eden**

We are engaging with stakeholders in the Eden catchment as part of an integrated approach to developing our future plans across the water, wastewater and bioresources business areas. We will build on the success of the River Petteril integrated catchment project, which is taking place in a sub catchment of the River Eden. The pressures on water resources are mainly driven by environmental designations, with the River itself designated as a Special Area of Conservation. We will continue our approach of working in partnership with organisations such as the Eden Rivers Trust and the North Pennines Area of Outstanding Natural Beauty to deliver activities in the catchment to improve raw water quality, and identify where these activities may offer a longer term benefit to water resources. For instance, working with farmers to reduce nutrient inputs to land to address taste and odour issues associated with algae in raw water. A reduction in algae will help to maintain the capacity of water treatment works to deal with demand during periods of prolonged dry weather. Similarly we will continue to work in partnership to deliver habitat restoration, such as riparian woodland. There are expected to be long term resilience benefits of this both for water quality and availability because trees establish roots which help to slow the flow of water. Woodland corridors are important for biodiversity, nature connectivity, carbon storage and reducing erosion and improving water quality. Short-medium-long term activities in the Eden will feature in the AMP8 WINEP and beyond.





## Uncertainty

See Table 1 above for WRW.

Table 9: United Utilities Environmental Destination Approach Summary.

Further insights into the evaluation and approach to date are summarised as follows:

- We are using the EA's Enhanced environmental destination scenario to inform our WRMP24 longer term planning and the emerging adaptive pathways investment plan. Our investment modelling considers a wide range of potential future scenarios. We are using these scenarios to identify the best value options that we will promote in our WRMP24. We will also use them to show adaptations needed to achieve the enhanced scenario. We are currently reviewing our approach to adaptive planning and scenarios in light of the recent Ofwat consultation.
- Where Strategic Resource Options (SROs) are being evaluated, we are seeking opportunities for enhancements to the local environment.

### Non-Public Water Supply

Details of licence reductions for non-PWS are contained within Appendix J. For environmental destination it is important to note the co-dependency between PWS and non-PWS abstractions.

Calculation of PWS licence reductions within the EA Waterbody Abstraction Tool is proportionate across all abstractions in a waterbody, thus if a non-PWS abstraction is present, or has influence upon a groundwater, both abstractions will need to be addressed for no-deterioration or environmental destination (2050 EFI) to be delivered.

Development of this plan and conversation with our non-PWS stakeholders indicates that many non-PWS abstractors do not have the resource or ability to undertake investigations to the same standard as water companies. This is a risk for the delivery of environmental flows in 2050.

### Non-Public Water Supply - Environmental Destination

#### ENGLAND

Environmental destination for non-PWS is largely dependent upon modification of abstraction licences by the Environment Agency. WRW have used the EA Waterbody Abstraction Tool to calculate the licence reductions for PWS and non-PWS necessary to achieve EFI's in 2050, but have not communicated the detail of individual licence reductions to non-PWS abstractors as this is a matter for the Agency.

A defining feature of non-PWS abstraction is that a business will often rely upon a single licence for its water needs and non-PWS abstractors cannot share or amalgamate licences in the same way that water companies can. Our sector stakeholders have indicated a strong desire to engage with the Agency at a local level to understand what may happen to their licences over the coming years.

We are concerned that non-PWS abstractors do not have the resources or expertise to undertake environmental investigations to the same standard as water companies.



We estimate that the Environment Agency will need to modify around 2,400 non-PWS licences before 2050 in order to secure the environmental benefit associated with reductions to water company licences.

#### **Plan for current regulatory requirements**

##### **WFD NO DETERIORATION**

We do not hold the recent annual data necessary to calculate an accurate estimate of no-deterioration licence capping for non-PWS. We have however identified a total volume of 140 MI/d (consumptive) of apparently unused licence capacity in non-PWS licence abstractions and apparent non-PWS headroom (fully licenced minus recent actual (consumptive)) of 3635 MI/d. Within the WRW region there are around 14,700 non-PWS licences that will need to be assessed by the Environment Agency beginning in 2028.

#### **Planning for long term needs**

To achieve the desired environmental destination there needs to be coordinated action to modify PWS and non-PWS licences at the same time in the same place. A catchment-based approach may be the best way of achieving this.

#### **Uncertainty**

The fundamental uncertainty in non-PWS data is the age of the dataset we are using – mostly 2010 to 2015. Whilst water company abstractions are relatively stable, non-PWS use can change rapidly. For example, over the period 2016 to 2022 we have seen the closure of a number of coal-fired power stations across the region. Whilst the licences may remain in some cases, recent actual abstraction has decreased greatly. The Covid-19 pandemic has also taken a toll upon many businesses across the region, which has likely affected the pattern of abstraction in some areas. The view of our sector stakeholders is that any changes to abstraction licences must be based upon very recent data to truly reflect real water use.

*Table 10: Non-PWS Environmental Destination Approach Summary.*

## **D.9. Work to be done for final WRMP and WRW regional plan**

In Wales we will work with the NRW and key stakeholders on the development of the AMP8 NEP.

We have shared the source level deployable output reductions with our regional EA teams and propose to discuss these and identify any areas for improvement for our final WRMP.

We will develop an AMP8 WINEP investigation and implementation actions and liaise with the EA on its development.

We will also discuss our proposed AMP8 WINEP and longer term environmental destination assumptions with Natural England.

We will consider feedback from the dWRMP consultation and update our plan where appropriate.



