Draft Water Resource Management Plan 2024

Appendix D – Environmental Destination

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Appendix D – Environmental Destination

D1 Environmental Destination overview

In its 25 year Environment Plan the Government has set out ambitious long term goals to protect and enhance the water environment by improving at least three quarters of our waters to be close to their natural state as soon as is practicable. These long-term goals are reflected in the Environment Agency's latest draft River Basin Management Plans.

To achieve these goals we will need make large scale changes to the ways we abstract water from our sources of groundwater supply. By the 2030s the Environment Agency's abstraction licensing policy means that many of our existing groundwater abstraction licences will be capped and we can longer assume that any spare licence capacity will be available to meet future needs. In the longer term, by 2050, the current guidance on WFD no deterioration licencing capping and environmental destination means we would need to reduce groundwater abstraction to help achieve the environmental destination goals described in the Environment Agency's National Framework.

The measures set out in our draft Water Resources Plan 24 (dWRMP24) will protect and improve the water environment. The recommendations set out in this draft plan are a continuation of the proactive, long term environmental protection measures that described in our WRMP19.

Overall we estimate that the impacts of these changes will mean that the licence capping policy will reduce our current deployable output by 180Ml/d by 2040 while the environmental destination impacts will reduce our deployable output by a further 260Ml/d by 2050. These are material changes to our supply capability and our dWRMP24 includes the supply and demand investment that will be needed to accommodate these changes without destabilising public water supplies.

Based on our current understanding of the need to cap abstraction licences in order to prevent WFD deterioration and the need to reduce future abstraction in order to achieve Environmental Destination goals, our dWRMP24 includes the deployable output reductions summarised in Table D1.1 .

In our WRMP19 we recognised what the WFD requirements could mean for our future abstractions and we took proactive measures in that plan to prevent WFD status deterioration. For example, in our WRMP19 we committed to reducing our impacts from current groundwater abstractions under RSA by 23.5 Ml/d in the Nottinghamshire WRZ. We also committed under WFD No Deterioration, to not take up spare licence capacity by up to 88 Ml/d at our groundwater sources abstracting from the Sherwood sandstone aquifer. We also committed to ambitious demand management and leakage reductions. These measures alone will improve the long-term resilience of the aquifer.

Table D1.1: Summary of water resource zone deployable output reductions (Ml/d) in draft WRMP24

Resource Zone	Early regulatory needs, 2030 to 2040			2050 BAU+
	2030	2035	2040	2050
Bishops Castle	0.00	0.00	1.22	2.16
Chester	0.00	0.08	0.08	0.08
Forest and Stroud	0.36	0.36	0.25	4.96
Kinsall	0.49	0.49	0.49	0.49
Mardy	0.74	0.74	0.74	3.31
North Staffordshire	22.58	22.58	43.91	116.77
Ruyton	0.00	0.00	0.78	1.27
Shelton	27.00	27.00	45.00	87.22
Stafford	0.00	3.45	3.45	16.96
Strategic Grid	34.66	34.66	31.70	79.93
Whitchurch & Wem	3.73	3.73	3.73	4.09
Wolverhampton	1.93	1.93	3.58	19.32
Newark	0.00	0.00	0.00	1.44
Nottinghamshire	48.59	48.59	44.45	104.03
Rutland	0.00	0.00	0.00	0.00
Total	140.08	143.61	179.37	442.02

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 dWRMP24 plan will deliver a deployable output (DO) reduction of c.140Ml/d by 2030 and c.179Ml/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.442Ml/d.

To put this into context, STW is contributing 84% of the planned DO reductions across the WRW region to deliver environmental improvement and prevent future deterioration by 2050. The remaining 16% is made up 7% United Utilities and 9% 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.140Ml/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 plan:

- we have an accelerated plan to deliver c.140Ml/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 planning cycle to inform thinking for activities beyond 2030.

D1.1 Policy context

This section outlines some of the main English policies, pertinent to the Environmental Destination of our region. The main Welsh regulatory policies, regulations and legal instruments are outlined in Section D13.

The Government's 25-year Environment Plan

The Government's 25-year Environment Plan for England sets out an ambitious vision to secure a supply of clean and plentiful water by bringing at least three quarters of our waters close to their natural state as soon as practicable. This can be achieved by implementing the following objectives in England:

- Reducing the damaging abstraction of water from rivers and groundwater, ensuring that by 2021, the proportion of water bodies with enough water to support environmental standards increases (from 82% to 90% for surface water bodies and from 72% to 77% for groundwater bodies across England)
- Reaching or exceeding objectives for rivers, lakes, coastal and groundwaters that are specially protected, whether for biodiversity or drinking water as per the River Basin Management Plans
- Supporting Ofwat's ambitions on leakage, minimising the amount of water lost through leakage year on year; each water company is expected to reduce leakage by at least 15% from 2020 to 2025.

Severn Trent, working with Water Resources West (WRW), will endeavour to propose a plan which promotes the Government's long-term ambitions to protect the environment.

Local Nature Recovery Strategies

The Local Nature Recovery Strategies is an important new policy brought in through the Environment Act 2021. The UK Government's overall ambition is that Local Nature Recovery Strategies will be a powerful new tool that will help the public, private and voluntary sectors work more effectively together for nature's recovery, and enable collective effort to be focussed where it will have most benefit. Key to achieving this will be creating genuine local collaboration with a partnership of organisations and individuals working closely with each "responsible authority". Local Nature Recovery Strategies are an important part of an ambitious package of measures introduced by the Environment Act 2021 to reverse nature's decline. Environmental Improvement Plans and legally-binding targets, including the additional target for species abundance for 2030, will establish long-term policy direction and ambition. As a company, and through WRW, we will work with the responsible authority and wider group of stakeholders to ensure our proposed plan supports the aims of the Local Nature Recovery Strategies. The upcoming guidance in this regard will help us shape our future environmental destination to ensure we have a supportive role in restoring and protecting our natural environment.

National Framework for Water Resources

The National Framework sets out the principles, expectations and challenges for the five regional water resources groups (made up of the statutory water undertakers and other water users). The National Framework outlines the principles that must, should and could be incorporated into their plans. The Welsh Government and Natural Resources Wales have also given their support to this framework. The framework has strong links to the River Basin Management Plans. The following sections summarise how we are implementing the National Framework principles and expectations in the dWRMP24.

Regional Water Resource Planning

On the 16th March 2020 the Environment Agency (EA) published their National Framework (NF) for Water Resources. Appendix 4 of the National Framework presents the scenarios. The National Framework sets the strategic direction for long term regional water resources planning. It marks a step change in water resources planning and establishes five regional water resources groups who will produce a set of coordinated, cross-sector plans. The plans will identify options needed in each region to manage demand and increase supply and realise opportunities from water resources planning by working collaboratively.

Severn Trent Water Limited (STWL) is part of WRW along with Dwr Cymru/Welsh Water (DCWW), South Staffs Water (SSW), United Utilities (UU) and Hafren Dyfrdwy (HD) as well as representatives of other abstractor sectors. The EA's National Framework report identified that WRW will require an additional 639 Ml/d for public water supply between 2025 and 2050 (167 Ml/d for drought resilience, 237 Ml/d for population change, 167 Ml/d for environmental improvement and 68 Ml/d for climate change) with an additional 283 Ml/d for other water users (industry, agriculture and power generation).

Regional groups and water companies need to understand environmental needs in the long term to inform water resources planning and deliver best value investment decisions. Up until now, we have focused on identifying sustainability changes for the upcoming AMP (Asset Management Plan), using the EA's WINEP (Water Industry National Environment Programme). Now, for the first time, regional groups and water companies will work with regulators and other partners to develop a shared long-term destination on sustainable abstraction and a plan to achieve it. This will include potential future licence changes, to be included in the long term supply demand balance of our WRMPs.

For the draft plan STWL and WRW need to include scenarios for sustainability changes for environmental destination to use as planning assumptions. These will be used for inter-regional comparison and to support adaptive planning.

WRW has produced a methodology framework to enable a consistent development for the region's Environmental Destination and this, along with regular discussions with regulators and stakeholders, has been utilised in the development of the STWL dWRMP24.

English WRMP supplementary guidance

The EA published supplementary water resources planning guidance for Environmental Destination in England. For England, the Environmental Destination set out in this document relates to Severn Trent Water's public water supply abstractions and potential reductions in deployable output to protect and enhance the environment.

Environmental Destination should take a holistic approach to catchment management and be cross sector. However, we are in the early stages of the evaluation and strategy development and the focus from our English regulator, the EA, is on the identification of potential abstraction reductions and solutions development.

The Environmental Destination includes both the shorter to medium-term regulatory needs and the potential longer term direction to 2050 and beyond, taking account of a dry climate change scenario. We have included Water Framework Directive (WFD) improvement implementation measures, licence capping assumptions to prevent WFD status deterioration based on recent guidance (see Section D5) and scenarios relating to the longer-term environmental destination (see section D8).

Welsh

WRMP supplementary guidance

Wales has also published supplementary guidance for Environmental Destination. This takes a holistic approach and is aligned with Welsh legislation. Further information in Wales is in section D13.

Environment Agency Updates 2021/22

In early 2022 the EA produced a summary of what it wanted to see in regional plans (see figure 1.1). This is also a useful reference of what needs to be evaluated and reported in the Severn Trent dWRMP24. The approach for columns 1, 2 and 4 are summarised in this section. Column 3 is outlined in Appendix G: Our Plan.

Figure D1.1: EA slide on what they expect to see in the plan

The WRMP Planning Guideline sets out that the plan:

"must deliver the regulatory actions required to avoid deterioration and meet targets for Protected Areas

must deliver actions required to meet the abstraction plan for 2027 (where applicable) and those required to achieve WFD regulations objectives, as defined in River Basin Management Plans

should take account of government and regulators' objectives for the environment

should include the measures in the Water Industry National Environment Programme (WINEP) and the National Environment Programme (NEP) (where applicable)

should include your long term environmental destination, clearly setting out the actions you will take in the short, medium and long term to achieve it. You should distinguish between actions that are required to meet current regulatory requirements and those that form part of your longer term destination. If the actions to achieve the long term environmental destination are not known at this stage, you should identify what further work is needed to understand the actions that are required to deliver your environmental destination

should fully reflect and support the achievement of the regional long term environmental destination (where one applies) and the achievement of your WRMP environmental destination"

In addition the EA and OFWAT have specified three scenarios to be evaluated in the dWRMP and regional plans (the definitions of these are described in Section D6):

1. High Scenario – Enhanced
2. Core scenarios to be included in the WRMP plan baseline tables – Business as Usual (BAU) scenario plus needs of riverine European Designates sites (BAU+)
3. Low Scenario – a plausible low scenario required by OFWAT

D1.2 Overview of Severn Trent Water's approach to Environmental Destination

Our Environmental Destination

In England, by 2050 the BAU+ deployable output reductions increase to a total of c.442Ml/d.

Measuring progress against the STW BAU+ environmental scenario reductions our plan presents 30% of the 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 for 2050. To put this into context, Severn Trent is contributing 84% of the planned DO reductions across the WRW region to deliver environmental improvement and prevent future deterioration.

For the dWRMP24 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 (29Ml/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 (~20Ml/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 regulator commitments

The early abstraction licence reductions between 2030 and 2040 relate to our current estimate of what is needed to deliver 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.140Ml/d in public water supply deployable output by 2030 increasing to c.179Ml/d by 2040.

For AMP7 we have included agreed licence reductions and flow compensation changes to achieve WFD improvements. This includes c.30Ml/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.

For WFD 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 dWRMP24 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 precautionary assumption of 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 could change. 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

We have used licence change / average deployable output 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.

We are taking a 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 if the first 2 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.

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

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.

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 & NEP and stakeholder engagement.

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

Other evaluation programmes are being undertaken e.g., River Severn Regulation review and the Shropshire Groundwater Scheme. We have a collaborative plan to understand when outputs may feed into the Environmental Destination evaluation process.

Collaboration at catchment scale and opportunities for joining with other sectors to achieve multiple benefits. We are prioritising catchment engagement with other sectors and seeking to join up water company plan drivers to maximise catchment benefits.

We will factor uncertainty and the ranges of pressures on catchments into our decision-making process.

Tools and data used in the evaluation will include groundwater models, hydro-ecological models, and UKCP18 climate data.

Insights into the evaluation and approach to date

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 Seven Trent 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 c.442Ml/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 are 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. Therefore, we have used non modelled reductions in our analysis of the longer-term impacts (2050).

While we have identified the water resource solutions needed to accommodate these abstraction changes, we are still working through the water network and treatment works investment needed to accommodate such changes to how we would manage water supply. These will need to be considered as part of our AMP8 WINEP investigation and options appraisal work.

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.

The following sections describe the shorter term and longer-term actions that Severn Trent have taken account of in the dWRMP24 and regional plan. Sections D2 to D5 sets out the shorter-term sustainability reductions for England. Section D6 to D8 outlines longer term scenarios. Sections D9 and D10 describes work in two catchments to consider a holistic approach for Environmental Destination. Sections D11 and D12 provide an overview of other shorter term WFD related actions. Section D13 describes Severn Trent's relationship to the upstream catchments in Wales.

D2 Restoring Sustainable Abstraction (RSA)

Some of our existing water 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 from AMP3 to AMP6 to investigate and implement solutions to address potentially environmentally damaging abstraction licences. We investigated the impacts of those abstractions identified by the Environment Agency as possibly causing harm to the environment. Through our investigation work we gathered site specific evidence of the extent of damage being caused, and whether our activities are the main cause, or just part of the problem.

Upon investigation, where our abstractions were identified to be the cause or part of the problem, we acknowledged that we needed to find and implement solutions. These solutions might include supporting stream flows though compensation discharges and environmental improvements. Where this has been evaluated alongside dWRMP24 solutions, for some areas, we have reduced our abstraction licences at the affected sites, linked to developing alternative source of supply. Sustainability reductions to licences may have been 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.

Our investigations were all completed by 2020 and the EA have now closed the RSA programme. We are implementing solutions from the AMP6 investigations between 2020 and 2030.

D2.1 RSA Sustainability Changes

In the preparation of our previous PR14 business plan, the Environment Agency's National Environment Programme (NEP) for AMP6 set out the waterbodies and protected sites where it was suspected that our abstractions were unsustainable and causing detrimental environmental impact. This has been the route whereby water companies have evaluated and included action to improve the WFD status relating to flow or water level pressures. Throughout AMP6 we worked with the Environment Agency to complete environmental investigations and solution appraisals at these sites. This options appraisal process was completed and the Environment Agency incorporated the results into the AMP7 WINEP3 that was released in April 2018 for implementation between 2020 and 2025. The outcomes of these appraisals informed the recommended solutions we described in WRMP19 and these ongoing activities have been reflected in our dWRMP24.

Where the investigations concluded our activities were having a damaging impact, then our dWRMP24 includes the solutions we have agreed with Environment Agency to remove or mitigate these effects. These solutions take the form of:

- 'Local' solutions, such as changes to our compensation flows at surface water sites or environmental improvement measures such as river habitat restoration which are being implemented in AMP7.
- 'Strategic' new supply-side solutions that will allow us to reduce abstraction from a number of our unsustainable groundwater sources.

Where we needed to reduce unsustainable abstraction, we agreed with the Environment Agency that we will make changes to the associated abstraction licences by end of AMP7 (2025). However, we also agreed with the Environment Agency that in some cases we would take an 'upfront permitting' approach to these licence changes. This means that in some cases the changes will not take effect immediately, allowing us time to complete the required engineering changes to our water supply network and protect our customer's security of supply. In such cases, we are implementing local schemes in AMP7 to mitigate for the effects of ongoing abstraction by making improvements in stream habitat (see Environmental Measures below). All licence reductions and our required interventions will come into effect and be applied by 2030.

We have included the AMP7 WINEP implementation schemes in our plan. This includes the agreed sustainability changes for each individual site. Although there will be some refinement of the distribution of reductions during AMP7 we have used these assumptions in our plan, ahead of further evaluations being completed. These site level changes have been modelled, where applicable, in aggregate using our Aquator water resources model to derive the deployable output impact on each water resource zone. The site-based reductions have been used as input to our central best estimate to assess the combined impact of both RSA and WFD No Deterioration impacts on our deployable output (DO).

Table D2.1 to D2.6 below lists those sources where our AMP6 RSA investigations concluded that abstraction reductions or other environmental solutions may be required. The sites listed in these tables were included in the Environment Agency's April 2018 WINEP3 and carried an 'implementation' driver. A short description of the nature of the solution has been added for clarity. These schemes were included in our WRMP19 and are now part of our AMP7 WINEP delivery programme.

Table D2.1: WINEP groundwater schemes (measure taken from AMP7 WINEP) – Forest & Stroud WRZ

WRZ	RSA Investigation Site	Measure	Description of scheme
Forest & Stroud	Cinderford Brook	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration Measures Sustainability change to prevent risk of future deterioration

Table D2.2: WINEP groundwater schemes (measure taken from AMP7 WINEP) – North Staffordshire WRZ

WRZ	RSA Investigation Site	Measure	Description of scheme
North Staffordshire	Aldford Brook	Sustainability Change	Catchment/River Restoration Measures Sustainability change to prevent risk of future deterioration

Table D2.3: WINEP groundwater schemes (measure taken from AMP7 WINEP) – Nottinghamshire WRZ

WRZ	RSA Investigation Site	Measure	Description of scheme
Nottinghamshire	Dover Beck and Oxton Dumble	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration Measures in waterbodies Combined sustainability reduction of up to 23.5 Ml/d off 15-year recent actual abstraction
Nottinghamshire	Rainworth Water	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	
Nottinghamshire	Bevercotes Beck	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	
Nottinghamshire	Vicar Water	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	

Table D2.4: WINEP groundwater schemes (measure taken from AMP7 WINEP) – Shelton WRZ

WRZ	RSA Investigation Site	Measure	Description of scheme
Shelton	Lower Worfe - Stratford Brook, Albrighton Brook & River Worfe	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration Measures Sustainability reduction of up to 3Ml/d off 15-year recent actual
Shelton	River Strine (multiple waterbodies)	Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration and alternative local flow support measures
Shelton	Upper Worfe - Burlington Bk	Sustainability Change	Continuation of WRMP14 Scheme
Shelton	Upper Worfe- Neachley Bk	Sustainability Change	Continuation of WRMP14 Scheme

Table D2.5: WINEP groundwater schemes (measure taken from AMP7 WINEP) – Strategic Grid WRZ

WRZ	RSA Investigation Site	Measure	Description of scheme
Strategic Grid	Batchley Brook	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration Measures Sustainability reduction of up to 1.5Ml/d off 15 year recent actual
Strategic Grid	Confirmed Coventry Coal Measures (River Sowe and Sherbourne)	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration or local flow support measures. The scheme includes revoking a disused licence Sustainability reduction of up to 4.4Ml/d off 15 year recent actual
Strategic Grid	Hartlebury Common SSSI	Sustainability Change	Local flow support measure (small associated sustainability reduction of up to 0.5Ml/d off 15-year recent actual abstraction) – this is no longer anticipated to be required as water quality is not suitable.
Strategic Grid	Battlefield Brook	Sustainability Change	Completion of WRMP14 Scheme

Table D2.6: WINEP RSA surface water schemes (taken from WINEP3 - April 2018)

WRZ	RSA Investigation Site	Measure	Description of scheme
Strategic Grid	Carsington Reservoir (Henmore Brook)[1]	Sustainability Change & Land Management/ Habitat Restoration/ Physical Improvement	Catchment/River Restoration and small change to local flow support measures
Strategic Grid	River Dove at Egginton	Sustainability Change	Solution to be agreed with EA following further assessment. Agreed to remove 90 HOF
North Staffordshire	Tittesworth Res (R. Churnet)	Sustainability Change	Local flow support measures. Solution to be agreed with the Environment Agency following further assessment
Strategic Grid	Stanford Reservoir	Sustainability Change	Continue local flow support measures; change to control for compensation and reassessment of volumes required
Strategic Grid	Quorn Brook (Cropston and Swithland Resrs)	Sustainability Change & Adaptive Management	Local flow support measures by introduction of reservoir compensation volume of up to 4Ml/d
Strategic Grid	River Ashop[1]	Sustainability Change	Change to local flow support
Strategic Grid	River Noe[1]	Sustainability Change	Change to local flow support

Note 1: These sites are listed in WINEP3 with a no deterioration driver. They have been included in table A4.2 of our dWRMP24 as they are AMP6 RSA investigation sites and scheme was agreed though RSA options appraisal.

We were required under the RSA programme to determine whether our existing abstractions were meeting RBMP sustainability objectives and in cases where there was risk of not meeting these, we determined the licence changes that were required to our abstractions to meet RBMP objectives. Where we have identified "sustainability change" in order to meet these requirements, we have assumed losses below the agreed WFD baseline recent actual abstraction rather than the current average abstraction licence quantity. The combined total for the RSA related sustainability changes for the groundwater sources, below recent actual abstraction is ~30Ml/d.

D2.2 Environmental Measures

In AMP 7 we are delivering 11 environmental measures schemes which are included in tables D2.2 to D2.6 above. The driver for these projects is to improve ecological resilience to low flows. There are 11 catchments which include 17 waterbodies where we have an obligation to deliver environmental measures. Each of these catchments have been investigated for multiple AMPs (in terms of river flow, macroinvertebrates etc) to understand the impact of our groundwater abstraction on surface water flow. Where our groundwater abstraction is impacting surface water bodies we have included in WINEP for a solution to be implemented. The sites which these schemes are being delivered at are as follows:

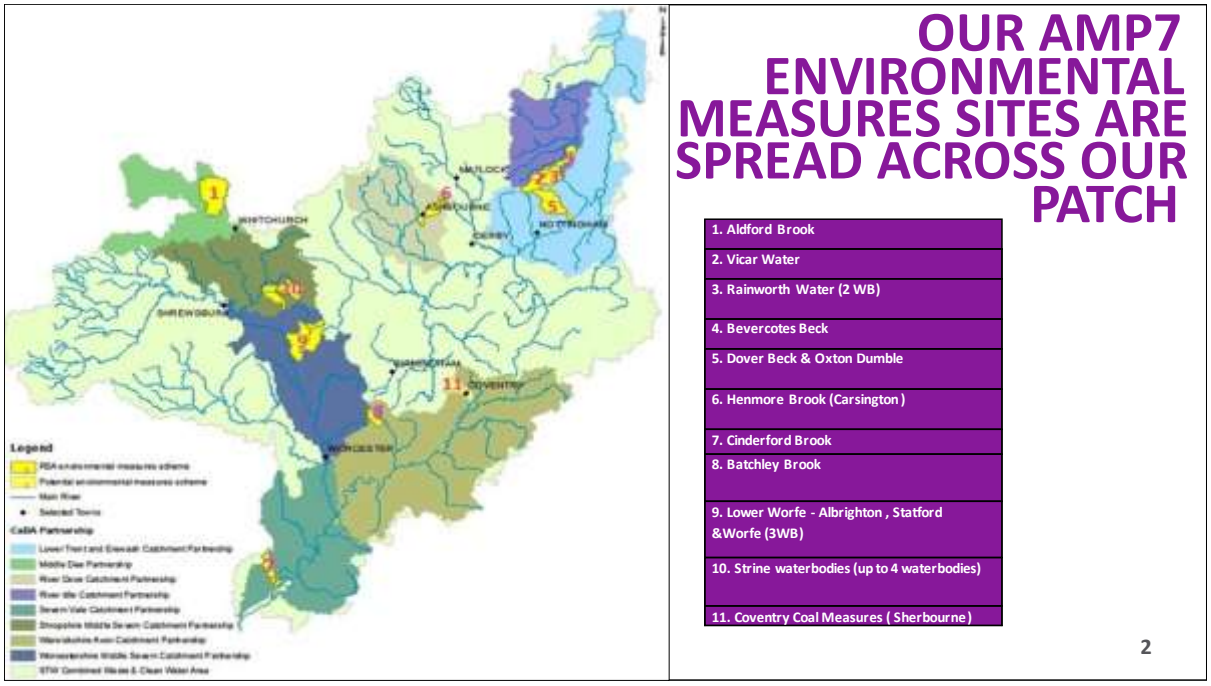
- Cinderford Brook
- River Sherbourne
- Aldford Brook
- Vicar Water
- Rainworth Water
- Bevercotes Beck
- Strine
- Lower Worfe
- Henmore Brook
- Doverbeck
- Batchley Brook

In year 2 of AMP7 we have already delivered a 6000m^2 wetland adjacent to Cinderford Brook as part of phase 1 of our restoration scheme for this site. This will provide habitat, biodiversity and natural capital benefits to the area and phase 2 for this site will follow for the remainder of this AMP and will focus on river restoration activities. We have also delivered feasibility and optioneering for all sites in year 2 of AMP7 and set up a new partnership working method for scheme delivery.

Our delivery method for this river restoration activity is partnership working with environment non-government organisations (eNGOs) such as Wildlife and River Trusts. We are formally in partnership agreement with most Trusts to deliver this work with the remaining two due to be signed over summer of 2022. This partnership working with local Trusts and the EA will ensure successful delivery of these schemes by the end of AMP deadline and also provide many other benefits in terms of expert local knowledge, local stakeholder engagement benefits and so on.

Year 3 of AMP7 for these schemes will include detailed design for river restoration activities and the start of delivery activities in these catchments.

Figure D2.1: Distribution of Environmental measures schemes across the Severn Trent region



Protected area commitments

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

This piece of legislation combined the land and marine aspects of the European Union's Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Wild Birds Directive (Directive 2009/147/EC) (known as the Nature Directives) to ensure the conservation of a wide range of rare, threatened, or endemic animal and plant species in the UK. Under this legislation, approximately 200 rare and characteristic habitat types are also targeted for conservation in their own right.

The Wildlife and Countryside Act 1981 (as amended) requires statutory undertakers (including water companies) to take reasonable steps, consistent with the proper exercise of their functions, to further conservation and enhancement of the features of sites designated as Sites of Special Scientific Interest (SSSIs).

Habitats Directive sites and SSSI could be sensitive to the impacts from abstraction if the features of interest are flow or water level dependent and abstraction sources do not necessarily need to be within the boundary of the site to have a potential for impact.

Historically we have investigated a number of protected areas under the RSA programme or under SSSI WINEP drivers in AMP7. Following investigation, where required, any licence changes have been made. One implementation scheme was included in the AMP7 WINEP for Hartlebury Common SSSI (see Table D2.5), however, following further feasibility and discussions with both the EA and NE, this solution is no longer going to be implemented and the commitment will be removed from WINEP.

D3 Water Framework Directive no deterioration

D3.1 Background to WFD No Deterioration

Under the Water Framework Directive (WFD) we have an obligation to prevent the deterioration of the quantitative and qualitative status of surface or groundwater WFD waterbodies. The EA defines deterioration as a change in the class of one of the elements used to determine the status of a waterbody from its existing class to the class below, or a deterioration within the lowest class.

Deterioration of the status of a waterbody could arise if our abstractions increase in the future, within our currently licenced quantities, due to growth. Growth may occur at a source due to increased demand, for example from new housing developments, to make up for a sustainability change elsewhere, or as a result of a planned operational change. If this occurred, we would be taking more water out of the environment. Taking action to prevent deterioration now will prevent us from having to repair damaged waterbodies in the future, which would be more expensive. Our abstractions need to be more sustainable, and we need to achieve this without compromising the supply of water to our customers.

The Environment Agency developed a methodology to advise water companies on a risk-based approach to managing the WFD risk at our sources relating to the timing of when the predicted risk of deterioration could occur 'Guidance on water resources investigations into the risk of WFD water body deterioration, Jan 18'. This facilitated the prioritisation of actions to be undertaken by water companies and these were included in the AMP7 WINEP for Severn Trent.

In November 2021 and April 2022 the EA shared their evolving policy on licence capping to prevent deterioration of the water environment in the form of letters to water companies and supplementary guidance:

- 'Addressing deterioration risk from existing abstractions', letter to water companies in England, 15 November 2021
- Water resources planning guideline supplementary guidance – actions required to prevent deterioration (Draft), Published 15 November 2021
- 'Addressing deterioration risk from existing abstractions' letter to water companies in England, 4 April 2022
- Water resources planning guideline supplementary guidance – actions required to prevent deterioration v2.0, Published 4 April 2022

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 linked to the WFD status of associated waterbodies. The EA will either cap licences at maximum peak abstraction or recent actual average abstraction depending on the environmental risk. The April WR planning supplementary guidance outlines that:

"Maximum peak abstraction is the maximum volume of water abstracted in any one year during the representative abstraction period. This means:

- *maximum peak abstraction is to allow flexibility to meet high demands, such as during droughts and for operational requirements, such as outage.*
    - *we expect water companies to control growth in overall abstraction above recent actual average volumes determined during the representative period at individual licensed sources.*
    - *previous caps at maximum peak potentially allow the quantities abstracted to increase year on year. This is no longer the case. We expect water companies' average abstraction and*

deployable output (DO) to remain at recent actual average volumes unless the Environment Agency has confirmed that some growth is permitted.

- *the Environment Agency advises water companies not plan to use the additional DO provided by the maximum peak cap to enable housing growth unless the Environment Agency has confirmed that the associated increase in abstraction would be permissible.*
- *where abstraction increases beyond permissible levels and causes deterioration, the Environment Agency may have to instigate changes to licences that have caused the deterioration to cap them at recent actual average abstraction.*
- *maximum peak abstraction for operational reasons such as outage should not extend beyond 6 months.*

- *Recent actual average abstraction is the total volume of water abstracted during the representative recent actual period divided by the number of years in that period. No growth and very limited operational flexing are permitted in these circumstances."*

A summary of the licence capping assumptions for the scenarios for which licence change should be considered are outlined in the 15 November 2021 letter accompanying the draft November guidance and is provided in Table D3.1.

Table D3.1: Licence capping summary table in EA 15 November 21 information letter reflecting the scenarios for a licence change detailed in Water Resources planning guidelines supplementary guidance - actions required to prevent deterioration (Draft), Published 15/11/2022.

Environmental scenario	Licence change
• **flows in a water body do not support good ecological status (GWS); or** • **a groundwater body is at poor quantitative status; or** • **there is evidence that the ecology is damaged by abstraction; and** • **there is planned growth**	• **cap licences at recent actual average abstraction rates**
• **flows in a water body do not support good ecological status; or** • **a groundwater body is at poor quantitative status; but** • **there is no planned growth**	• **cap licences at maximum peak abstraction rates**
• **flows in a water body support good ecological status; or** • **a groundwater body is at good quantitative status; and** • **planned growth is likely to cause deterioration to poor status**	• **cap licences at maximum peak abstraction rates**

The WRMP supplementary guidance complements the risk-based approach used to prioritise the risk of deterioration based on forecast growth in abstraction, outlined in the section below, and therefore a profile of potential average licence reductions, and hence deployable output reductions, has been generated to inform our planning assumptions for the dWRMP24. We have also tested different licence capping profiles to inform our adaptive pathways planning.

The WRMP supplementary guidance for licence capping also includes a requirement not to assume we can take the maximum peak abstraction rates, they are for short term operational use to maintain security of supplies, not for sustained increase in abstraction. Therefore, under both licence reduction scenarios, the

Environment Agency's expectation is that long term abstraction for sources would not exceed the recent actual average abstraction, either as an average over a period of a number of years or in some cases at all. As such for the draft plan we have had to make the precautionary assumption that our groundwater licences long term average deployable output is capped at recent actual abstraction.

This latest EA supplementary guidance augments the previous January 2018 guidance which advised water companies on a risk-based approach to managing WFD risk at our water sources. This previous guidance related to the timing of when the predicted deterioration risk could occur. The latest no deterioration guidance has led to a change in our understanding of the likelihood of abstraction licences being capped to recent actual abstraction quantities.

D3.2 Development of the AMP7 WFD No Deterioration WINEP programme

We have a large AMP7 WINEP programme relating to WFD No Deterioration. We prioritised our groundwater sources for evaluation in AMP7 and categorised them as Adaptation, Prevent & Mitigate or Investigation sites.

- For the Adaptation sources (42) we have assumed that we will make licence changes that will reflect the agreed WFD recent actual abstraction. Licence changes are to be made by 2024/24 and implementation of the new licence quantiles by 2030. Catchment improvement measures are being implemented in AMP7 in 11 catchments to improve the environment and mitigate any risk of deterioration (see Section D2; Environmental Measures).
- For the Prevent & Mitigate sources (24) we would undertake further evaluation and either make licence changes that will reflect the agreed WFD recent actual abstraction or identify and implement mitigation measures to prevent environmental deterioration; for WRMP19 purposes we assumed 50% of the deployable output loss between the current deployable output and the WFD recent actual abstraction.
- For the investigation sources (43) we would investigate the potential for deterioration; for WRMP19 purposes we assumed 50% of the deployable output loss between the current deployable output and the WFD recent actual abstraction.

The latest EA WFD No Deterioration guidance supersedes these assumptions and licence capping to ensure no deterioration will be more extensive for the dWRMP24.

For our surface water sources, the EA only classified a relatively small number as higher risk. Out of this modest number of sources there are Hands-off Flow (HoF) conditions in many of the licences. In most cases, the HoF provides appropriate protection for the environment. If the HoF is not considered an appropriate protection mechanism, then we will have already investigated the sources as part of previous Habitats Directive (HD) or Low Flows programmes. No further changes have been identified to be needed for WFD No Deterioration.

D3.3 Development of the hydro-ecology models

In AMP7 we continue to develop environmental evidence and the tools we can use to help improve our understanding of how we can achieve WFD objectives in our region. We continue to develop hydro-ecology models through collaborative projects with the Environment Agency. The models use historical and current ecology (invertebrate) data from a number of streams in part of the West Midlands originating from the Permo-Triassic sandstone. They have previously been used to assess abstraction pressure as part of the RSA investigations and have been updated during the course of our Priority A No Deterioration investigations in AMP7. Through using the models in conjunction with groundwater modelling, the hydro-ecological models now enable us to make predictions about future deterioration risk from our groundwater abstractions, where

appropriate for use, and can provide an additional piece of supporting evidence to guide decision making around future abstraction.