Table 11: River Idle Priority Options Table

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
Idle_43	Poulter/Clumber flood meadow restoration/NFM	Wetland/flood meadow restoration and NFM/MAR/WWNP in Poulter catchment. This may include 1) flood meadow restoration at Carburton upstream of Clumber Park, 2) flood meadow restoration at Cuckney/Norton, 3) slow the flow type measures to enhance recharge and manage flooding, 4) 2019 project dropped due to lack of funding/interest post-COVID.	HPO	Improves water quality, Flood management, Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
Idle_19	Retford flood risk	Work with existing flood management programme (currently scoping/optionseering) to encourage NFM measures that will enhance recharge.	HPO	Improves water quality, Flood management, Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
Idle_07	Wetland creation Bawtry/Idle Washlands SSSI restoration	Create biodiversity-rich flooded wetland u/s of Misson/Bawtry near confluence with Ryton. Store winter flows, restore floodplain habitats/Idle Washlands. Existing proposal was very developed as Silver Grasslands project, good partner/landowner buy-in but failed lottery funding. This option intends to build upon existing work already undergoing in this area.	HPO	Improves water quality. Flood management. Benefits for conveyancing/drainage issues?  Wetland creation - biodiversity. Benefits for Misson Line Bank (SSSI) and Misson Training Area (SSSI)? Enhanced recharge - trade off against future reductions.	This area may be too far distant from STWL sources to have an appreciable benefit for STWL.
Idle_48	New Sources – Nottinghamshire Confined Aquifer		HPO	Improved water quality for PWS (lower Nitrate). Abstraction impact on waterbodies potentially lower as more spread out and buffered by	Other water quality issues arising from older, deeper water?



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
		Intention to adjust abstracting groundwater further away from the outcrop areas and move East with boreholes.		storage of aquifer; may help with conjunctive use.	
Idle_01	Mansfield flood meadow	Flood meadow restoration near Mansfield STW (Maun catchment). Use existing flood ditch (historical flood meadow) to balance seasonal flow.	MPO	Improves water quality, Flood management, Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
Idle_04	New WTW from River Idle	(WRMP09 Option 12-31) New intake on the River Idle between Bawtry and West Stockwith, pumping into a new raw water storage reservoir. A new WTW would also be required.	MPO	Could help resolve conveyancing/drainage management issues. Benefits for Idle Washlands SSSI (water level management)? Additional source of water that could replace future reductions in groundwater abstraction.	Idle currently closed to abstraction even at Q30. Will EA open at high flows? Can a PWS source be operated in such a way that drainage problems are resolved? Would there be buy-in without this? Intermittent (and unpredictable) supply - during high flows only. EA study on impact of abstraction at high flows 'inconclusive'.



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
Idle_18	Worksop flood risk	Work with existing flood management programme (currently scoping/optioneering) to encourage NFM measures that will enhance recharge.	HPO	Improves water quality, Flood management, Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
Idle_20	Farm storage in lower Idle	Priority catchment work in April 2021 piloted farm storage of peak flows. Could this be scaled up? The Idle is currently closed to abstraction even at Q30. Possibly water resource benefit. Likely flood management benefits.	MPO	Flood management. Source of water to farms - encourage to trade/reduce groundwater licences?	Idle currently closed to abstraction even at Q30. Will EA open at high flows? WR benefit uncertain.
Idle_22	Calverton to ASR in Idle and Torne	dWRMP24 option 202. Collaboration with the Coal Authority to transfer 10-30 MI/d that they need to abstract due to rising mine water to ASR in the currently overabstracted Idle and Torn groundwater unit. Water would need significant treatment which cost would be split between STW and Coal Authority.	MPO	Wetland creation (one option to clean the mine water). 10-30 MI/d that could replace future reductions in groundwater abstraction.	Cost of treatment Risk of contamination of aquifer
Idle_23	Calverton to River Trent and later abstract	dWRMP24 option 203. Collaboration with the Coal Authority to transfer 10-30 MI/d that they need to abstract due to rising mine water to the River Trent. STW could then abstract water that has been diluted further down stream.	MPO	10-30 MI/d that could replace future reductions in groundwater abstraction.	Water quality impact on Trent



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
<b>Idle_24</b>	Enhanced demand management beyond WRMP19	Further steps to reduce leakage, reduce demand and improve water efficiency in Notts beyond targets already in WRMP19	MPO	Reduces demand.	What is already going into dWRMP24?
<b>Idle_41</b>	Rainworth Water wetland creation	CaBa Rainworth Water Masterplan - the creation/improvement of wetlands in Rainworth Water to enhance biodiversity and recharge. It includes: 1) creating multiple managed wetlands that will collect runoff from the A60, 2) re-naturalise the riverbank at Joseph Whitaker school, 3) feasibility study to assess the creation of a wetland area in school grounds, 4) allow the river to break its banks and re-naturalise within the bounds of the local nature reserve, 5) extend existing small ponds into a series of wetlands, 6) Forestry Commission/NWT project Sherwood Pines, 7) feasibility study for urban runoff, 8) a new complex water quality project linked to other Rainworth projects. This option will follow on from the current delivery project, incorporating further environmental measures building upon previous work.	MPO	Wide range of benefits for catchment depending on measures selected. Improved water quality, habitat, hydromorphology. Enhanced recharge - trade off against future reductions. Improved flow regime in Rainworth Water.	Landowner permission required Archaeological interest - may require investigation. Wildlife interest - may require protected species survey
<b>Idle_42a</b>	Flexible abstraction reform pilot	Pick one or more case study from to deliver in AMP8 under time-limited licence	MPO	Opportunity to make best use of available groundwater and surface water resource across multiple sectors.	Need to get approval from EA for any short-term licence changes Willingness of non-PWS abstractors to engage will be crucial
<b>Idle_42b</b>	Catchment-wide flexible abstraction reform	Case studies and collaborative working to promote flexible abstraction trading.	MPO	Opportunity to make best use of available groundwater and surface water resource across multiple sectors.	EA licensing approach may limit some opportunities (e.g., peak flow storage)



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
Idle_44	Revisit Vicar Water augmentation	Revisit rejected augmentation options from AMP6 RSA Options Appraisal: AMP6 constrained list VW02: New augmentation or supply to source ponds VW07: Augment from Clipstone PS or new borehole	MPO	Potentially a more effective way to restore flow to Vicar Water than GW abstraction reductions, with less risk of groundwater flooding.	If from new source, would need to take off existing abstraction.  Cost to run for long period?  Uncertain water quality, especially near source ponds.
Idle_45	Revisit Bevercotes Beck augmentation	Revisit rejected augmentation options from AMP6 RSA Options Appraisal: AMP6 constrained list BB06: New augmentation source	MPO	Potentially a more effective way to restore flow to Bevercotes Beck than GW abstraction reductions, with less risk of groundwater flooding.	If from new source, would need to take off existing abstraction.  Cost to run for long period?
Idle_46	Revisit Rainworth Water augmentation	Revisit rejected augmentation options from AMP6 RSA Options Appraisal: AMP6 constrained list RW02,05,07: Augmentation from new source	MPO	Potentially a more effective way to restore flow to Rainworth Water than GW abstraction reductions, with less risk of groundwater flooding.	If from new source, would need to take off existing abstraction.  Cost to run for long period?  Depending on location of borehole, may lose much of the augmentation water to leakage through base of stream (fissured).  Potential WQ disbenefits with STW augmentation option.
Idle_16	Sutton-in-Ashfield river restoration	"Daylighting the Maun" - EA project (in the pipeline) with Local Authority. Maun currently culverted through park.	LPO	Improved ecological resilience.	Is this already happening? What is the benefit for WRW getting involved?



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
Idle_25a	Projects from Bevercotes desk study (riparian)	<p>Range of riparian and WQ measures in Bevercotes Beck. Some will be picked up by STWL AMP7 Environmental Measures, but others could be delivered through ED.</p> <p>Measures include:</p> <ul style="list-style-type: none"> <li>-Protection of areas vulnerable to erosion</li> <li>-Leaky willow dams in agricultural drainage ditches</li> <li>-Diversification of channel morphology and flow conditions by:               <ul style="list-style-type: none"> <li>a. creation of vegetated in-channel pool-riffle sequences,</li> <li>b. installation of woody debris, meanders and berms in a widened riparian corridor along the length of the watercourse</li> </ul> </li> </ul>	LPO	Improved ecological resilience, Habitat improvements, Improved water quality.	Uncertain what will already be covered by AMP7 EM.
Idle_25b	Projects from Bevercotes desk study (sewage treatment)	<p>Phosphate stripping of sewage effluent.</p>	LPO	Improved water quality/ecological resilience.	None known
Idle_47	River support and downstream re- abstraction	Seasonal operation of PWS sources into river for downstream re- abstraction	LPO	None known	None known





Table 12: Worcestershire Middle Severn (WMS) Prioritised Options Table (River Worfe and River Stour)

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
WMS_02	Worfe on the Wildside extension and Worfe Water Environmental Improvement Fund	Previous river/catchment restoration project building on AMP7 STW environmental measures, CaBA partners and large landowners keen to keep working. Collaborate with existing project in Worfe. Holistic catchment approach. Possibly tackle sedimentation, fish barriers, tree planting, sedimentation. R7P project ENV068: <i>The River Worfe catchment has ongoing land management issues resulting in ongoing WFD waterbody failures of all waterbodies within the catchment</i>	HPO	Improve ecological resilience, Reduced sedimentation, Improved access for fish, Improved water quality.	None known
WMS_39	Bromsgrove Brooks	Working alongside partners at North Worcester Water Management, Worcestershire Wildlife Trust and the local community to continue to improve the towns brooks for people and Wildlife and deliver Bromsgrove further environmental measures. This would build on the Love your river Bromsgrove work, STWs Sanders Park restoration and the work of NWWM. Bromsgrove is important as one of the last breeding locations of water voles, it also suffers flooding and low flow issues. (R7P project ENV058)	HPO	Improved hydromorphology, Improved ecological resilience, Flood alleviation, Wetland creation - biodiversity  Water vole habitat. May include alternative approaches to improving flow regime or enhanced recharge that may be traded off against future abstraction reductions.	None known
WMS_09	Salmon in the Stour/Smestow Fish access	Collaborate with/expand on existing Salmon in the Stour project (Severn Rivers Trust/EA). Remove barriers or create fish passes in Smestow and/or Stour catchment. Opportunities to improve WFD failings including habitat, water quality and fish passage.	HPO	Improved habitat for salmonids and access to tributaries at lower flows. Improving fish access could reduce requirement for future abstraction reductions	WR benefit uncertain: are fish the main driver for needing to improve flows in these waterbodies or would abstraction reductions still be needed in waterbodies with flow failures.
WMS_25	Upton Warren Hen Brook Enhancements	Hen Bk pollution from STW, opportunity to work together to enhance channel (reprofile) create additional ponds (offline)	MPO	Water quality improvement, Improved hydromorphology, Improved ecological resilience.	None known