Work is ongoing in AMP7 to extend the spatial scope coverage of the hydro-ecology model to other parts of the Severn Trent region influenced by the Permo-Triassic sandstone aquifers, to allow better understanding around the range of potential sustainability changes that could arise from WFD No Deterioration. A hydro-ecology model can help us optimise a solution to get the best environmental outcomes.

D3. 4 Progress with AMP7 WINEP to July 2022

During the AMP7 investigation process we have further refined our approach and understanding of future predicted growth at our sources, aligning to the household growth numbers used for the dWRMP24. We have also updated the allocations of waterbodies to our sources. To inform development of our WINEP for AMP8 we have reviewed the prioritisation exercise to ensure it reflects our current understanding of the risk. We will be discussing this with the EA and will refine our assumptions for the final WRMP 24. We are also finalising the agreed WFD recent actual baseline for our sources and these updated numbers will be included in our final plan. Following the release of the new WFD No deterioration guidance in April 2022 we are also reviewing and updating our WINEP evaluation approach and will be sharing and discussing this with the EA.

We have also completed a number of investigations in 2022. These were finalised after assumptions had been included for the dWRMP24. Table D3.2 summaries the assumptions used in the dWRMP24 and the final investigation outcomes. The sustainability reduction assumptions will be updated in the final WRMP 24. Other high priority investigations for our Wellings, Shiffords Bridge, Stoke on Tern, Edgmond Bridge, Puleston Bridge, Lilleshall, Rodway and Woodfield sources are due for completion in September 2022.

Table D3.2: assumptions used in the dWRMP24 and the final investigation outcomes

Source	dWRMP24 assumptions	Investigation outcome
Bigwell	Bigwell has WFD ND INV Mar 22 - likely that no reduction required, however, not signed of so reduction assumed 2040.	Investigation agreed that no licence reduction is required for this source.
Kinsall	Kinsall INV & OA Mar 22, provisional capping by 2030. Rednall also in zone. Suggestion that Rednal would not need capping. INV not signed off so assumed worst case licence capping at both sources.	Outcome of the investigation is that annual limit for the Kinsall portion of the licence is to be reduced to 4.33 Ml/d, but with the understanding that we will operate to a 15-year average abstraction for the source at the WFD baseline 3.97 Ml/d, to come into effect by 2030. There is no licence change proposed for Rednal, the overall aggregate is unchanged and no change to max daily.
Green Street	Currently assumes by 2030 sources have a 50% loss of the Baseline - >ADO amount and 100% loss by 2040.	Outcome of the investigation is that annual limit for the licence is to be reduced to 6.12 Ml/d (although the EA are checking this figure), but with the understanding that we will operate to a 15-year average abstraction for the source at the WFD baseline 5.3Ml/d, to come into effect by 2030.
Lee Brockhurst	INV&OA 2022, potentially licence capping proposed but solution not finalised, 1 AMP to implement. Assume if a solution needed for one source would design for needs of all in small zone. longer term ADO taken down to long term RA.	Revised baseline 6.25 Ml/d. Outcome of the investigation is that annual limit is to be reduced to 7.1 Ml/d, but with the understanding that we will operate to a 15-year average abstraction for the source at the WFD baseline 6.25 Ml/d, to come into effect by 2030. Peak unchanged.
Overton Scar	INV&OA 2022, potentially licence capping proposed but solution not finalised, 1 AMP to implement. Assume if a solution needed for one source would design for needs of all in small zone. longer term ADO taken down to long term RA.	Revised baseline 1.8 Ml/d. Outcome of the investigation is that a rolling aggregate is added for this source meaning 15 yr average will be 1.8Ml/d.
Preston Brockhurst	INV&OA 2022, potentially licence capping proposed but solution not finalised, 1 AMP to implement. Assume if a solution needed for one source would design for needs of all in small zone. longer term ADO taken down to long term RA.	Revised baseline 0.9 Ml/d. Outcome of the investigation is that annual limit is to be reduced to 1.34 Ml/d, but with the understanding that we will stick to a 15-year average abstraction for the source at the WFD baseline 0.9 Ml/d, to come into effect by 2030. Peak unchanged.
Plemstall	INV&OA 2022, no growth due to way source works. Plan to sign off for full licence. Assume source ADO reduced to WFD recent actual until confirmed but assume as no risk could implement change an AMP later (2035).	Investigation agreed that no licence reduction required for this source due to the way the source operates and the current water body classifications. Any future planned increase in abstraction at this source would need discussion and agreement with the EA.

D4 Managing the risks around WFD Deterioration

In July 2018, we shared with the Environment Agency our draft 'No Deterioration Technical Framework' that we proposed to follow in AMP7. In the document, we confirmed that our WFD No Deterioration investigations had been prioritised based on the abstraction impacts on the EFI.

A core aspect of our No Deterioration Framework is the annual abstraction review (AAR) process, this allows us to manage the risk of deterioration in a dynamic way. The AAR gives an update of abstraction rates across all of our sources each year. The AAR also includes a growth assessment to provide an updated forecast of growth across our supply area up to 2027 and up to 2040, this assessment will highlight the sources where abstraction is likely to increase to meet the demand and show the difference between recent actual abstraction and forecast abstraction. We use this to identify any deterioration risks which aren't already being addressed.

For a number of our sources, we have also developed Source Action Plans (SAP), SAPs for remaining sites are being completed. These SAPs provide an assessment of the WFD challenge for groups of sources, that form water supply operational control groups, and exploration of options that could be considered to solve that challenge.

Another important aspect that supports our No Deterioration Framework is environmental monitoring, which helps us measure and manage the risk of deterioration. We have developed a Monitoring Strategy; a process for prioritising environmental monitoring in accordance with the level of risk of WFD deterioration, which focuses on our Adapt and Prevent/Mitigate sources. The monitoring strategy allows us to establish baseline conditions in relevant waterbodies; understand the sensitivity of receptors in those waterbodies to changes in groundwater abstraction; detect changes from baseline conditions; and understand the reasons for changes. It may also help understand the benefit or need for sustainability reductions and mitigation measures, as well as collect data to develop and refine our predictive tools, such as hydro-ecological models. Monitoring will help inform our Adaptive Management approach to ensuring activities are not risking WFD deterioration. Our investigation programme is supported by a bespoke monitoring programme, which is source and site specific, aimed at filling in the data gaps to enable us to better understand the risk of deterioration. In addition, in AMP7 we are increasing the number of observation boreholes targeted at our sources, particularly those under investigation, to increase the number of sites we have for monitoring of groundwater levels across the region.

The information collated through the AAR, SAPs and monitoring work is being used to develop Operational Area Sustainable Abstraction Strategies (OASAS), these will be used to inform investment and operations – based decision making to ensure that we are able to successfully implement our No Deterioration approach across the company. The OASAS will look at our growth requirements and legislative requirements at a smaller scale than the dWRMP24 and may also suggest smaller scale solutions such as those anticipated for the Prevent / Mitigate sources above (e.g. improved Instrumentation Control and Automation (ICA) and telemetry and new distribution links from sources which are more sustainable to control groups which need additional water). They will also identify the control groups within the Water Resource Zones where demand management and leakage reduction should be focussed.

D4.1 WFD No Deterioration and drought

This section summarises our review of sources of water we may call upon in drought conditions and our evaluation of the risk of no deterioration from the use of these sources.

We have followed industry best practice for drought planning purposes and our approach is summarised in our Drought Plan (DP). The programme for preparing DPs is slightly different to the WRMP process. Our current DP

for period 2022-2027 is available on our website and has recently been published. Referring to our DP 2022-2027, we have measures in place to prevent or mitigate for the environmental impacts of drought actions. The raw water sources included in our DP, where we would apply for a drought permit or drought order, have an accompanying WFD assessment which appraises the risk of deterioration occurring from abstractions during drought conditions. For our groundwater sources, particularly those drawing from the Permo-Triassic aquifer, the inter-annual fluctuations arising from a drought is likely to be buffered by the storage of the aquifer.

We accept that if the emergency sources listed in our DP were to be used during a drought event, the effects of the abstraction would be compounded to those already in place under normal, average conditions within the waterbody. This may potentially lead to unsustainable abstractions in the interim within these waterbodies. We would mitigate for any long-term effects of any short-term abstraction changes using mitigation measures agreed with the Environment Agency.

While the emergency sources listed on our DP are not specifically listed on our WINEP programme, some groundwater sources are located on waterbodies that are listed on WINEP. Any compounding effects arising from the additional abstraction from the emergency sources would be considered through our WFD No Deterioration work and risk management. As an additional consideration, we have a responsibility to ensure that deterioration of waterbodies is prevented from abstraction at all our surface water and groundwater sites regardless of whether there is an entry listed in the WINEP programme.

Our DP states that for emergency sources, we will consider the need for assessments against waterbody deterioration if there was a likelihood that these sources would be required during a drought event. This is justified due to the long lead in time before we may need to use these sources. However, we will further consider within our technical WFD No Deterioration framework whether the sources most likely to be required during a drought should be investigated as part of our wider AMP8 WFD No Deterioration programme. We will continuously liaise with the Environment Agency regarding the need to undertake further work at our surface water and groundwater sources, regardless of whether they are listed in the WINEP programme.

D5 Short to medium term sustainability reduction assumptions

D5.1 Groundwater source deployable output scenarios

Severn Trent has a large WINEP programme in AMP7 and AMP8 relating to RSA implementation actions and WFD No Deterioration risks which range from certain licence changes for the Adapt sources to uncertain licence changes for the Investigation & Options Appraisal and Prevent & Mitigate sources. Three WINEP scenarios have been developed:

- **Low DO impact (High DO):** The lowest impact scenario incudes RSA implementation and Adaptation WFD No Det sources being taken down to the WFD baseline volumes or below - certain for implementation by 2030.

- **Medium DO impact (Medium DO):** The medium scenario assumes an additional licence reduction at the investigation and prevent mitigate sources (50% of the gap between groundwater average deployable output (ADO) and WFD baseline recent actual volumes) - assuming implementation by 2030. This has been used as a planning assumption. The distribution of the impact and timing of any sustainability reduction will be modified once AMP7 WINEP evaluation has been undertaken for both the investigation & options appraisal and the prevent / mitigate at risk sources.

- **High DO impact (Low DO):** The highest impact would take all at risk sources down to the WFD baseline volume - assumes 2040 implementation. These are conservative assumptions based on the latest EA licence capping guidance. 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.

- **Groundwater sources that are not included in the current AMP7 WINEP:** For dWRMP24 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 DO and RA abstractions by 2030 in our central best estimate for all sources in this category. We have assumed precautionary assumptions applying an average licence reduction to recent actual by 2040.

In earlier versions of the draft plan, we had assumed the Medium DO impact scenario which is consistent with the assumptions we included in WRMP19. Following the release of the licence capping guidance by the EA in November 21 and April 22, and feedback on the pre consultation of the regional plan in Jan 22, we have now assumed the High DO impact scenario in our plan as a precautionary approach at this time.

D5.2 Surface water licence changes

In addition, in all scenarios there are RSA implementation schemes on surface water sources included in the Aquator model outputs:

- The River Dove Egginton hands off flow (2030)
- Cropston and Swithland reservoir compensation changes (2024 – 2028)
- Ashop, Noe and Jaggers Clough flow changes (2024-2028)
- Tittesworth Compensation / Deep Hayes

These surface water reductions have been included in the Aquator water resource modelling for 2030.

D5.3 dWRMP24 baseline data tables

For the shorter term regulatory requirements, we have included assumption around our AMP7 WINEP programme and precautionary assumptions based on the latest EA WFD No deterioration guidance relating to licence capping. 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.

We have included this in dWRMP24 baseline data tables in line 7.1 BL; Total confirmed DO reductions to restore sustainable abstraction. It should be noted, however, that these are planning assumptions, not source specific commitments.

For the most part the Medium DO scenario is assumed to be delivered by 2030 (as outlined in the WRMP19) and a further 10 years has been allowed for the delivery of the remaining reductions by 2040. Some exceptions were applied to smaller zones where we have assumed one solution would be delivered for all sources.

It is possible, when we undertake updated WFD 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 have also run an 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.

Table D5.1 summarises the sum of the groundwater source deployable output reductions by WRZ. Section D7 summaries the Aquator water resource model runs and what has been included in the baseline data tables.

Table D5.1: Summary of groundwater source DO reductions by WRZ for early regulatory needs (Ml/d)

Water Resource Zone	Total DO losses 2030	Total DO losses 2035	Total DO losses 2040	DO loss due to WFD improvement and licence Capping for No Det
Bishops Castle			1.22	**1.22**
Chester		0.08		**0.08**
Forest and Stroud	2.43		1.33	**3.76**
Kinsall	1.31			**1.31**
Mardy	0.74			**0.74**
North Staffordshire	22.58		21.33	**43.91**
Ruyton			0.78	**0.78**
Shelton	27.55		17.02	**44.57**
Stafford		3.45		**3.45**
Whitchurch and Wem	3.73			**3.73**
Wolverhampton	5.42		1.58	**7**
Notts	70.65		0.86	**71.51**
Newark	2.47			**2.47**
Strategic Grid	22.07		7.18	**29.25**
Total	158.95	3.53	51.3	**213.78**

D6 Longer term Environmental Destination methodology

As outlined in section D1 in 2020 the EA published their National Framework (NF) for Water Resources and Appendix 4 of the National Framework presents potential future abstraction licence reduction scenarios in the face of potential growth and dry climate change impacts.

This section describes the EA NF scenarios and the methodology used to translate the EA NF scenarios into source level Deployable Output numbers for scenarios to either input into Aquator water resource model or directly into the dWRMP24 supply demand balance tables and adaptive planning scenario analysis. These scenarios support the development of the Severn Trent Water dWRMP24 and the Water Resources West (WRW) regional plan.

D6.1 Environment Agency Scenarios 2020

The Environment Agency (EA) has undertaken a national catchment data exercise using their Water Resources Geographical Information System (WRGIS) water resource models to identify waterbodies that may not meet their environmental flow targets by 2050, taking into account the impacts of climate change on natural river flows.

To help develop the long-term environmental destination, the EA developed scenarios exploring the impacts of the potential abstraction recovery required to achieve different levels of environmental protection. The figures quoted are based on the presentation output from the WebEx1 held on the 23 April which presents differing numbers from that included in the Appendix 4 of the National Framework document:

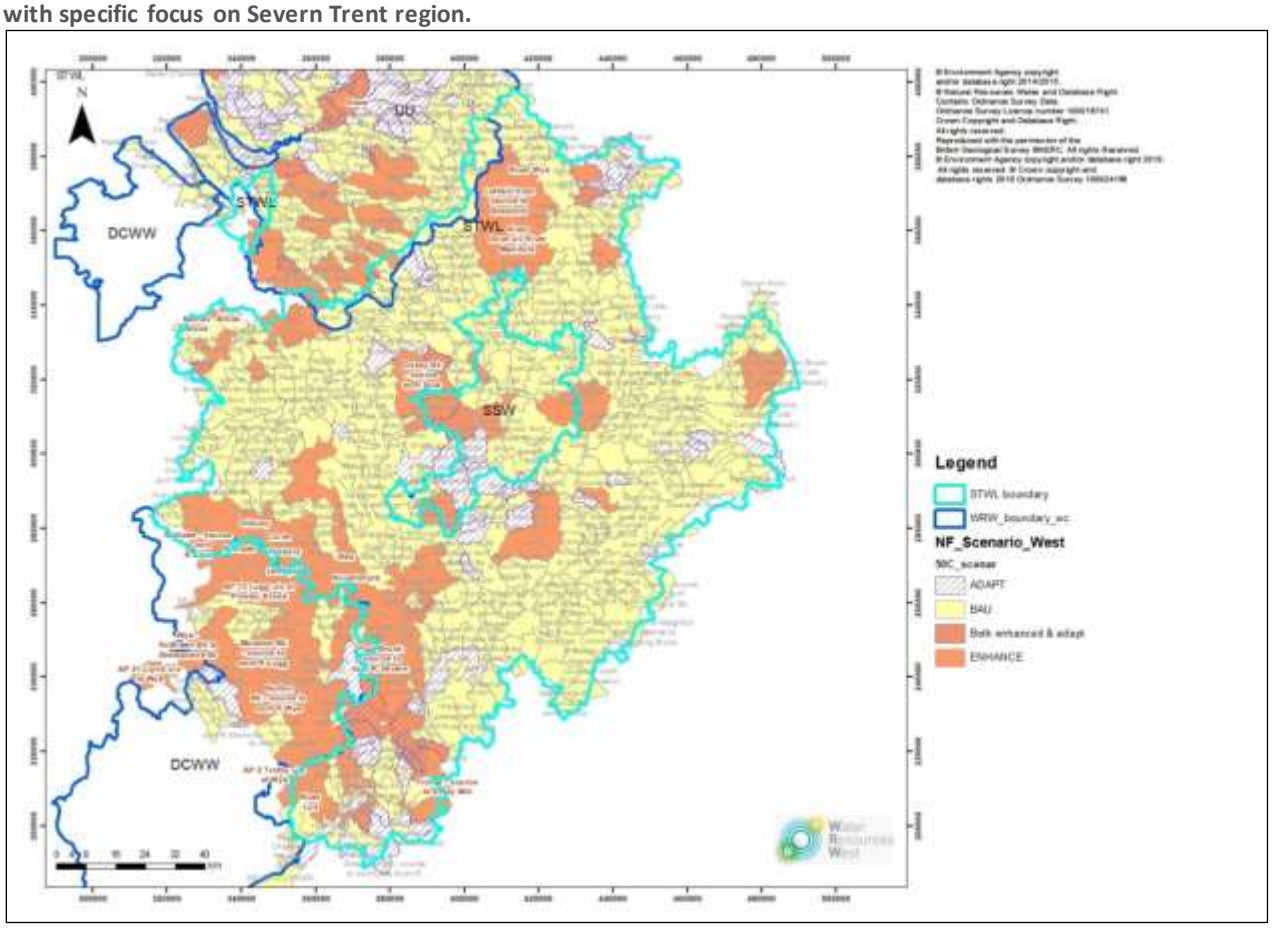
- 2050 BAU (business-as-usual) scenario (the minimum expected). This identifies 380 Ml/d of abstraction reduction for water companies in WRW in order to meet the Environmental Flow Indicator (EFI). This volume excludes NRW. EFI is a high level, desk-based tool and should only be used as a screening tool rather than to set the flow target itself; better information (e.g. site specific) and understanding is needed on how to set appropriative flow targets. The EA have stated that we must use this scenario as a minimum in our dWRMP24. This excludes WFD uneconomic waterbodies

- 2050 Enhance scenario. This identifies 423 Ml/d of abstraction reduction for water companies in WRW. This volume excludes NRW. The Enhance scenario gives greater protection for Special Areas of Conservation (SACs) by applying the CSMG (Common Standards Monitoring Guidance) targets which are tighter than EFI. The EA have stated that we should use this scenario to target action in protected areas and Principal Salmon Rivers.

- Adapt scenario. This scenario accepts that we may not be able to achieve the Enhance scenario with a shifting climate meaning a lower standard of compliance in non-WR HMWB (non-water resources heavily modified water bodies, HMWB, i.e. not reservoirs). As this relates to non-water resources HMWB it is not particularly relevant to STWL and we have not utilised it. We have not been provided with the abstraction impact numbers for this scenario.

- Combined scenario. This scenario combines BAU/Enhance/Adapt and specifies which scenario the EA have used for each waterbody. Where a waterbody is both Enhanced and Adapt the EA has taken the precautionary approach and used the Enhance scenario. We have not been provided with the abstraction impact numbers for this scenario.

Figure D6.1: distribution of BAU, Adapt, Enhanced and Enhanced/Adapt waterbodies within WRW region, with specific focus on Severn Trent region.



For both the BAU and Enhance scenarios, the EA have assessed Future Potential (based on recent actual abstraction rates uplifted for growth) and Fully Licensed (assumes licences will be used to their full volumetric limits) abstraction rates.

The slides below (figures D6.2 & D6.3) are taken from the EA workshop on 23rd April 2020 (200423 Environment ambition WebEx Workshop 1.pdf) and give the total reductions by sector for each region. Note that these differ significantly from the equivalent figures in Appendix 4 of the National Framework (Appendix_4_Longer_term_environmental_water_needs.pdf). These slides are more recent than Appendix 4 which was published on 31st March 2020 and the slides are therefore assumed to be correct.

There is an expectation that water companies will plan for abstraction reductions above and beyond those required in the WINEP, with the aim of meeting environmental flow requirements in all waterbodies. Other types of measures to achieve the ambition and make catchments more resilient should also be considered.

Short (<5 years), medium (5-15 years) and long term (>15 years) priorities need to be identified to achieve the environmental destination and can include investigations, licence changes and other actions. This will then feed into the decision-making process to determine what is taken forward at this time taking into account the decision making criteria and affordability.

Figure D6.2: EA slides summarising the NF scenario data – Business as usual scenario

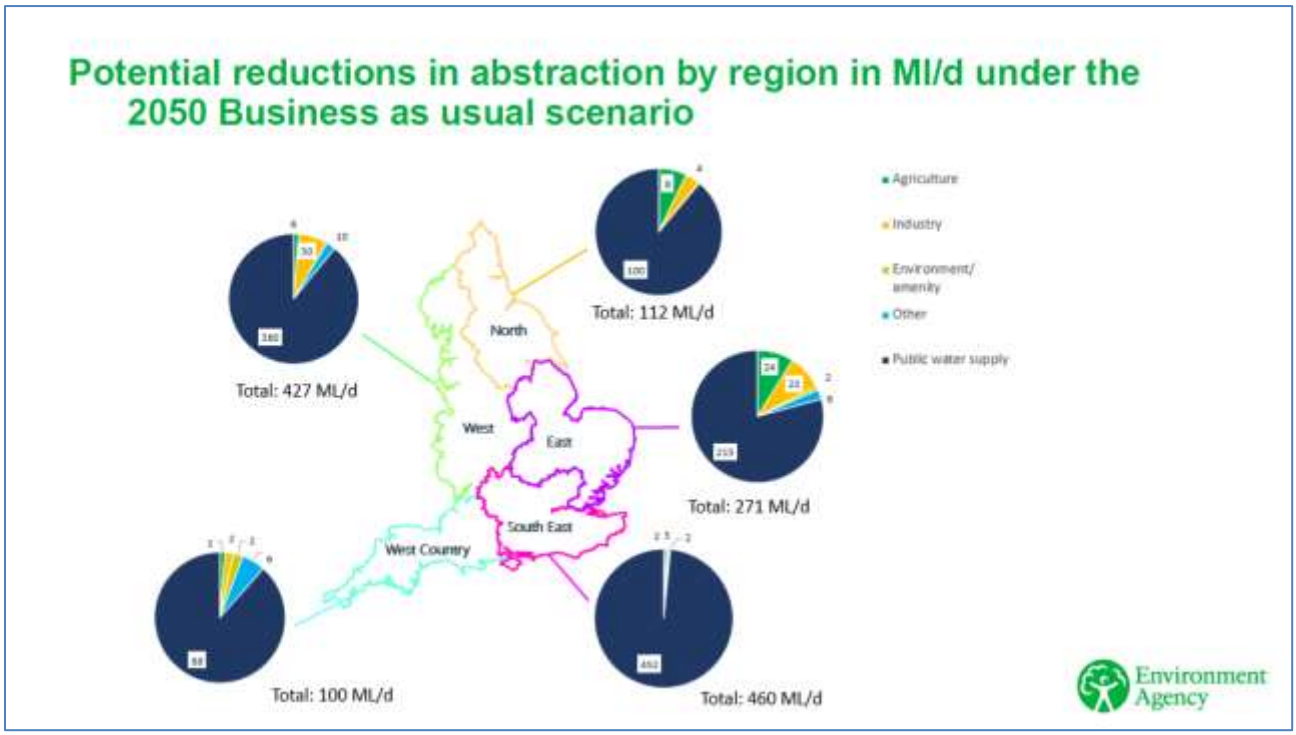
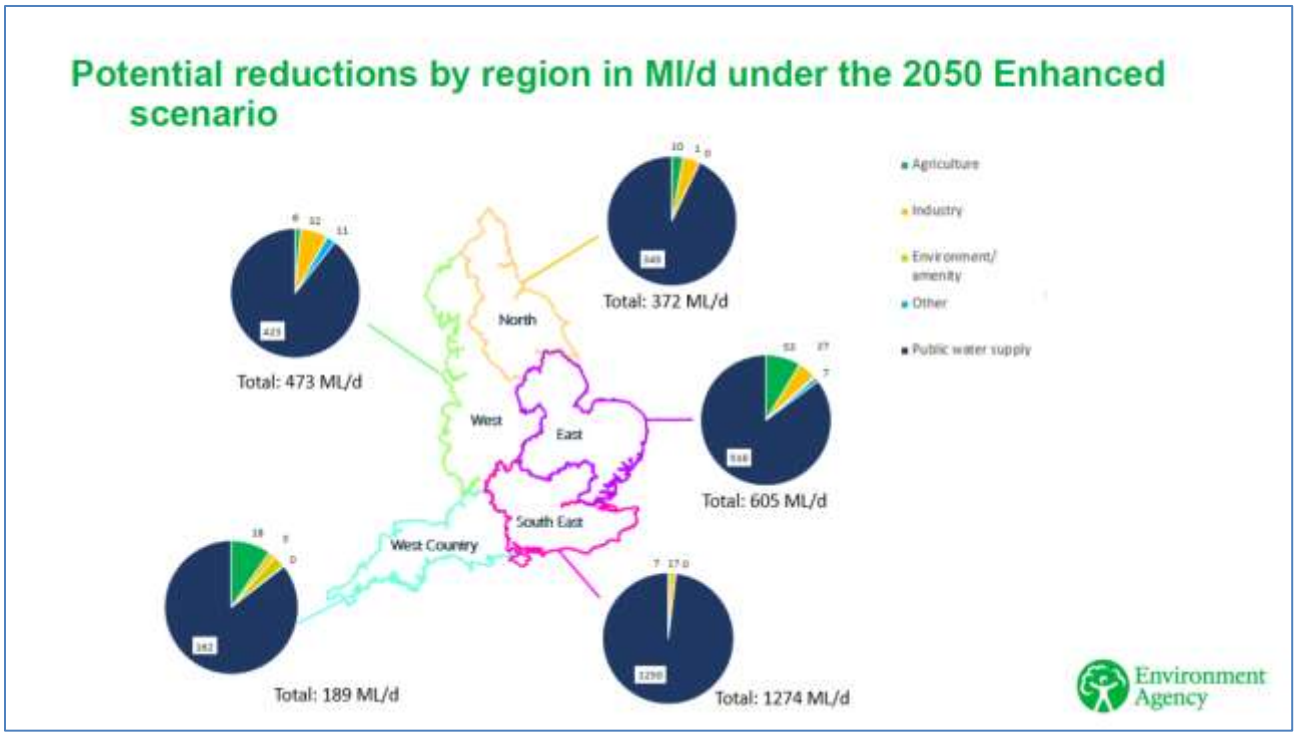


Figure D6.3: EA slides summarising the NF scenario data – Enhanced scenario



We consider that there are a range of uncertainties associated with the EA's method including:

- It is based on achieving the EFI (Environmental Flow Indicator), which is a useful screening tool, and may not take into account local evidence of the flows required to support the ecology.
- The factors used in WRGIS for groundwater sources to surface water bodies are approximations and would require detailed evaluation to inform any abstraction licence change.
- It is based on achieving CSMG targets in Enhance catchments, but these targets may not yet have been formally agreed.
- It uses UKCP09 climate change scenario (not UKCP18) and only uses one ensemble member (AFIXK) which is one of two driest ensemble members.
- To determine the Future Predicted scenario the EA have used growth factors (based on difference in distribution input between 2020/21 and 2044/45) from our revised dWRMP19. The EA's approach allows Future Predicted abstraction to exceed Fully Licensed due to growth, but this would not be allowed if there is any concern over the environmental impact. Future Predicted was based on recent actual abstraction rates (using the 2010-15 period which is now 5 years out of date) uplifted for growth.
- It includes estimates for unlicensed abstractions, many of which are soon to come under the licencing regime; this will result in reduced uncertainty in the future.
- The abstraction licence and recent actual data in the WRGIS is not up to date.
- It is unclear what has and has not been included in the EA's 2025 baseline analysis.

Although there is considerable uncertainty, these scenarios are the best tool we have available to explore the potential future challenges for the environment and abstraction impacts at this time.

D6.2 Scenarios included in the dWRMP24

In order to inform regional planning as part of WRW and dWRMP24, we are required to assess and quantify impacts of potential abstraction licence changes on our sources. The Environment Agency's Water Resource Planning supplementary note, 2020 (Environmental Destination guidance) outline how we should review the National Framework environmental scenarios data to explore how different levels of environmental protection affect potential abstraction changes; this should be used as a guide to inform decisions on the longer-term destination. Consideration is to be given to use of additional information or local evidence to interpret these. We should use the scenarios to consider catchments at risk of not meeting environmental objectives in the future due to abstraction pressures.

The National Framework scenario data has been used to inform a view of potential future abstraction licence changes in the longer term. This work will contribute to the development of an adaptive plan for Environmental Destination. It is noted that this is a very high-level assessment and that Severn Trent's view is that a 5 to 10 year investigation and options appraisal programme is needed to gather evidence, develop a full range of appropriate solutions and assess the cost and benefit of any potential changes.

We received feedback on the consultation that was held on the pre-draft WRW regional plan in January 2022. In addition, we have been receiving further guidance in the form of presentations and documents. The latest clarification, which we are utilising in our draft plan was shared on the 3 May 22 (20220503 Response to regional group paper_final.doc) and included clarification from both the EA and Ofwat. Key paragraphs are presented below.

> "The BAU+ locally verified scenario uses existing policy and regulatory approaches now and in the future. It includes everything under which Environment Agency's policy and regulatory commitments remains the same. It also includes applying Common Standards Monitoring Guidance (CSMG) flow targets at European designated riverine sites by 2050 at the latest. These targets were defined by Natural England in 2014 and therefore it is appropriate to account for these in long term planning. Locally verified refers to the analysis that regional groups have done to refine the scenario data developed at national scale by the Environment Agency for the National Framework. This incorporates the discussions held locally with stakeholders and regulators plus work that has already happened or is in progress to ensure the right level of protection and enhancement is being applied. "

Figure D6.4 shows the differences between the scenarios.

Figure D6.4 – EA table summarising the Environment destination scenarios, the arrow indicating which should be utilised as a minimum

Environment Agency Scenario	Supports Good Status (WFD) by 2027	Supports Good Status (WFD) by 2050	CSMG met for Protected Areas (European sites)	CSMG Met for SSSI's	Enhanced Abstraction Sensitivity Banding for Chalk	Enhanced Abstraction Sensitivity Band for Salmon
2025 Baseline (current planned action)	Yes	No	No	No	No	No
2050 Business as Usual (BAU)	Yes	Yes	No	No	No	No
2050 BAU+	Yes	Yes	Yes	No	No	No
2050 Enhanced	Yes	Yes	Yes	Yes	Yes	Yes
2050 Locally enhanced	Enhanced plus additional priorities					

"BAU+ locally verified is the minimum requirement, however, this does not limit regional groups and water companies from developing a higher level of protection and enhancement for the environment and seeking enhanced scenario."

Further clarification has also been provided relating to the scenarios that OFWAT require to be considered in the dWRMP24.

"2.2 Compatibility of the Environment Agency's position on BAU+ with the Ofwat's Common Reference Scenario

Ofwat, in its guidance for Long Term Delivery Strategies at PR24, complements the work and desire of the environment destination. While the Environment Agency has set out that the BAU+ locally verified scenario should be used in planning, the local verification element means that changes could be different, and potentially lower, than those included in the original BAU scenario. **Local verification, and therefore long-term clarity on the changes required to abstraction, will take time, require evidence and will not be fully understood until after the completion of investigations between 2025 and 2030.** For this reason, it is important that the Ofwat common reference scenarios both high and low set out an envelope and mark the boundaries of potential changes in each direction. Companies will then test the long-term delivery strategy against both high and low scenarios to demonstrate its robustness to each potential future.

The Ofwat common reference scenarios include a **high scenario (which is based on the Environment Agency's enhanced) and a low scenario which is 'currently known legal requirements'. The latter is being applied in the regional plan reconciliation process using the Environment Agency EA's national framework BAU+, then using local review to take out proposed licence changes with significant associated uncertainty. All these scenarios should include agreed WINEP changes and licence capping.** BAU+ as the most likely scenario would fit between the high and the low. The approaches are therefore compatible, being based on common scenarios and representing a plausible range of changes. "

Abstraction changes in the medium term relate to the current AMP7 WINEP programme and the latest EA licence capping guidance.

A summary of the scenarios being generated that are explicitly reported in the plan are summarised in Table D6.1:

Table D6.1 Draft Water Resources Plan 24 scenario summary

Enhanced	BAU+ Min to be included in the dWRMP24 baseline tables		Plausible Low
OFWAT high	+	BAU	OFWAT low
Used EA Waterbody Abstraction Tool (WAT) Outputs reviewed by water co's, adjustments made	Review European sites and associated licences – identify if additional reductions needed	Used EA Waterbody Abstraction Tool (WAT) Outputs reviewed by water co's, adjustments made	Start with baseline scenario (BAU+) and use local reviews to remove abstractions with significant uncertainty about whether the reduction is needed
Early reductions to include WINEP and licence capping guidance sustainability reductions (outlined in sections D2 to D5)			

The methodology we have used for the assessment of the longer-term potential abstraction impacts for the Draft Plan is described in the sections below.