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
<b>WMS_04</b>	Flow attenuation on Wesley Brook u/s Shifnal	Work with Shropshire Council and EA to develop NFM opportunities in Wesley Brook. This option will build upon a project that is currently being undertaken in the area.	MPO	Flood management, Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
<b>WMS_10</b>	NFM/flow attenuation in Worfe u/s of Hilton a.k.a Hilton Flood Alleviation Scheme (R7P)	Work with Shropshire Council and EA to develop NFM opportunities upstream of Hilton R7P project ENV052: Shropshire Council are currently investigating the possibility of a flood alleviation project in Hilton to protect 14 properties at risk of flooding from the Hilton Brook. The exact format of this project is not yet known and options for upstream storage and/or NFM are being considered. An assessment of the recent flooding is currently being undertaken as part of a Section19 report. This option will build upon a project that is currently being undertaken in the area.	MPO	Flood management. Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
<b>WMS_19</b>	Woodland Grange Flood Alleviation and Water Vole Habitat	Improve quantity and quality of wetland habitat and improve water environment; clear Himalayan Balsam, de-silt balancing ponds, tree-work and channel feature enhancement. This will increase flood storage and biodiversity and create water vole habitat.	MPO	Flood alleviation, Wetland creation – biodiversity, Water vole habitat. Enhanced recharge - trade off against future reductions.	Exact location unclear WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
<b>WMS_01</b>	Bridgnorth - rewilding & rewetting	Rewilding, flood plain reconnection/rewetting in Worfe catchment near Bridgnorth. EA has been approached by interested landowner. At least 1 farm cluster identified, opportunity for multi-benefit collaboration.	MPO	Flood management, Wetland creation - biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
<b>WMS_08</b>	NFM or similar in Salwarpe catchment	Fund NFM measures or other peak flow storage to resolve flooding issues and improve flow regime in Spadesbourne and Battlefield Brooks. Expand on existing flood storage work in Salwarpe and STWL RSA environmental measures.	MPO	Flood management, Wetland creation - biodiversity. Could enhance recharge to Bromsgrove sandstone aquifer, offset against reductions to groundwater abstraction.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
<b>WMS_20</b>	Land Management: Bromsgrove Brooks	EA have identified that headwaters are suffering from agricultural diffuse pollution. Initially, 4 farms will be targeted in this area for improvements; farm scale reports on soil and water management in the Salwarpe catchment.	MPO	Water quality improvement, Improved ecological resilience.	None known
<b>WMS_13</b>	Soil management	Soil management (reduce compaction, reduce intensity of farming). Possibly through ELMS scheme or existing STWL programmes (e.g. STEPS, B4B etc.)	MPO	Reduces flooding, Improved soil, health/sustainability of farming, Reduce soil erosion, WQ benefits, Climate change/carbon. May improve recharge/reduce runoff; trade off against future abstraction reductions.	WR benefit uncertain Yield implications for farmers.
<b>WMS_27</b>	River Severn Naturalisation	The project would aim to implement measures to increase marginal and bankside habitat features to increase ecological diversity and where feasible aim to restore the historic connectivity to the floodplain	MPO	Improved habitat and biodiversity Floodplain reconnection, flood alleviation?	None known
<b>WMS_30</b>	Battlefield Brook Water vole Habitat Creation	Creating backwash pools and water vole refuges along with providing FRM benefits	MPO	Water vole habitat.	None known



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
<b>WMS_24</b>	Catshill Marsh Development	With NWWM and WWT look at improving the development to improve the remaining marsh e.g., throttle brook to create a better marsh area	MPO	Flood alleviation, Wetland improvement – biodiversity.	None known
<b>WMS_12</b>	Riparian tree planting, buffer strips	Riparian tree planting, buffer strips. Possibly through ELMS scheme or existing STWL programmes (e.g. STEPS, B4B etc.)	MPO	Improved resilience of fish, Improved WQ (temp, nutrients, sediment runoff), Tackles rural pollution, Climate change,  Biodiversity/habitat benefits. Could reduce flow requirements in some waterbodies; trade off against future abstraction reductions.	WR benefit uncertain.
<b>WMS_31</b>	Hoo Brook Water level management	The installation of a series of ramps or similar to hold water up in the Hoo Brook just above the confluence with the River Stour. This is work is required to stop the northern end of Wilden Marsh SSSI from drying out. Recent developments nearby the proposed site has been noted and will be taken into consideration to ensure that there are not any adverse effects upon this development.	MPO	Habitat restoration – biodiversity. Improved flow regime in Hoo Bk and water level management in SSSI - trade off against future abstraction reductions?	None known
<b>WMS_16</b>	Lickey End Flood Alleviation Scheme	Purchase of a field to create biodiversity benefits and a flood storage area via a throttle weir. This will protect Bromsgrove. The area will be designed to include access for maintenance and habitat for water voles as well as biodiversity enhancement.	MPO	Flood alleviation, Wetland creation – biodiversity. Enhanced recharge - trade off against future reductions.	WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
<b>WMS_36</b>	Battlefield Brook Channel Restoration	Re naturalisation of channel of Battlefield brook parallel to M5 motorway. Creation of meanders, backwaters, installation of large woody debris. Tree planting.	MPO	Improved hydromorphology, Improved ecological resilience.	None known
<b>WMS_37</b>	Battlefield Rural Diffuse Pollution Project	Fence farmland between Sander Park and the M5 to restrict livestock access to the brook.	MPO	Water quality improvement, Improved ecological resilience.	None known



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
WMS_11	Fund farm storage infrastructure/rainwater harvesting	Fund farm storage infrastructure in exchange for reduced GW abs?	MPO	Reduce flooding downstream  Improved resilience for farms. Reduced non-PWS GW abs by making more use of peak flow storage; trade off against future PWS reductions.	Small volumes involved unlikely to be cost-beneficial; significant deficits will remain.
WMS_09	Salmon in the Stour/Smestow Fish access	Remove barriers or create fish passes in Smestow and/or Stour catchment. Collaborate with/expand on existing Salmon in the Stour project (Severn Rivers Trust/EA).	MPO	Improved habitat for salmonids and access to tributaries at lower flows. Improving fish access could reduce requirement for future abstraction reductions	WR benefit uncertain: are fish the main driver for needing to improve flows in these waterbodies or would abstraction reductions still be needed in waterbodies with flow failures.
WMS_28	Stour Weirs	There are a number of weirs on the River Stour that form a complete barrier to the movement of fish. The quality River Stour has improved significantly in recent years and many fish species are now present, including salmon and trout.	MPO	Improved access for salmonids to upper reaches of Stour.	None known
WMS_05	New source on River Severn	Make use of large surplus on Severn to replace groundwater abstractions with increased surface water abstraction (new source)	LPO	Opportunity to manage Severn flow regime better through Severn Reg Review. River Severn has WRGIS Q95 surplus of >100 MI/d throughout WMS catchment.	Lots of EA sensitivity around Severn (supporting habitat for SAC estuary, principal salmon river).  Surplus is created by Severn Regulation which causes issues further upstream. Will need to review holistically and consider outcomes of Severn Reg Review.  Also resilience concerns for water supply if balance shifts too much