D6. 3 Choice of scenario for our plan

In the WRW emerging plan WRW, including STW, set out a journey for an Enhanced environmental destination for our region but highlighted the uncertainty in the evaluation and included both the medium and longer term potential abstraction reduction impacts in scenario analysis to inform an adaptive plan rather than include it in or base plan.

We have gathered information, via a number of forums, on views of our stakeholders and customers. While these do not represent a statistical survey for our supply area, they are important feedback for us along with the views of our regulators. Table D6.2 provides a high-level summary of the feedback from key forums where we specifically asked for views relating to Environmental Destination. Appendix I describes our stakeholder and customer engagement in more detail.

Stakeholders are for the most part supporting an Enhanced destination. Customers were supportive but saying we need to consider the cost to customers.

For Severn Trent, as a whole the, BAU+ and the Enhanced scenarios are very similar. The volume of water being protected in the scenarios where there were designated sites or species are already high in the BAU+ scenarios so additional water for Enhanced protection is relatively small in the EA NF assessment. The areas where a potential need for Enhanced protection include Nottinghamshire (mostly the Idle catchment) in the east (~20Ml/d), Shropshire in the west (~6Ml/d) with small differentiations (~1Ml/d) in some other areas.

Table D6.2: High level summary view of stakeholder feedback on the level of ambition for WRW and STW.

Forum	View on level of Environmental Destination
WRW pre-consultation plan stakeholder workshop voting , Jan – Feb 2022	79% supported Enhanced, 15% BAU and 6% current regulations
Written consultation responses to WRW pre-consultation plan, Feb 2022	Stakeholders overall supporting an Enhanced destination
Written consultation responses	Stakeholders overall supporting an Enhanced destination
Deliberative research on strategic priorities, drought resilience and approach to the environmental destination (November 2021)	Views were initially mixed on which level of the ED they preferred, with the lowest level of ambition being least preferred. For those selecting level 1, cost is the main reason, as well as the balance with other challenges Severn Trent is facing. Level 2 was felt to be a middle ground, balanced and proportionate. Level 3 was felt to be required by some to address and urgent problem. When presenting more information on the trade offs involved including the wider environmental impact of new water sources around 1/3 of participants changes their view, with a mix of those selecting a lower level (influenced by the need to balance cost, the environment and carbon) and those choosing a higher level, reflecting the importance of the local environment.
Reconvened deliberative research on the environmental destination (May 2022)	We presented two possible approaches to tackling the environmental destination – an adaptive planning approach which included statutory investment in AMP8 as well as extensive investigations compared to more extensive investment in AMP8. With concern over the cost of living having risen since the initial research in November 22 we find a preference for the adaptive approach.
Quantitative research on the environmental destination and compulsory metering (May 2022)	Representative quantitative research with 1,000 customers including the bill impacts of the environmental destination. More customers (45%) support the adaptive approach compared to more extensive investment up front (42%) with 13% unsure. Reasons for supporting doing extensive investment now centre about doing the best for the future and the environment now and avoiding uncertainty, whilst those who support the adaptive approach focused on the benefit of doing investigations.
Meeting with NFU	Supportive of the need to manage abstraction but in a way that supports all abstractors. NFU and members would like to work more closely with us on alternative options / share water resources to mitigate any reductions.

For the dWRMP24 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 (29Ml/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 (~20Ml/d) and this catchment has been prioritised for early investigation to understand the needs of this catchment. 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.

By 2050 the BAU+ deployable output reductions increase to a total of c.442Ml/d. Measuring progress against the STW BAU+ environmental scenario deployable output reductions our plan presents 30% of the 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. 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.

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

D6.4 Methodology for development of the BAU and Enhanced scenarios

Waterbody Abstraction Tool analysis

The EA provided a copy of their Waterbody Abstraction Tool (WAT) to regional groups to aid analysis of the Environmental Destination scenarios and allow local review and refinement. This tool can be utilised to run the original NF scenarios outlined above. For the draft plan we commissioned Mott MacDonald to utilise an adapted version of the EA Waterbody Abstraction Tool (WAT) to generate source level licence reductions for the EA scenarios. These scenarios included Enhanced, (BAU+), BAU, Adapt and Combined. This is an automated process with set decision criteria and is useful to evaluate the potential scale of reductions, however, it is not suitable to make decision for individual sources. We have utilised data from the Enhanced and BAU scenario to develop the scenarios to include in our plan.

STWL reviewed the data for its groundwater sources and provided some revised input data to:

- Ensure group licences were apportioned appropriately across sources in the group, taking into account any sources that were non-operational.
- Applied a few corrections to annual licences.
- Provided recent actual data that aligned with dWRMP24 Medium WINEP scenarios for potential licence reductions.
- Set growth factors to 0 for the STWL groundwater sources. There were a mixture of negative and positive growth factors in the WAT data. STWL will manage the groundwater sources to ensure no deterioration so no growth has been assumed.

D6.5 STWL review of Waterbody Abstraction Tool outputs

Severn Trent undertook a review of the PWS source reductions provided by Mott MacDonald. A high-level summary of the review was been shared with the Environment Agency.

Surface water abstractions

The surface licences in each ledger were reviewed separately from the groundwater sources to determine the likelihood that the National Framework reductions included changes to surface water licence. In most cases the working assumption is that they have not, based on the assumptions the EA have stated in the National Framework. The assumptions included screening out if they were a reservoir (RESRVRFLAG), level dependant

(LDMU), a lake (LAK), or have a Q95 hands off flow (Q95HF); these reasons were explicitly flagged in the National Framework sheets. The methodology also indicated that they also screened our water bodies where upstream support was "COMPLEX support > SWABS impacts, these were not explicitly flagged in the data, but a view was taken that where support by regulation, such as the River Severn Abstractions, this applied to those abstraction points. The exception is made where 1) the scale of reductions appears to be significantly larger than can be accounted for by groundwater alone and 2) the surface water licences in the ledger have a Q95 WR impact that is non-negligible.

The Dove catchment was the only instance in which there is clear evidence that the original National Framework reduction has a large surface water component. This is due to the Egginton licence, the current HOF for which is set to protect Q98 rather than Q95, so a change in HOF is included in the EA scenarios. Due to the location near the bottom of the catchment and taking into account recent investigations which indicate that the ecology is not significantly impacted by the current hands-off flow, this has not been included in our assessment for our dWRMP24. This assumption was shared with the EA in Aug 21 (email 10/8/21).
We also reviewed the conditions we have on our surface water licences and the planned licence changes we have agreed to implement with the EA. We concluded that the surface water abstractions already contained environmental protection and not further changes have been assumed.

Reductions taken forwards
For the most part the groundwater reductions have been taken forwards for the operational sources at this time. Some overrides have been applied in the BAU and Enhanced scenario as follows:

- Screened out surface water abstraction reductions for abstractions with HOF, complex river support or HMWB measures (assessment undertaken on original National Framework dataset and summarised above);
- Tame Anker and Mease / SG WRZ: No reduction on Edgbaston as it is in the wrong ledger area in the EA's WRGIS;
- Worcestershire Middle Severn / SG WRZ: A quarter of the licence reductions has been assumed for the Bromsgrove sources that were set to 0, to prevent urban flooding, assume would increase compensation support (Burcot, Wildmoor and Sugarbrook). Reductions reduced by 15.84Ml/d.

European Protected sites review
As outlined above there is a requirement, from the EA for England, to include a + element to the BAU scenario.

> **"It also includes applying Common Standards Monitoring Guidance (CSMG) flow targets at European designated riverine sites by 2050 at the latest."**

We have undertaken a review comprising the following steps:

- Mapped up the location of our abstractions in relation to European designated riverine sites for our region. Identified sources that could potentially impact these sites
- Reviewed the NE CSMG guidance for rivers (https://data.jncc.gov.uk/data/1b15dd18-48e3-4479-a168-79789216bc3d/CSM-Rivers-2016-r.pdf)
- Reviewed the NE catchment specific documents "Moving towards common monitoring guidance targets"
- Expert view discussion in STW's Hydrology team

For STW most European designated riverine sites relate to regulated rivers and a range of abstractors benefit from these rivers. Abstraction and flow is very complex and requires modelling to get to a target and solution. We will need to discuss with regulators if the existing habitats directive reviews provide the required protection. Based on the review STW are not including any additional reductions but we need to take the

summary of the review to our English environmental regulators EA and NE. The review is summarised in Table D6.3. Any changes, if required, will need to be incorporate between draft and final plan.

Table D6.3: Summary of Riverine SAC review relating to STW abstractions

SAC/SPA	Abstractions	BAU+ scenario
Severn Estuary	River Severn surface water abstractions. Regulated river. Extensive modelling, multi abstractors (PWS and Non PWS) for review of consents	No additional reductions included
Humber Estuary	River Trent catchment abstractions STW abstractions covered already in downstream HoF	No additional reductions included
River Dee	Regulated river, multi abstractors (PWS and Non PWS)	No additional reductions included
River Wye	Looked at individual CMSG targets for this river – these were developed after review of consents and targets seem to align with RoC	No additional reductions included
Peak District Dales Rivers (Derwent R Wye and upper R Dove)	No STW abstraction in this area – a few long disused sources to be considered for revocation.	No additional reductions included
River Meace	No abstraction close to river – STW is undertaking a project to relocate STW discharges.	No additional reductions included
R Clun/ R. Teme	Riverine SAC where STW has limited information on flows. Severn Trent have 1 small groundwater source (Clungunford) located upstream of site, this does not have HoF or other conditions on the licence. However, CMSG targets doc for 2014 comment from EA states The Clun and Upper Teme are considered fairly natural, there are no known large abstractions or discharges in that catchment. No existing investigation for the Clungunford source to determine if the abstraction is impacting or CMSG targets are being met.	No additional reductions included DCWW have been investigating their Leintwardine source in the AMP7 WINEP for this catchment.

D6.5.1 Ofwat low scenario

On the 3 May the EA and OFWAT clarified their definition of the OFWAT low scenario.

> **"low scenario which is 'currently known legal requirements'. The latter is being applied in the regional plan reconciliation process using the Environment Agency EA's national framework BAU+, then using local review to take out proposed licence changes with significant associated uncertainty. All these scenarios should include agreed WINEP changes and licence capping."**

There is considerable uncertainty in the longer-term National Framework scenarios as outlined above. Other factors may limit the resilience of the water environment e.g. water quality related pressures, flood defence measures etc.

This aside this data is the best current information for regional groups to be using to develop scenarios relating to potential abstraction reductions in the longer term to protect the environment in a changing climate. To this end a range of scenarios are being considered in the company and regional WRMPs.

WRW has considered how to define and evaluate uncertainty to generate an OFWAT low scenario. The timing of the guidance on the OFWAT low has resulted in the development of a methodology that could be implemented to inform the interregional reconciliation underway in May 2022 and will also inform the dWRMPs. This evaluation may be developed further ahead of the final WRMPs due to be published in 2023.

It should be noted that we are seeking a plausible low scenario so we can test a range of scenarios in the regional plan. Some fairly conservative assumptions have therefore been made in order to achieve a differentiation between the low and the BAU+ scenario. STW has applied the WRW methodology to the PWS abstractions

Ofwat low methodology summary

A number of data sources and principals have been utilised to generate the OFWAT low scenario. This section describes the data sources and the methodology that was developed though WRW to ensure a consistent framework across all water companies in the WRW region.

The Waterbody Abstraction Tool

The EA Waterbody Abstraction Tool (WAT) has been used to generate 2050 scenario abstraction reductions, assuming abstraction is the sole action to deliver environmental destination. This tool uses Environmental Flow Indicator (EFI) flow targets to then calculate abstraction reductions needed to achieve the flow target. These reductions are calculated for both PWS and non-PWS abstractions.

The Environmental Flow Indicator

The Environmental Flow Indicator (EFI) has been developed by the EA as a national screening tool to determine the amount of flows required to support the environment (good WFD status) and is used as the initial step in the development of abstraction management policy for England. Within its evaluation methodology the EA acknowledge uncertainty in the assessment. A description of this uncertainty is summarised here (Source EA Environmental Flow Indicator paper Jan 2013[1]):

> **"The EFI is used in the hydrological classification for WFD to identify the water bodies where reduced river flows may be causing or contributing to a failure of good ecological status. This is called the compliance assessment. Compliance has been assessed at low flows (Q95) using recent actual scenario.**

[1] http://www.hwa.uk.com/site/wp-content/uploads/2017/12/SWCD11.5-EA-Guidance-on-EFI-January-2013.pdf

The compliance assessment shows where specific scenario flows are below the EFI, and indicates by how much. This is used to identify areas where flows may not be supporting good ecological status and target further investigation of what measures are needed to achieve good ecological status.

The degree of non-compliance has been split into three compliance bands, each band indicating the certainty that flow conditions do not support good ecological status. The compliance bands help to prioritise action where the abstraction pressure, and therefore the risk of not supporting good ecological status are greatest. The percentage below natural flow for each compliance band is shown in Table 3."

Figure D6.5: EA Table 3 in the EA Environmental Flow Indicator paper Jan 2013

	Flow adequate to support GES	Flow not adequate to support GES: Low to Moderate Confidence (uncertain)		Not adequate to support GES: High Confidence (quite certain)
Abstraction Sensitivity Band	***Compliant with EFI***	***Non-compliant Band 1*** (up to 25% below the EFI at Q95)	***Non-compliant Band 2*** (25-50% below the EFI at Q95)	***Non-compliant Band 3*** (up to 50% below the EFI at Q95)
ASB3. high sensitivity	<10%	<35%	<60%	>60%
ASB2. moderate sensitivity	<15%	<40%	<65%	>65%
ASB1. low sensitivity	<20%	<45%	<70%	>70%

Table 3: The percentage difference from natural flows for each compliance band and how this relates to supporting good ecological status (GES). Percentages given are the range below natural flow for the relevant abstraction sensitivity band.

The EFI guidance also allows for the development of local flow requirements where there is sufficient evidence to do so. Tools such as hydro-ecology models or similar frameworks have and can be developed to improve the understanding of the needs of the catchment and flows required to support a healthy ecosystem.

We have utilised this uncertainty in the OFWAT low methodology we have adopted.

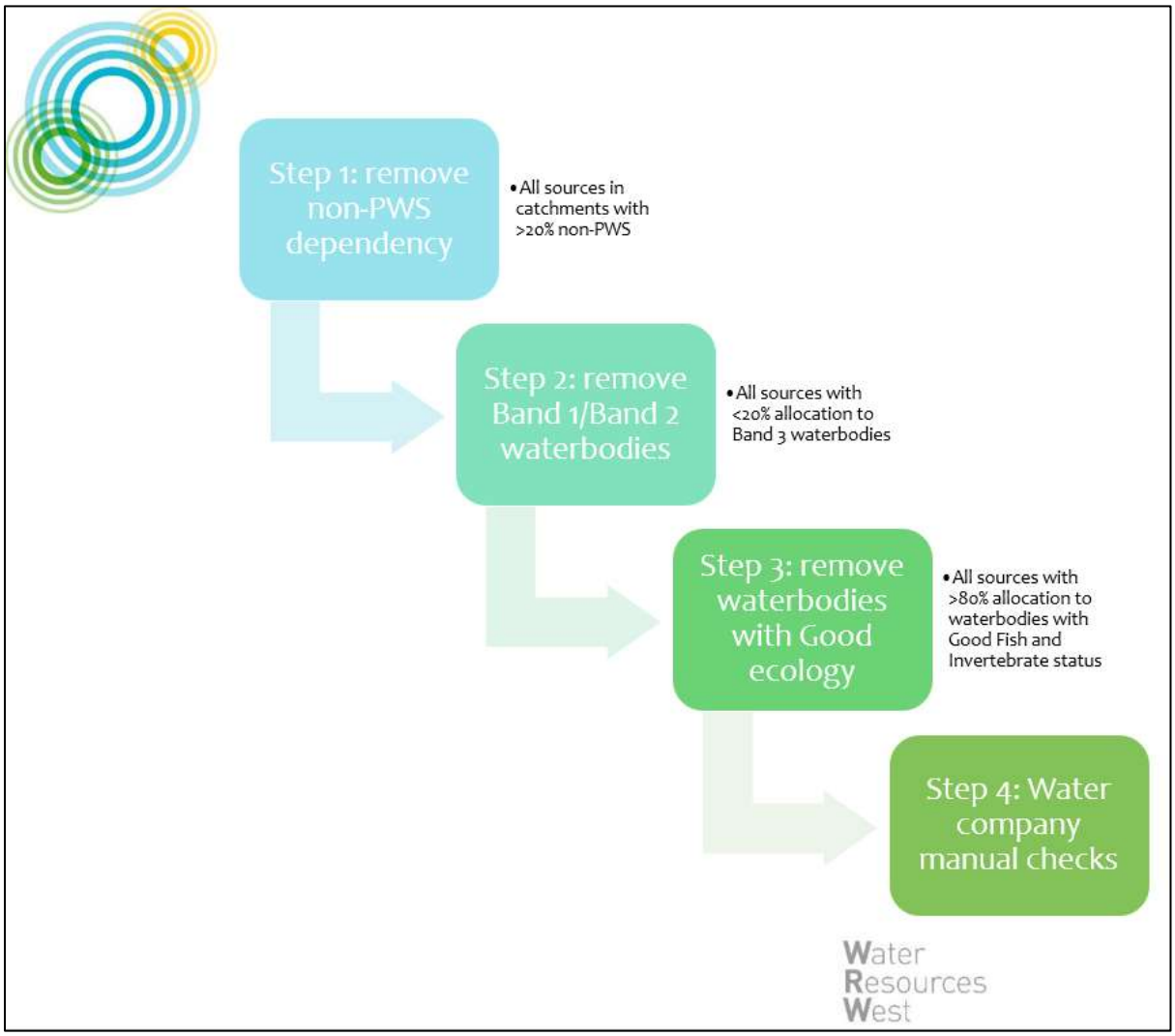
D6.5.2 WFD RBMP Cycle 3 water body assessments

Each waterbody has a WFD classification (RBMP3) and we will use this data to aid the uncertainty assessment. Flows are a supporting element to WFD classification. The WFD 'Supports good' element may be Supports Good, Does not Support Good or Blank (usually for AP's). A waterbody can be assessed as good status, even if the flow element does not support good, if other indicators are assessed as good or high. The latest WFD assessment has also been utilised in the OFWAT low methodology we have adopted.

Methodology summary

We used a four-step process for identifying reductions with 'significant uncertainty' that should be removed from the Ofwat Low scenario as summarised in Figure D6.6.

Figure D6.6: Methodology to develop the OFWAT low scenario for the long term Environmental Destination



Data sources utilised include:

- National Framework BAU PWS and Non-PWS reductions from the EA Waterbody Abstraction Tool (Mott MacDonald outputs for WRW)
- Flow compliance bands for 2050 BAU scenarios prior to any licence reductions (takes into account the climate change perturbed flows and proportionally adjusted ABS flow targets)
- Groundwater abstraction allocation to 5 surface waterbodies (from Waterbody Abstraction Tool)
- WFD classification assessment (Cycle 3) for WRW surface waterbodies
- WFD Groundwater body balance test (2019 assessments)

These have been collated to support the analysis.

Step 1: Remove lines with significant levels of non-PWS dependency

In catchments where a significant proportion of the reductions needed to meet the 2050 EFI are in non-PWS sectors there is considerable uncertainty as to the benefits of the allotted PWS reductions without a clear process for ensuring Non-PWS reductions are also implemented.

Initial screening is undertaken at an EA CAMS ledger area scale to identify catchments with significant non-PWS abstraction. These reductions have been screened, removing any ledger areas that have >20% of the total reduction attributed to non-PWS.

For the ledgers that would fall out under this criterion a more detailed review is undertaken to determine the abstraction pressures in the surface water bodies that the PWS abstractions influence. If PWS abstraction dominates these waterbodies then the ledger area would not be screened out and be taken forward to step 2.

Step 2: Remove lines where reduction is driven by recovery from Band 1/Band 2 waterbodies

The flow compliance data set as our starting point is the Waterbody Abstraction Tool 2050 flow compliance bands pre any abstraction reductions. This 2050 EFI has been adjusted for the climate change scenario utilised for the National Framework assessment.

As noted in Section 3 above, the EFI methodology assigns a rating of "Quite Certain" that flows do not support Good Status to Band 3 non-compliant waterbodies, but a rating of "Uncertain" to waterbodies in Band 1 and Band 2. We have therefore screened out any reductions that are predominantly driven by recovery to the EFI in these waterbodies, as there is uncertainty about whether the flow regime does or does not support Good Status.

We have removed from the Ofwat Low scenario any source that has <20% allocation[2] to Band 3 non-compliant waterbodies.

Step 3: Remove lines where flow-sensitive ecological elements are currently at Good status or better

The Cycle 3 WFD assessment is based on monitoring data based on recent assessment. Some waterbodies have flows that are not compliant with the EFI but nevertheless are at Good status for flow-sensitive ecological elements (Fish and Invertebrates). This implies that the current hydrological regime does in fact support Good status, despite failing the EFI compliance test. There is therefore significant uncertainty that further flow reductions are required in such waterbodies, and we have accordingly screened them out of the Ofwat Low scenario.

All sources with >80% allocation to waterbodies with both Fish and Invertebrate status of Good or High are screened out.

Step 4: Water company review

The final step of the screening process for Ofwat Low is for water companies to review the screening steps and the list of sources that have been included and excluded and make any further manual changes based on local information. Sources may be screened out or back in at this stage.

In addition during this review the scale of reductions from individual sources can be adjusted and justification provided for any changes to the reductions included in the Waterbody Abstraction Tool outputs.

Calculation of groundwater source DO numbers post sustainability reductions

Alignment of WINEP/licence capping short to medium term reductions with the longer term Environmental Destination reductions has been undertaken. For this review we have used the potential new average licences from the Waterbody Abstraction Tool (BAU and Enhanced), the WINEP/licence capping scenarios (High, Medium and Low DO) and the OFWAT low scenario.

[2] Groundwater abstractions are given a percentage allocation to up to five waterbodies, whereas surface water abstractions are generally allocated to the single waterbody in which they are located

The WFD recent actual baseline numbers, that are in the process of being finalised with the Area EA, are used to develop the licence capping scenarios. Separately the EA Waterbody Abstraction Tool has been used to generate the longer term licence reduction numbers. The reductions from both data sets do not always align; we would expect the first reduction to be based on the WFD recent actual baseline and then a lower cap due to the Environmental Destination scenario. This is not always the case as they have been derived separately therefore the lowest value of the WINEP/ licence capping or ED is taken forward for the longer term deployable output number. The potential new annual licences are assumed to be the future ADO for the sources.

Groundwater source deployable output reduction results

The sum of the groundwater source BAU+ deployable output (DO) reductions, below the current PR24 average deployable output (ADO), for each WRZ is summarised in Table D6.4 below. Table D6.5 summaries all the longer term Environmental destination scenarios. Note this table also include 75%, 50% and 25% BAU scenarios which have also been used to develop the adaptive plan.

Note, these reductions are a sum of calculated groundwater source level reductions. For the larger water resources zones (WRZ) the zonal deployable output is calculated using the water resources Aquator model that gives an average deployable output for the source utilised in combination. These latter results are reported in section D7 and D8.

Table D6.4: Summary of groundwater source DO reductions by WRZ for the earlier regulator needs and the BAU+ scenario

Water Resource Zone	DO loss due to licence Capping and No Det	Further DO reductions to achieve BAU ED by 2050	Total DO losses 2050
Bishops Castle	1.22	0.94	2.16
Chester	0.08	0	0.08
Forest and Stroud	3.76	4.71	8.47
Kinsall	1.31	0	1.31
Mardy	0.74	2.57	3.31
North Staffordshire	43.91	72.86	116.77
Ruyton	0.78	0.49	1.27
Shelton	44.57	42.22	86.79
Stafford	3.45	13.51	16.96
Whitchurch and Wem	3.73	0.36	4.09
Wolverhampton	7	15.74	22.74
Notts	71.51	59.58	131.09
Newark	2.47	1.44	3.91
Strategic Grid	29.25	48.23	77.48
Total	**213.78**	**262.65**	**476.43**

Table D6.5: Summary of all scenario ADO source reductions including the earlier regulatory reductions) for scenarios by WRZ

Water Resource Zone	Total ED reductions in the longer term, this includes the earlier WINEP/licence capping reduction assumptions included in Table D6.4.					
	Enhanced	BAU (+)	Ofwat Low	BAU 75%	BAU 50%	BAU 25%
Bishops Castle	2.28	2.16	1.22	1.92	1.69	1.45
Chester	0.08	0.08	0.08	0.08	0.08	0.08
Forest and Stroud	10.79	8.47	3.76	7.15	5.84	4.65
Kinsall	5.60	1.31	1.31	1.31	1.31	1.31
Mardy	3.12	3.31	0.74	2.67	2.02	1.38
North Staffordshire	116.77	116.77	90.75	97.78	78.79	60.55
Ruyton	1.27	1.27	0.78	1.15	1.02	0.90
Shelton	88.67	86.79	79.02	75.49	64.18	52.88
Stafford	17.19	16.96	16.96	13.58	10.20	6.83
Whitchurch and Wem	5.37	4.09	4.09	4.00	3.91	3.82
Wolverhampton	22.74	22.74	22.74	18.80	14.87	10.93
Notts	150.96	131.09	99.97	112.12	93.49	80.09
Newark	3.91	3.91	3.41	3.55	3.19	2.83
Strategic Grid	76.92	77.48	47.44	64.89	52.30	39.79
Total	**505.67**	**476.43**	**372.25**	**404.48**	**332.89**	**267.49**

D7 Scenarios modelled in water company water resource models

The scenario source deployable output numbers have been used as model inputs to the Severn Trent water resource model, Aquator. This modelling has followed the methodology described in the Supply Forecast methodology outlined in Appendix A. Seven of Severn Trent's fifteen water resource zones have a modelled deployable output using the Aquator water resources model. The remaining eight water resource zones are calculated in the tables by summing the individual source potential sustainability reductions.

For WINEP / licence capping two scenarios were rerun for the draft plan, the medium and low DO. These were run for both the 1:200 and the 1:500 drought resilience. These figures were included in the baseline SDB tables with the exception of North Stafford where the DO impact from the model was significantly lower than the reduction model inputs. There was concern that the model detail would not reflect local or resilience issues and that the more conservative sum of the source DO reductions should be taken forwards at this time. Further work to refine the assessment for the Staffordshire zone will be required for the final WRMP. The model results are summarised in Table D7.1.

Table D7.1: Aquator model deployable output reductions for WINEP and licence capping scenarios

WINEP/licence capping scenario	WRZ						
	Strategic Grid	Notting-hamshire	Newark	North Staff	Shelton	Wolver-hampton	Forest & Stroud
Mid WINEP2030 impact on 1 in 200 DO	-34.66	-48.59	0.00	-2.45	-27.00	-1.93	-0.36
Low WINEP2030 impact on 1 in 500 DO	-31.70	-44.45	0.00	-20.95	-45.00	-3.58	-0.25

*Modelled WINEP impacts are not used in dWRMP24 table for NStaff

For the longer term Environmental Destination, three scenarios were run in the Aquator model, (Enhanced, BAU+ and low) to evaluate the range of modelled deployable output reductions. For these Environmental Destination scenarios the modelled deployable output impacts were far higher than the sum of the individual source deployable output numbers. Upon review of where the Aquator model was failing, it was concluded that the Aquator model results were not representative of the water resource pressures, due to network connections leading to demand centre failures; essentially the STW system is not configured to be able to move water around when there are such large sustainability reductions included in the modelling (or on the ground) and this breaks the modelled definition of the water resource zone. It was therefore decided that the sum of the source deployable output numbers would be included in the SDB tables for the longer term as a representative way of representing the scale of impact and water resource solution investment required. Additional investment in the supply network / assesses has not yet been assessed or costed and will need to be evaluated as part of the proposed AMP8 WINEP Environmental Destination investigations and options development work programme. The model results are summarised in Table D7.2.

Table D7.2: Aquator model deployable output reductions for 1:500 Environmental Destination (DO reductions in addition to the WINEP and license capping scenarios in Table D7.1)

WINEP/ licence capping scenario	WRZ						
	Strategic Grid	Notting-hamshire	Newark	North Staff	Shelton	Wolver-hampton	Forest & Stroud
Enhanced ED	-222.88	-312.46	0.00	-116.27	-122.00	-17.42	-2.05
50% Enhanced ED	-93.14	-130.57	0.00	-57.90	-73.00	-9.84	-0.25
BAU ED	-215.52	-302.14	0.00	-116.27	-122.00	-17.42	-1.54

Note: None of these modelled ED impacts are used in dWRMP24 table

For the shorter term regulatory requirements we have included assumption around our AMP7 WINEP programme and conservative assumptions based on the latest EA WFD No Deterioration guidance which outlines the licence capping approach. 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.

In forming the longer term Environmental Destination scenarios for the draft plan we have accepted that the best available tool for developing scenarios at this time is the EA's Waterbody Abstraction Tools spreadsheet. The information has considerable uncertainty and is not sufficient to inform source level reductions but is useful to develop potential future scenarios to inform an adaptive plan in relation to potential environmental needs. It should not be interpreted that we are planning to implement or are signing up to any of the licence

changes we have included in the scenarios to be modelled in our dWRMP24. They are purely scenarios to show the possible scale of impact. A comprehensive investigation plan should be included in the AMP8 WINEP to reduce the uncertainty in the assessments.

There are some earlier licence change commitments and where we have agreed and committed to these they are described specifically.

Environmental Destination sets out the plan for water resource deployable output reductions from 2025 through to a long-term plan for 2050 and beyond. Significant demand reductions and/or water source development as well as investment in the water resources assets and the supply network would be needed to enable the scale of licence changes we have modelled to be implemented. These elements, taking into account other water resource pressures for our plan, are described in Appendix G.

D8 Environmental Destination deployable output reductions evaluated in plan

The impacts of environmental improvements and no-deterioration licence capping for each water company in WRW are summarised in Table D8.1 below.

In the catchment where there are proposed licence reductions there are also non-PWS abstractions. In most catchments action will be required by all sectors. 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.

Table D8.1: Deployable output reductions (Ml/d) for environmental enhancements and environmental protection.

Resource Zone	2024-25	2030-31	2035-36	2040-41
Bishops Castle	0.00	0.00	0.00	1.22
Chester*	0.00	0.00	0.08	0.08
Forest and Stroud	0.00	0.36	0.36	0.25
Kinsall*	0.00	0.49	0.49	0.49
Mardy	0.00	0.74	0.74	0.74
North Staffordshire	0.00	22.58	22.58	43.91
Ruyton	0.00	0.00	0.00	0.78
Shelton	0.00	27.00	27.00	45.00
Stafford	0.00	0.00	3.45	3.45
Strategic Grid	0.00	34.66	34.66	31.70
Whitchurch and Wem*	0.00	3.73	3.73	3.73
Wolverhampton	0.00	1.93	1.93	3.58
Newark	0.00	0.00	0.00	0.00
Nottinghamshire	0.00	48.59	48.59	44.45
Rutland	0.00	0.00	0.00	0.00
Total	0.00	140.08	143.61	179.37

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

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 we have assessed these. In addition, a low scenario has been generated by removing reductions with the greatest uncertainty.

In addition to public water supply abstractions there are also licenced 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, currently the achievement of the Environmental Flow Indicators (EFI's) in 2050, will be dependent upon complementary licence modifications to be undertaken by the Environment Agency from 2030 onwards.

Table D8.2 below shows the range of Environmental Destination scenarios WRZ deployable output reductions. A positive number shows a reduction in the deployable output relative to the WRZ deployable output. The BAU+ scenario has been included in the baseline tables.

Table D8.2: Environmental Destination scenarios reductions relative to WRZ deployable output

Resource Zone	Early regulatory needs	2050 BAU+		2050 OFWAT Low		2050 Enhanced	
	7.2BL (Ml/d)	ED 7.3BL (Ml/d)	Total (Ml/d)	ED reduction in addition to earlier reg. needs	Total (Ml/d)	ED reduction in addition to earlier reg. needs	Total (Ml/d)
Bishops Castle	1.22	0.94	2.16	0.00	1.22	1.06	2.28
Chester	0.08	0.00	0.08	0.00	0.08	0.00	0.08
Forest and Stroud	0.25	4.71	4.96	0.00	0.25	7.03	7.28
Kinsall	0.49	0.00	0.49	0.00	0.49	4.29	4.78
Mardy	0.74	2.57	3.31	0.00	0.74	2.38	3.12
North Staffordshire	43.91	72.86	116.77	46.84	90.75	72.86	116.77
Ruyton	0.78	0.49	1.27	0.00	0.78	0.49	1.27
Shelton	45.00	42.22	87.22	34.45	79.45	44.10	89.10
Stafford	3.45	13.51	16.96	13.51	16.96	13.74	17.19
Strategic Grid	31.70	48.23	79.93	18.19	49.89	47.67	79.37
Whitchurch & Wem	3.73	0.36	4.09	0.36	4.09	1.64	5.37
Wolverhampton	3.58	15.74	19.32	15.74	19.32	15.74	19.32
Newark	0.00	1.44	1.44	0.94	0.94	1.44	1.44
Nottinghamshire	44.45	59.58	104.03	28.46	72.91	79.45	-23.90
Rutland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	179.37	262.65	442.02	158.49	337.86	291.89	471.26

D9 Catchment evaluation

D9.1 Introduction

The development of the Environmental Destination for Severn Trent and WRW will be an iterative process and this methodology is focused on establishing the first version of Environmental Destination for the region.