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
					towards surface water - groundwater sources are an important asset.
<b>WMS_06</b>	Increase abstraction from existing sources on River Severn	Make use of large surplus on Severn to replace groundwater abstractions with increased surface water abstraction (existing sources)	LPO	Opportunity to manage Severn flow regime better through Severn Reg Review. River Severn has WRGIS Q95 surplus of >100 MI/d throughout WMS catchment.	<p>Lots of EA sensitivity around Severn (supporting habitat for SAC estuary, principal salmon river).</p> <p>Surplus is created by Severn Regulation which causes issues further upstream. Will need to review holistically and consider outcomes of Severn Reg Review.</p> <p>Also resilience concerns for water supply if balance shifts too much towards surface water - groundwater sources are an important asset.</p>
<b>WMS_07</b>	New source on Borle Brook	Make use of c. 6 MI/d surplus on this waterbody (new surface water source) to replace groundwater abstractions in Worfe catchment	LPO	Borfe Bk has WRGIS Q95 surplus of 6.8 MI/d. Could utilise this to replace groundwater abstraction in Worfe.	<p>Potential for impact on Borfe Bk.</p> <p>Distance from relevant control groups possibly prohibitive - where would it be treated, how far would water need to move? Infrastructure requirements likely disproportionate to available resource.</p>
<b>WMS_14</b>	Blakedown Brook augmentation	<p>Revisit augmentation options rejected in AMP6 OA. Either:</p> <p>[2] New borehole adjacent to Ganlow or Clent Brook in upper catchment</p> <p>[3] New borehole at Roundhill or adjacent to pipeline</p>	LPO	More effective way of improving flow regime than large scale abstraction reductions.	<p>Uncertainty whether flow regime requires augmenting. Uncertainty around GW quality and impact on SSSIs. Would need to reduce some GW</p>



Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
		[10] Pipeline from Broome Lodge (existing augmentation borehole)			abstraction anyway to provide licence for augmentation.
<b>WMS_15</b>	Spittle Brook (Checkhill Bogs) augmentation	Revisit augmentation options rejected in AMP6 OA to rewet Spittle Bk to confluence with Smestow	LPO	More effective way of improving flow regime than large scale abstraction reductions.	AMP6 flow trial showed that much augmentation water would be lost by the end of the SSSI due to leakage through the stream bed. Would need to reduce some GW abstraction anyway to provide licence for augmentation.
<b>WMS_32</b>	River Stour Water Quality including Pollutants on the Stour (including tributaries Hoo Brook and Blakedown Brook).	A model for collaborative working to improve water quality, including Hoo Brook and Blakedown Brook. It will aim to tackle sources of urban pollution in Kidderminster and Stourport-on-Severn.	LPO	Water quality improvement Improved ecological resilience	None known
<b>WMS_38</b>	River Stour Ecological Enhancement and Stourport floodplain meadows	Historically the area has been canalised. It is owned by the council and an otter holt was installed, since then it has not received much attention and could be enhanced for ecology and improved from its current canalised state. Also opportunity to restore and recreate flood plain meadows and fen on the River Severn corridor in Stourport . (R7P project ENV001)	LPO	Habitat restoration – biodiversity. Improved hydromorphology. Improved ecological resilience. Enhanced recharge - trade off against future reductions.	Low priority waterbody for WRW WR benefit uncertain: how much could recharge be enhanced? GW body will remain Poor.
<b>WMS_40</b>	Catchment monitoring cooperative	More rigorous monitoring of catchment using citizen science (based on similar 3-yr project in Teme catchment).	Monitoring	Community engagement Improved conceptual understanding/data	None known



Table 13: Wyre Priority Options Table



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_33	UU Fell Sources (Tarnbrook Fells) intakes - sediment management plan	Implementation of a sediment management plan at the main Fell intakes, which could have downstream in-stream habitat benefits	HPO	Improved ecological resilience of headwaters, including those within Bowland Fells SAC, via habitat improvements downstream. Potential indirect/secondary benefits i.e. keeping the intakes free from deposits.	Difficult to define benefit (and linkage to be
Wyre_30	Highways constructed wetlands	Wetland construction (Wyre and Calder, Brock and tribs, Fleetwood peninsula)	HPO	Water quality improvements due to filtration of road/transport run-off. Creation of new habitats for aquatic and riparian species. Potentially catchment water retention/runoff slowing.	Uncertain/minor
Wyre_17	Ainspool NFM Project	3km riparian fencing. 200 low cost NFM measures. Creation of 3 flood storage ponds. 1ha of floodplain reconnected.	HPO	Improved water quality, improved infiltration of water through soil. Increased storage of water for up to 24hrs, resulting in a more resilient catchment and reducing downstream flood risk. Increased aquatic and terrestrial diversity. Enhanced recharge	Uncertain r
Wyre_14	Scorton Weir Removal	1 weir removed. 1km soft engineered bank protection installed. 6 community workshops.	HPO	3.5km river opened to migratory fish (Salmon, Sea Trout, Eel, Brook Lamprey). Local geomorphological improvements, promoting natural processes and resilience. Creation of additional riparian and in river habitat supporting both aquatic and terrestrial species. Reinstatement of natural processes and resilience of this reach of river. Intellectual and physical access improvements. Local community engagement on issues pertinent to the Wyre.	Large scale, expensive generally objection
Wyre_38	Calder intakes sediment management plan	Review and revise the 2017 sediment management plan, with the aim of increasing resilience of fisheries habitats.	MPO	Transport of sediments downstream; associated fish habitat benefits. Potential minor benefit, preventing sedimentation of intakes.	Difficult to define benefit (and linkage to be
Wyre_06a	NFM over Fylde aquifer	Natural Flood Management measures on outcrop of Permo-Triassic sandstone (Fylde aquifer) - short-medium term trial projects	MPO	Flood prevention, Wetland creation, Short-term pilot project to inform longer term implementation (Wyre_06b). Enhanced recharge.	Uncertain recharge b - sand dominated soi agricultural land. Po local stakeholders' corridor where imple