For England, the EA National Framework (NF) high level assessment has been provided to aid understanding of the potential current regulatory pressures (baseline) and potential longer term pressures (2050 and beyond) on abstraction licences. The EA guidance highlights the need to consider abstraction pressures, however, a holistic range of measures is also encouraged.

For Wales, the NRW guidance is seeking a holistic approach and alignment with other Welsh priorities.

A WRW Environmental Destination methodology was agreed in 2020 to ensure consistency of approach between the different water companies within WRW. Following this WRW convened a Task and Finish Group for Environmental Destination which included representative from the water companies, EA, NRW and the EA to support the development of the WRW approach for Environmental Destination and allow review and discussion of analysis.

A supplementary methodology note, supporting the WRW environmental destination methodology, has been utilised to identify short to medium term no regret actions to improve the water environment where there is evidence of impact from an abstractor's water resource activities. The aim is to make the water environment more resilient to external pressures, such as drought and climate change, and/or improve water body status which will add short term value to our regional plan. Where possible we are seeking multisector catchment opportunities including water resource options for the short to long term. The main elements of the methodology supplementary note are outlined in this section and Section D13 for Wales.

The longer term risk and actions will require further evaluation, the scale of potential impacts from a dry climate change scenario is significant and so we need to ensure the most appropriate future river flow scenarios are utilised. Companies are likely to run a detailed investigation programme over the next 5 to 10 years to consider hydroecology and catchment resilience needs and how this can be balanced against the resilience of water supply across sectors and affordability. This investigation programme will form part of the short term measures needed to achieve the environmental destination.

The size of the WRW region means that it is not feasible to give the same level of assessment to all catchments at this time. To this end STW worked with WRW to review and prioritise at management catchment scale in England, to align EA ledger areas and with the Catchment Based Approach (CaBA) stakeholder groups. As similar prioritisation process was undertaken for Wales which is described in this section with the results summarised in Section D13; Environmental Destination for Wales.

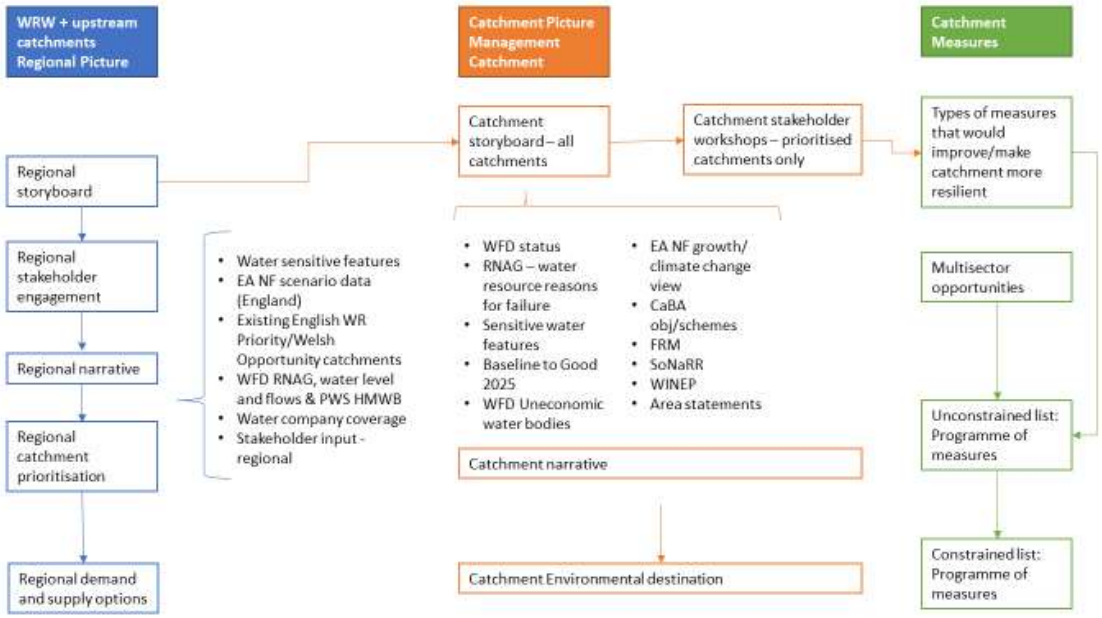
We have identified short to medium term no regret actions to benefit the water environment, with identifiably linked water resource benefit, in our region along with areas to focus further investigations.

This section outlines the methods used to:

1. Undertake regional catchment prioritisation in England, or areas of opportunity in Wales, across the region.
2. Undertake in-catchment characterisation and prioritisation. To generate an unconstrained list of potential options/measures (Tier 1 assessment).
3. To further develop an unconstrained list of options in some prioritised catchments to determine a constrained list of options and an investigation action plan (Tier 2 assessment).

An overview of the concept of points 1 to 3 is provided in Figure D9.1.

Figure D9.1: Overview of development of WRW Environmental Destination catchment characterisation and option development



For England, potential longer term water resource actions have been considered through scenario analysis where licence reduction assumptions are made using the EA National Framework data as a guide (see sections D2 to D8 above). Further investigations are likely to be identified to reduce the uncertainty in this assessment to inform the adaptive management plan for each catchment and the region.

The term "WRW catchments" includes the catchments in the WRW boundary and the upstream catchments in Wales. The Idle and Torne and Lower Trent and Erewash catchments originally lay in the Water Resources East (WRE) boundary but are part of the Severn Trent supply area, these catchments have now been moved into WRW.

Our process considered both (1) regional catchment prioritisation (England) and areas of opportunity (Wales) and (2) in catchment characterisation and prioritisation. These are defined as follows:

- Regional catchment prioritisation: To undertake a high-level characterisation and prioritisation of all WRW catchments, including associated upstream or supply area catchments, using readily available data sources. This was undertaken at a Water Framework Directive (WFD) management / Catchment Based Approach (CaBA) catchment scale. This identified the catchments to be prioritised for action in England for STW;

- Areas of opportunity: In Welsh catchments the NRW guidance indicated that we should identify opportunities to improve water resources management and seek to align with existing catchment projects and partnerships to maximise benefits. This identified the sub catchments/ areas that could be prioritised for action in Wales;

- In-catchment characterisation and prioritisation: To characterise and report on each catchment area and identify the ranges of measures that may be appropriate to protect and enhance water resources. This set out the water resources features, pressures and an unconstrained list of actions that could improve the catchment and make it more resilient to future changes.

D9.2 Regional Catchment Prioritisation

We worked with WRW to look at our region and to consider how we can prioritise work in relative to our supply area. The prioritisation is based on a numerical scoring assessment of datasets (see Table D9.1), weighted to give an overall ranking. A moderation stage then allowed stakeholder input that supported or overrode the numerical results. The reasons for any moderation were documented before being taken for approved by the multi-sector WRW senior management group. These elements of prioritisation are explained in turn below.

The steps followed were:

1. A numerical assessment per catchment

A numerical assessment has been undertaken using the datasets summarised in Table D9.1. Catchments have been scored against these criteria on a scale from 0 to 1.

2. A weighted overall prioritisation calculated

The weighting of these factors was reviewed in two separate England and a Wales workshops in June 2021. These workshops included a range of external stakeholders. The organisations represented are summarised in Table D9.2 below.

Other comments were also captured in the workshop which were also considered in the regional Stakeholder engagement in step 3.

3. Stakeholder engagement evaluation

The main stakeholder forums that supported the assessment are show in Figure D9.2 below

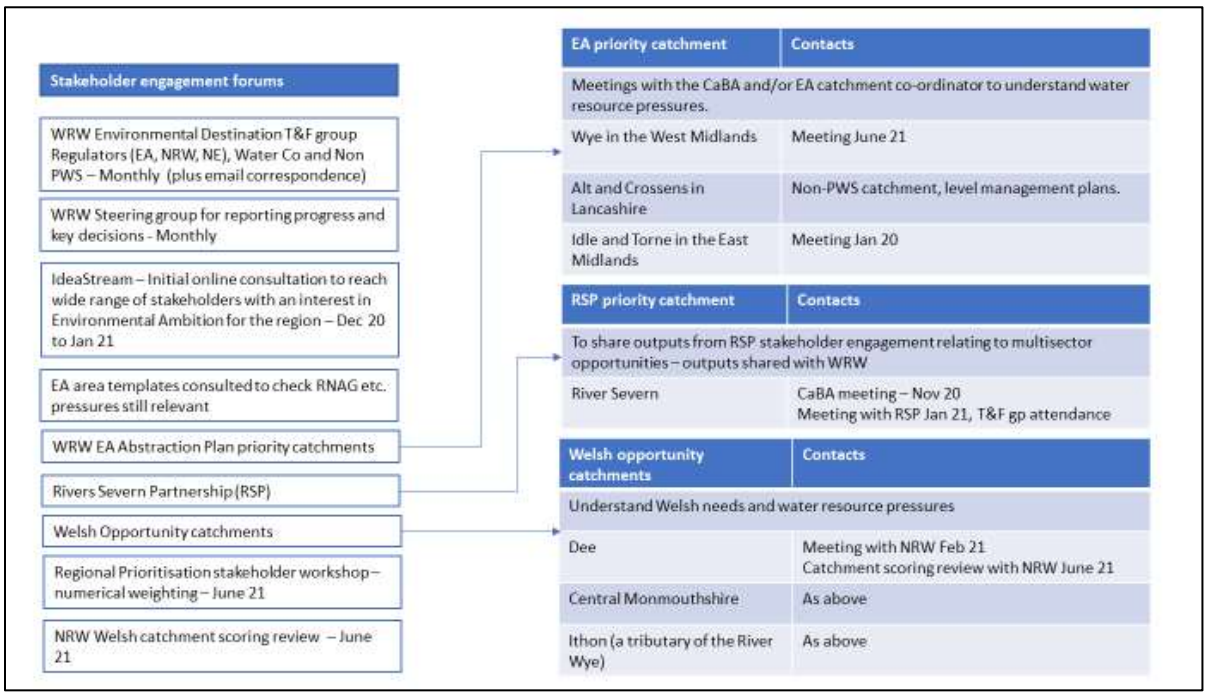
Table D9.1: Summary of Regional prioritisation data sets and the indicator area

Data set	Indicator area
Water sensitive features (protected areas, SSSIs, GWDTE, Salmonid Rivers)	These data sets give an indication of the relative water related environmental value in catchments at this time. Some initial screening has been undertaken to identify those which have water supported habitats that could therefore be potentially impacted by abstraction. At this time we do not hold a spatial data set to be able to include water related protected species, priority habitats or locally important features. This data will be collected for the prioritised catchments as evaluation progresses. Salmonid River: Represented by NF Enhanced waterbodies classification in England, Wales using the 20/21 at risk status. SAC rivers were given additional weighting.
EA National Framework (NF) scenario data with some initial adjustments following review by water companies	These data sets give a view of the potential sensitivity / scale of abstraction license reductions that may be required in the longer term to adapt to the pressures of climate change and growth. This included the water company reductions, with some adjustments, and the non-PWS abstraction reductions, no adjustments made. It should be noted that all catchments are potentially significantly impacted by climate change in the longer term.
Climate Change Risk Assessment data for Welsh catchments	The National Framework assessment was only undertaken for English catchments. For Welsh catchments we have used the CCRA data to give an indication of future pressure on water resources in the longer term. Following stakeholder consultation it was determined not to use this in the scoring.
Existing Water Resource Priority/Opportunity catchments	The English Priority catchments are areas where the Defra and the EA have identified significant catchment pressures and have included them in their Abstraction Plan to take a catchment based approach to achieving sustainable abstraction. The Welsh Opportunity catchments are areas that NRW has selected where the best suite of opportunities for addressing WFD objectives and wider SMNR and well-being outcomes have been identified. This has only been used where water resources has been identified as a driver.
WFD reasons for failure – RNAG 2015, PWS (Water levels/flows, Physical modifications)	This data is used to represent the flow pressure as determined in the WFD 2015 assessment. Similarly the assumption is that HMWB pressures will be picked up via RNAG e.g. RNAG Water Industry/Flow and Level pressure. The water companies will screen this data to determine if the pressure is likely to have been resolved though WINEP and may use this as a justification to deprioritise a catchment.
Heavily modified water bodies - HMWB (PWS)	Significant work has been undertaken to optimise the measures to support the environment from water company HMWBs as part of the WFD review. There may be further opportunities to support and enhance the environment while retaining the PWS purpose of these water bodies.

Table D9.2: Stakeholders supporting regional prioritisation workshops to finalise numerical weighting

Sectors	Organisations represented
Water companies and WRW	Welsh Water, Severn Trent Water, South Staffs Water and UU.
NGOs	Rivers Trust Wales, Welsh Dee Trust and the Wye and Usk Foundation
Non-PWS abstractors	Canal and Rivers Trust (CRT), Chemical Industries Association, Confederation of Paper Industries (CPI), Coal Authority, National Farmers Union (NFU) Wales, NFU West Midlands
Consultants	Stantec and APEM who are undertaking the evaluation with WRW

Figure D9.2: Stakeholder engagement forums to influence regional catchment prioritisation



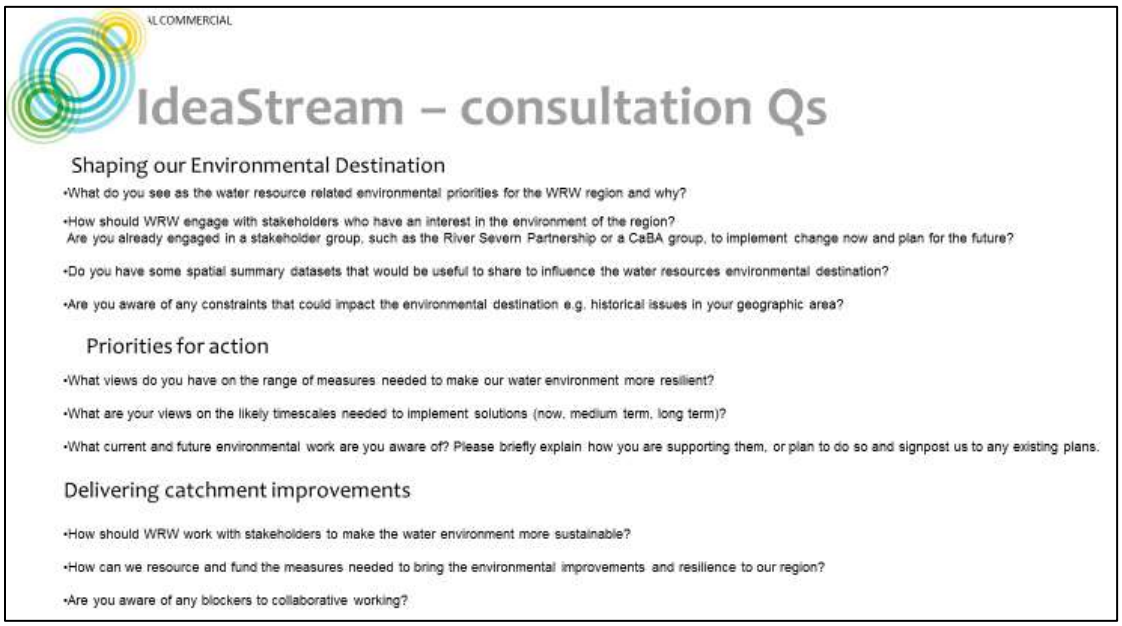
Water Resources West's initial resource position set out the main strategic themes and influences on the WRW plan. The themes included Climate Change, Population Growth, Economic Growth, Environmental Considerations and Amenity and Recreation. Feedback from consultation included, alongside a general welcome for the approach, the highlighting of some themes:

- Environmental implications/ambition
- Integrated catchment management including multiple benefits
- Changes in farming- and how they are accounted for
- Reservoirs for flood- getting the balance right
- Cultural heritage
- Archaeological sensitivity- such as ancient woodlands/ wetlands

These themes will need to be addressed in a number of places in the WRW and our WRMP plans, for example including catchment options in the environmental destination and water resource supply options workstreams.

WRW subsequently undertook an online consultation asking stakeholders a number of questions to help shape the environmental destination for the region. Figure D9.3 lists the questions asked in this consultation.

Figure D9.3: IdeaStream Environmental Destination consultation questions, Dec 20 – Jan 21



Responses were received from 33 organisations or individuals, summarised by sector in Table D9.3 as follows:

Table D9.3: Number of IdeaStream Environmental Destination consultation responses by sector

Sector	No. responses
Charities	2
Environmental	11
Farming	4
Internal Drainage Board (IDB)	1
Local Government	11
Non PWS	1
Other (individuals)	3
Grand Total	**33**

These responses include national-level organisations and area-specific responses. Table D9.4 show the number of responses grouped these by relevance to the different water companies in WRW.