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_25	Wyre and Calder Phosphate (Water Quality) Project	3-year Project. 15km riparian fencing. 5km riparian and instream habitat improvements. 10 farm advisory visits. Water quality improvement interventions on 5 farms. 3 wetlands created. 2000 trees planted.	MPO	Improved water quality resulting from reduced diffuse and point source pollution. Reduction in nutrients entering watercourses. Improved riparian and instream habitat benefitting both aquatic and terrestrial species. Increased aquatic and terrestrial biodiversity. Carbon storage (trees & wetlands). Reduced carbon cost (farming). Increased community, supply chain and local business resilience. Reduced downstream flood risk to roads and houses through floodplain restoration. Potential for water retention via wetland features.	Non
Wyre_26	Brock and tribs Phosphate (Water Quality) Project	3-year Project. 15km riparian fencing. 5km riparian and instream habitat improvements. 10 farm advisory visits. Water quality improvement interventions on 5 farms. 3 wetlands created. 2000 trees planted.	MPO	Improved water quality resulting from reduced diffuse and point source pollution. Reduction in nutrients entering watercourses. Improved riparian and instream habitat benefitting both aquatic and terrestrial species. Increased aquatic and terrestrial biodiversity. Carbon storage (trees & wetlands). Reduced carbon cost (farming). Increased community, supply chain and local business resilience. Reduced downstream flood risk to roads and houses through floodplain restoration. Potential for water retention via wetland features.	(Arguably lower pr Environmen
Wyre_31	Upper Wyre Habitat Improvement Project	5Km riparian fencing. 2km riparian and instream habitat improvements. 10 days farm advice. Water quality improvement interventions on 3 farms. 3 wetlands created. 1000 trees planted.	MPO	Improved water quality resulting from reduced diffuse and point source pollution. Reduction in nutrients entering watercourses. Improved riparian and instream habitat benefitting both aquatic and terrestrial species. Increased aquatic and terrestrial biodiversity. Carbon storage (trees & wetlands). Reduced carbon cost (farming). Increased community, supply chain and local business resilience. Reduced downstream flood risk to roads and houses through floodplain restoration. May be WR benefit depending on wetland features and potential	Uncertain WR benef for Environme



Option ID	Option Name	Option Description	Priority	Benefits	Disb
				for interaction with other projects (e.g. Wyre_01 & Wyre_34).	
<b>Wyre_27</b>	Fleetwood Peninsula Phosphate (Water Quality) Project	3-year Project. 15km riparian fencing. 5km riparian and instream habitat improvements. 10 farm advisory visits. Water quality improvement interventions on 5 farms. 3 wetlands created. 2000 trees planted. This option is not in an area with water resource pressures.	MPO	Improved water quality resulting from reduced diffuse and point source pollution. Reduction in nutrients entering watercourses. Improved riparian and instream habitat benefitting both aquatic and terrestrial species. Increased aquatic and terrestrial biodiversity. Carbon storage (trees & wetlands). Reduced carbon cost (farming). Increased community, supply chain and local business resilience. Reduced downstream flood risk to roads and houses through floodplain restoration. Potential for water retention via wetland features.	(Arguably lower pr Environmen
<b>Wyre_32</b>	Soil compaction/infiltration projects	Measures to improve soil permeability so as to enhance recharge. Existing projects between UU and local stakeholders - could these be expanded?	MPO	Improved carbon capture?  General health of soils/sustainability of farming? Decreased flood risk (reduced runoff, higher storage in soils). Enhanced recharge (focus in areas overlying the sandstone aquifer).	Non
<b>Wyre_06b</b>	NFM over Fylde aquifer	Natural Flood Management measures on outcrop of Permo-Triassic sandstone (Fylde aquifer) - medium-long term implementation projects	MPO	Flood prevention, Wetland creation, Longer-term projects as informed by 'pilot' projects (Wyre_06a). Enhanced recharge.	Uncertain r  Farm engagement generally highest v Potential resistance Limited geographical could be i



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_36a	Grizedale Brook holistic project (Upper)	<p>Holistic Grizedale Brook project which delivers on multiple measures. Potential opportunities include:</p> <ul style="list-style-type: none"> <li>• On-going monitoring to confirm no ecological flow stress on the Grizedale Brook.</li> <li>• In-channel restoration measures (green engineering pinch points for example) implemented to diversify depth profiles via scouring and gravel sorting etc. or to ensure longitudinal connectivity at low flows.               <ul style="list-style-type: none"> <li>• Riparian planting.</li> </ul> </li> <li>• Local measures to improve fish passage e.g. at concrete bed aprons.</li> <li>• Long-term measures to slow the flow from the top of the system</li> </ul>	MPO	Potential for multiple facets of increased ecological resilience, including water quality improvements, habitat diversity improvements, fish accessibility improvements etc. Indirect via increased ecological resilience - potentially assist in ongoing future justifications for no new compensation flow.	Mix of small and la proposed method potential
Wyre_36b	Grizedale Brook holistic project (Lower)	<p>Holistic Grizedale Brook project which delivers on multiple measures. Potential opportunities include:</p> <ul style="list-style-type: none"> <li>• Buffer fencing in the lower reaches, to prevent future channel access, to allow banks to consolidate and riparian vegetation to establish.</li> <li>• Implement measures to prevent silt ingress at fords.               <ul style="list-style-type: none"> <li>• Riparian planting.</li> </ul> </li> <li>• Local measures to improve fish passage e.g. at EA gauging weir.</li> <li>• Larger civils measures to improve fish passage e.g. at the railway bridge to reinstate capacity under both bridge arches, at the Higher Lane road crossing – removal and replacement with a clear-span bridge which would reinstate geomorphological processes and fish passage.</li> <li>• Improved management of the settling ponds, and reed-beds associated with M6 runoff to ensure more effective use.</li> <li>• Long-term measures to allow the channel use of / better connectivity with its floodplain.</li> </ul>	MPO	Potential for multiple facets of increased ecological resilience, including water quality improvements, habitat diversity improvements, fish accessibility improvements etc. Indirect via increased ecological resilience - potentially assist in ongoing future justifications for no new compensation flow.	Mix of small and large civils projects with a new Higher Lane r proposed method potential



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_34	Bank and riparian measures in the Wyre-Upper water body	Potentially complimentary suite of bank and riparian measures within the Wyre – Upper WB, to address known pressures e.g. livestock ingress. Beneficial actions are proposed to reduce the flow velocities during and following high rainfall events (e.g. through woody debris dams, tree-kicking, willow planting), undertake natural flood management interventions, some coppicing of mature trees in specific locations adjacent to the watercourses, new tree and willow planting in eroded bank areas, livestock segregation and fencing, and INNS eradication (Himalayan Balsam and Japanese knotweed are present in the area).	MPO	Multiple elements of improved ecological resilience, from habitat improvements and incremental improvements to water quality. Note potential overlap/opportunity to combine with Wyre_31. May be WR benefit depending on e.g. wetland features, scale of water slowing, plus potential for interaction with other projects (e.g. Wyre_01 & Wyre_31).	Difficult to define benefit (and linkage to be
Wyre_02	Cease Wyre Transfer	Treat abstraction from Lune directly without discharge into Wyre. New infrastructure required to facilitate this. This option is paired with investigatory option Wyre_01 and any actions taken on this option should also be taken on Wyre_01.	MPO	Reduce impact on migratory fish, Reduce INNS risk. Improves Wyre without loss of DO.	Impacts not currently (requires investigation of Wy Major infrastr
Wyre_29	Lords Brook Improvement Project	5Km riparian fencing. 2km riparian and instream habitat improvements. 10 days farm advice. Water quality improvement interventions on 3 farms. 5 wetlands created. 1000 trees planted.	LPO	Full catchment restoration. Improved water quality resulting from reduced diffuse and point source pollution. Reduction in nutrients entering watercourses. Improved riparian and instream habitat benefitting both aquatic and terrestrial species. Increased aquatic and terrestrial biodiversity. Improved water quantity and water supply resilience. Carbon storage (trees & wetlands). Reduced carbon cost (farming). Increased community, supply chain and local business resilience. Reduced downstream flood risk to roads and houses through floodplain restoration.	(Arguably lower priority for Environment



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_18	Thornton Flood Risk Resilience (Phase 2)	2ha wetland creation. 2ha Floodplain reconnection. 2km riparian fencing. 5 school rain gardens created. 3 SuDS created	LPO	Improved water quality. Increased storage of water for up to 24hrs, resulting in a more resilient catchment and reducing downstream flood risk. Improved infiltration of water through soil. Carbon sequestration (wetlands).  Education on the benefits of SuDS, engagement with school children. Enhanced recharge (noting that not overlying sandstone aquifer).	Uncertain recharge benefit to sa
Wyre_04	Cease abstraction from Tarnbrook intakes without HOFs	Cease abstraction from Tarnbrook intakes without HOFs; only keep larger intakes with HOFs.	LPO	Improved ecological resilience of headwaters within Bowland Fells SAC.	Negative WR ef
Wyre_05	Licence review of Tarnbrook intakes	Increase abstraction from larger intakes while reducing smaller intakes (operating within existing HOFs).	LPO	Improved ecological resilience of headwaters within Bowland Fells SAC. Offset reductions at smaller intakes with increases on larger. Maintain current abstraction volumes while improving environment.	Unknown headroom Intake infrastruc
Wyre_09	Improve road crossing on Grizedale Brook	Removal of current crossing (Higher Lane) which represents obstacle to fish.	LPO	Improves access of fish to upper reaches of Grizedale Brook. Improved local hydrogeomorphology.	Highways Asset. L (construction phase rest
Wyre_10	Fence off picnic sites to prevent recreational access	Fence off picnic sites on Brock and at Garstang on Wyre to prevent recreational access.	LPO	Reduce erosion/disturbance caused by recreational use.	Extent of impact unce with local
Wyre_11	Reinstate Damas Gill reservoir	Catchment measures to reduce WQ problems Implement HoF	LPO	Water quality benefits. Increased DO; noting that may be a compromise with loss of storage for the Fell Sources (Tarnbrook) abstractions.	Infrastructure imp  Uncertain how m improve WQ (wou investigation). Pote water abstracted licence (



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_12	Lancaster Canal Feeder and Aqueduct Weir (Calder) - Fish Passage Project	1 technical (larinier) pass and 1 bypass channel created to allow fish passage. 3km improved riparian and in river habitat.	LPO	17.8km of habitat opened to spawning fish for the first time in ~230 years.  Restoration of catchment ties in to UU AMP7 responsibility to deliver fish passage at Oakenclough abstraction point. Project would lead to feasibility to make further two weirs passable at Calder Vale. Improved riparian and in river habitat supporting fish at all life stages.	Non
Wyre_13	Preston Road (Inskip) Fish Easement Project	1 low cost novel baffle easement.	LPO	4km habitat opened to spawning fish. Relatively low cost, small project.	Non
Wyre_16	Grizedale Brook Restoration Project (Phase 2)	5Km riparian fencing. 3km riparian and instream habitat improvements. 10 days farm advice. 3 Farm Carbon Audits. Water quality improvement interventions on 3 farms. 5 wetlands created. 100 low cost NFM Measures installed. 2000 trees planted.	LPO	Full catchment restoration. Improved water quality resulting from reduced diffuse and point source pollution. Reduction in nutrients entering watercourses. Improved riparian and instream habitat benefitting both aquatic and terrestrial species.  Increased aquatic and terrestrial biodiversity. Improved water quantity and water supply resilience. Carbon storage (trees & wetlands). Reduced carbon cost (farming). Increased community, supply chain and local business resilience. Reduced downstream flood risk to roads and houses. Improved local air quality. Improved catchment resilience on Grizedale Brook may reduce potential requirement for a compensation release from Grizedale Dock Reservoir, and thus provide additional future security to existing water resource.	Non



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_22	Wyre INNS Project	3-year INNS eradication programme. Removal of 10ha of Himalayan balsam per annum. Development and deployment of riparian seed mix to recolonise cleared areas and reduce further opportunities for HB germination in Y2 and 3. Eradication, or near eradication of 5Ha of Japanese knotweed per annum.	LPO	Increased biodiversity. Reduced out competition from invasive species, resulting in more resilient habitats and biotopes. Improved water quality, reduction in losses of phosphate from fine sediments. Increased flood resilience. Improved social opportunities. Improved vocational skills. Improved knowledge sharing skills. Improved data processing skills.  Improved access to green and blue space.	Non
Wyre_23	Wyre Culvert Project	Install 12 low-cost baffles and fish easements.	LPO	Increased habitat connectivity and spawning habitat opened to migratory fish (Salmon, Sea Trout, Eel, Brook Lamprey). Indirect via increased ecological resilience.	Low cos
Wyre_24	Scorton Habitat Improvements	Improve trackways and use of fords to cross the River Wyre within the already established Scorton habitat improvement scheme.	LPO	Reduction of sediment and nutrient inputs into the River Wyre. Improved water quality. Increased biodiversity. Improved habitat and spawning gravels for important fish species.	Non
Wyre_01	Lune Transfer investigation	Investigate environmental impact of Lune Transfer on Wyre. Possibly leading to [Wyre_02]. (Study into the effects of the transfer on the Wyre flow regime, and resulting hydro-ecological influence).	Monitoring	Improves understanding of impacts. Potential to design a transfer regime that is more sensitive to the ecology. Improves understanding of impacts - may forestall the need to cease transfer.	Non
Wyre_07	Sustainable Lancaster Canal	Collaborate with Canals and Rivers Trust to resolve water resource issues relating to Lancaster Canal and water quality issues due to overspill into Wyre. Investigate overspill to NFM.	Monitoring	Potential water quality benefits. May be WR benefit depending on potential for interaction with other NFM projects (e.g. Wyre_06b).	Limited geographical of crossing/
Wyre_03	Tarnbrook intakes investigation	Revisit conclusions of previous studies on Tarnbrook intakes. Explore suitability of current regime for future. May lead to [Wyre_03] or [Wyre_04].	Monitoring	May be wider ecological resilience understandings associated with the previous studies. Improves understanding of impacts - may forestall the need to cease abstraction.	Non





Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_19	Wyre Estuary Juvenile Fish Survey/Priority Fish Monitoring Study/Catchment Electro-fishing Surveys	3 years of Transitional and Coastal waters surveys at existing WFD locations. 75 electro-fishing survey sites. 1 B&FC Marine Biology cohort per year trained in TraC surveys.	Monitoring	Greater understanding of the life histories of estuarine fish species within the river Wyre. Improved freshwater and estuarine fish data. Improved social opportunities. Improved vocational skills. Improved knowledge sharing skills. Improved data processing skills. Improved access to green and blue space.	Downstream monito low priority proje Dest
Wyre_20	Wyre Catchment Water Quality and Water Quantity Monitoring	Comprehensive water quality monitoring project within priority waterbodies. Data will be collected via water sampling, FIO monitoring, pesticide monitoring, novel pollutant monitoring and aquatic invertebrate sampling. Comprehensive water quantity monitoring project within priority waterbodies. Data will be collected via flow monitoring, level loggers, time-lapse photography, fixed point photography, walkovers,	Monitoring	Greater understanding of water quality issues within the priority catchments. Green job creation and training for two apprentices. Health and wellbeing benefits from citizen science participation. Improved social opportunities. Improved knowledge sharing skills. Improved data processing skills. Improved access to green and blue space.	Non
Wyre_21	Wyre Citizen Science Programme	Formation and development of 4 citizen science groups. Creation of three new datasets and addition to one existing dataset. Development of four bespoke training courses.	Monitoring	Education and engagement on the key issues faced by our rivers and catchments. Improved health and wellbeing. Improved social opportunities. Improved knowledge sharing skills. Improved data processing skills. Improved access to green and blue space.	Non
Wyre_28	Ephemeral Streams Investigation	3 year project - dry/wet surveys, macrophyte surveys assessing aquatic/terrestrial species. Species specific surveys.	Monitoring	Greater understanding of the role of ephemeral streams for rare species life histories. Greater understanding of ways to improve habitats in ephemeral streams.	Non



Option ID	Option Name	Option Description	Priority	Benefits	Disb
Wyre_37	Damas Gill feasibility investigation	Feasibility investigation is carried out to (a) understand if there is actual benefit in reinstating this source of supply, given associated loss in storage capacity for water abstracted from the fell sources; and (b) update understandings regarding the current risks posed by slurry storage within the catchment. There may be potential to mitigate against these water quality risks e.g. fund appropriate bunding, install alternative storage, provide operational guidance, instigate pollution prevention measures and spillage protocols etc. Replaces/precursor of Wyre_11.	Monitoring	Potential benefits to local water quality. Potential new source. Note however benefits may be offset against reduced storage for the Fell sources licence.	Benefits of Damas considering in conto reservoir storage abstr