Table D9.4: Number of IdeaStream responses grouped by water company area

Area	Water company	No. responses
Midlands	STWL/SSW	11
North West	UU	11
Wales	STWL/DCWW	6
National	all	5

The main themes from the responses were:

- Flooding was raised as an environmental priority across stakeholder groups along with reducing demand and increasing water efficiency.
- Early stakeholder engagement and effective communication are important across stakeholder groups.
- There are many opportunities for collaborative working with existing stakeholder groups. There are a number of ongoing projects / funding streams with similar ambitions. Waterwise and local government are particularly keen to work with WRW and this was mentioned in several of their responses.
- A lack of available funding and resources has been highlighted by a number of stakeholders as limitations to collaborative working. This will need to be considered when preparing surveys and organising engagement activities to get the most from stakeholders.
- A range of measures were suggested to make the water environment more resilient. Again, flooding and water storage were mentioned across stakeholder groups.
- The NFU responses were almost identical and consistently reinforced their desire to see flexible licencing, increased on-farm water resilience measures and grant schemes.

The EA and NRW guidance and the Environmental Destination Task and Finish Group feedback was also considered. This information has been used to inform the regional prioritisation relating to current catchment pressures and opportunities. The stakeholder feedback was also considered for in catchment prioritisation (see Tier 1 assessments below).

The final weightings for England prioritisation scoring was 3 for National Framework, environmental features, RNAG and 1 for the priority catchments, the latter being lower to ensure that this did not dominate the prioritisation results.

See section D13 for the weightings used for Wales.

4. Catchments evaluated by water company area and catchments prioritised as such.

The results of the numerical and graphical evaluation were evaluated by STW for the Severn Trent sub region and any adjustments to the prioritisation amended and justified e.g. information based on previous water resource WINEP evaluations or similar schemes, that would give a more up to date view of the water resource pressures by 2025[3].

5. Final review and sign off

The final prioritisation was agreed by the WRW Environmental Destination Task and Finish Group and then taken to the WRW Senior Group for sign off.

[3] i.e. the end of this AMP period and the baseline starting point for the current WRW regional plan and WRMPs.

The results of the prioritisation for the English catchments in the Severn Trent region are summarised in Table D9.5. The Welsh prioritisation process is summarised in section D13.

All catchments have had an initial characterisation assessment (Tier 1 assessment) undertaken to characterise them by the features listed in Table D9.1 above. A generic set of actions has also been generated as a starting point of an action plan and will be used to support AMP8 WINEP investigation proposals.

WRW took two catchments, in our supply area, forward for a more detailed assessment. This is termed a Tier 2 assessment and included stakeholder engagement in the catchments and a review of local evidence.

- The River Idle catchment in the River Trent catchment in the East Midlands. Anglian Water also has abstractions in this catchment and has engaged in this process.
- The Worcestershire Middle Severn catchment which includes the River Worfe and River Stour that form a sub catchment of the River Severn. South Staffs Water also has abstractions in this catchment and funded and engaged in this process.

Table D9.5 Priority order of catchments per water company

STWL ledger area regional prioritisation	
1. Idle & Torne	8. Warwickshire Avon
2. Worcestershire Middle Severn	9. Lower Wye
3. Staffordshire Trent Valley	10. Teme
4. Dove	11. Severn Corridor
5. Shropshire Middle Severn	12. Derbyshire Derwent
6. Lower Trent & Erewash	13. Soar
7. Severn Vale	

It is anticipated that further investigation of the higher priority catchments with water company abstraction will be undertaken for the next regional plan and some of these catchments may be taken forward for further evaluation at that time. We are currently proposing a large catchment investigation programme for WINEP AMP8 and will be working with the EA on the scope and extent of this work.

D9.3 Catchment stakeholder plans

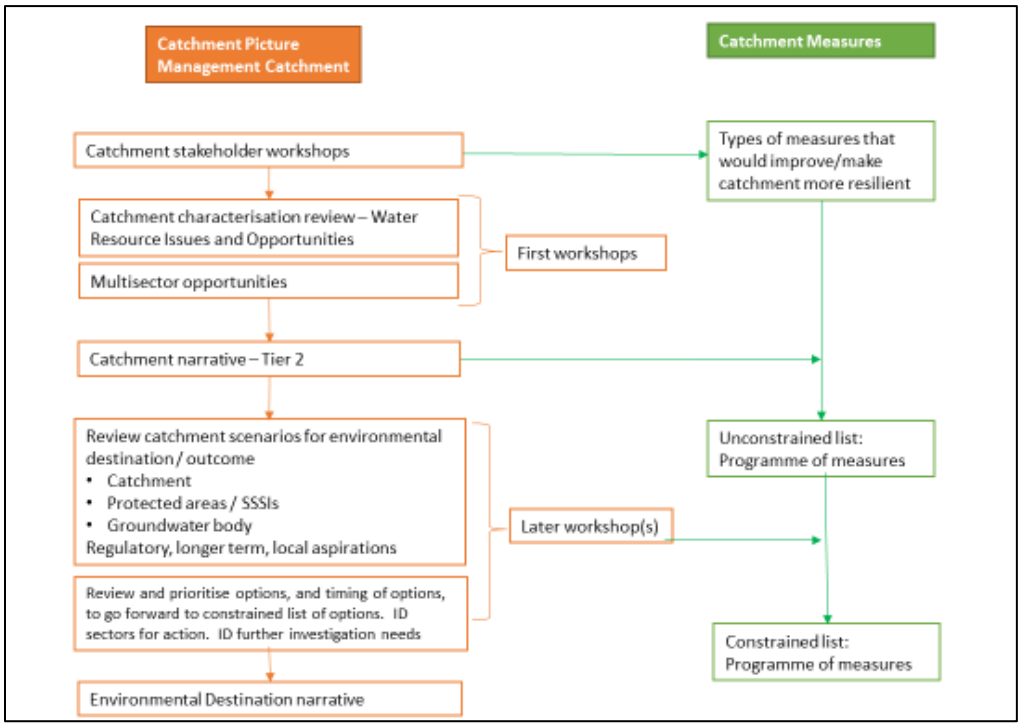
The Idle and the Worcestershire Middle Severn were taken forward for more detailed assessment including stakeholder engagement in the catchments (our Tier 2 assessments).

This assessment had a number of objectives:

- To trial an approach to 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 resources focused catchment action plan for all stakeholders to consider in their development and implementation of catchment improvements in the future.

Figure D9.4 outlines the process that has been followed for these two catchments.

Figure D9.4: Tier 2 refined assessment for prioritised catchments only, working with stakeholders



A summary of the types and timing of catchment interventions with significant and lower water resources benefits is provided in Figure D9.5.

Figure D9.5: types and timing of catchment interventions with significant and lower water resources benefits

Types and timing of measures

Red highlight– Most direct water resource influence
Green highlight– Other measures being implemented for catchment resilience

Measure category	Examples of measures that could build catchment resilience and have significant water resources benefit	Examples of measures that could build catchment resilience, lower direct water resources benefit
Water Resources Asset	Abstraction reductions*(off set by demand management / new water resource development and transfer of water across catchments)*, storage reservoirs, augmentation, STW input, conjunctive use, licence trading, amendments to discharge regime	Sewage treatment works phosphate reduction, drainage and waste water management
In stream	Channel narrowing, reмeandering, addition of gravel, barrier removal, leaky barriers, flow deflectors, fish pass, bypass channel, restocking	Invasive species control, flood alleviation
River banks	Buffer strips, fencing, tree planting, bank stabilisation / reprofiling	Invasive species control, flood management
Catchment	Natural flood management, managed aquifer recharge, peatbog restoration, floodplain reconnection	Invasive species control, strategic woodland planting, tree thinning, change in land use from arable, soil management reduced grazing stock density, field and road runoff capture

Short term (5yrs): In stream & river bank measures

Medium term (10– 15 yrs): augmentation, amend discharges, small storage reservoirs, smaller scale licence / abstraction reduction (with alternative sources), land management

Long term (>15yrs): Larger scale licence / abstraction reduction (with alternative sources), large storage reservoirs, land use change

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We held initial meetings with the CaBA hosts and EA to discuss how best to approach the stakeholder engagement in their areas. For the Idle it was agreed to hold two workshops, one with members of the CaBA and one with EA staff. For the WMS CaBA catchment the stakeholder groups for the two main rivers, the River Worfe in the north and the River Stour in the south were for the most part different, so two workshops were held with these two sub catchments.

We the conducted the initial workshops with the stakeholders taking them though story boards of pressures and options and augmenting our understanding using their feedback. We engaged small groups of stakeholders though online forums (this was undertaken during COVID restrictions). Some written input was also received via a template supplied for feedback from those attending the workshop and from some stakeholders who could not attend. The range of stakeholders organisations involved is summarised in Table D9.6.

Table D9.6: Organisations engaged in catchment pressures and options identification

Idle catchment	Worcestershire Middle Severn Stakeholders – River Stour
Environment Agency	Environment Agency
Nottinghamshire Wildlife Trust	Worcestershire Wildlife Trust
National Farmers Union	Severn Rivers Trust
Internal Drainage Board / Water management consortium	North Worcestershire Water Management
Severn Trent Water	Shropshire Wildlife Trust
Anglian Water	Severn Trent Water
	South Staffs Water

Once we had a revised list of options, an options screening process was developed for WRW that complemented the WRW water resource / demand management options screening process, which was suited to habitat improvement / physical restoration type measures.

Several documents were referenced as guidance to designing the screening criteria, these being:

- Water Resource Planning Guideline (WRPG) Supplementary Guidance – Environment and Society in Decision-making
- Water Resources Planning Guideline 2024 Supplementary Guidance: Environment and Society in decision-making (Wales)
- Water Industry National Environment Programme (WINEP) Options Development Guidance
- Water Resources West Options Development Methodology

The methodology overview is shown in Figure D9.6 and involves a high-level screening stage and a detailed screening phase.

The high-level screening questions are shown in Table D9.7. Scorings and rankings were developed and commentary informing decisions captured. In the high-level screening, no options were identified as unfeasible. Instead ~25% were categorised as low priority so they will still be available for further consideration, but won't be taken forward in the short term. The remaining options were taken forward to the detailed screening phase.

Figure D9.6: Methodology overview

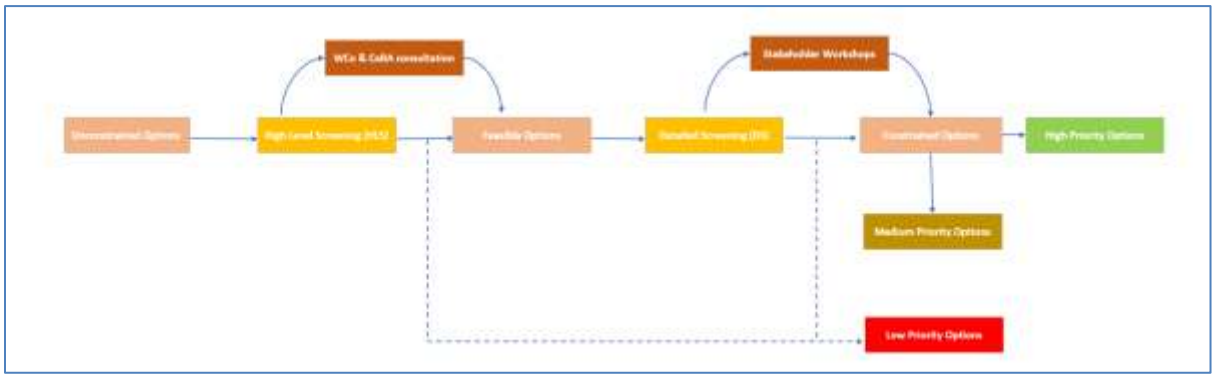


Table D9.7: High level screening questions

	Option benefit	Engineering Risk & Delivery Feasibility	Environmental Planning & Other Regulatory Constraints	Political & Customer Acceptability
Unconstrained List	Is there a Water Resource Benefit?	Is the option technically feasible?	Does the option cause unmitigable damage to a designated site?	Is the option politically unacceptable such that it is unlikely to gain planning approval?
	Will it improve catchment resilience?	Is the technology established with more than one example in the real world?	Does the option cause unmitigable damage to a national site?	Is the measure likely to be acceptable to landowners?
	Is the location feasible/ Flexible?		Does the option cause unmitigable damage to a heritage site/recreation use?	Is the measure likely to be acceptable to EA and Natural England?
	Is the option likely to be granted any necessary consent?			Does the option cause significant negative socio-economic impact that cannot be mitigated?

The detailed screening questions are summarised in Table D9.8. Guidance for each question has been developed along with scorings and weightings. Again, assumptions are captured and any overrides justified where better information was available.

During the options screening process we consulted external stakeholders though the WRW pre consultation stakeholder events in Jan and February 2022. Figure D9.7 shows the three questions put to the stakeholders and Figure D9.8 shows the response gathered via online voting. The response to question 2, on how we approach our environmental destination was used, following approval via the WRW Senior Group meeting , as the basis of the screening scoring prioritisation. From the feedback from these forums a multi benefit approach was taken to the numeric prioritisation process.

Table D9.8: detailed screening questions

Option benefit	Engineering Risk & Delivery Feasibility	Environmental Planning & Other Regulatory Constraints	Political & Customer Acceptability	Natural Capital – Provisioning Services	Natural Capital – Regulating Services	Natural Capital – Cultural Services	Carbon	Cost
What timeframe will this be delivered in?	How developed is the scheme?	Does the option require any consents? (EA, NE, Planning, etc.)	Is the option likely to be completely unacceptable to local residents?	Is there surface water benefit?	Is there flood management benefit?	Are there social benefits?	Does it increase carbon sequestration?	Is the capital expenditure high, medium or low?
		Is there a Water Framework Directive (WFD) benefit?	Have landowners expressed interest?	Is there groundwater resource benefit?	Is there habitat creation?	Are there negative impacts on recreation?	What is the carbon footprint of implementation?	Is the operational expenditure high, medium or low?
				Is there water quality benefit?	Are there improvements to fish passage?	Is there any benefit to other sectors?		
				Are there air quality benefits?	Are there improvements to fish passage?	Are there opportunities for volunteering?		
				Are there benefits to managing the water resource regime?	Is there improved habitat for species of interest?	Are there opportunities for education?		
				Are there negative impacts on agriculture/forestry /fishing?	Are there habitat connectivity benefits?			
				Will there be provisioning service enhancements?	Are there soil health benefits?			
					Can the measure be used for other scheme BNG requirements?			

Figure D9.7: Questions asked of stakeholders in pre-consultation WRW workshops Jan / Feb 22

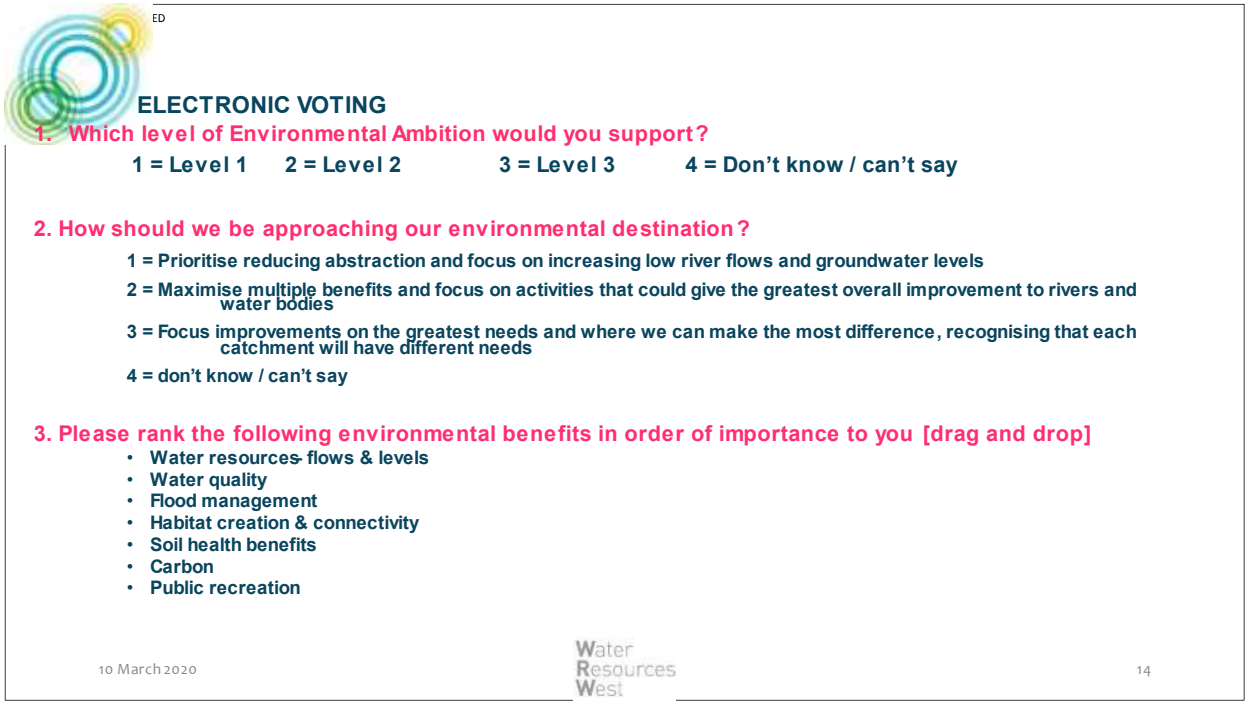
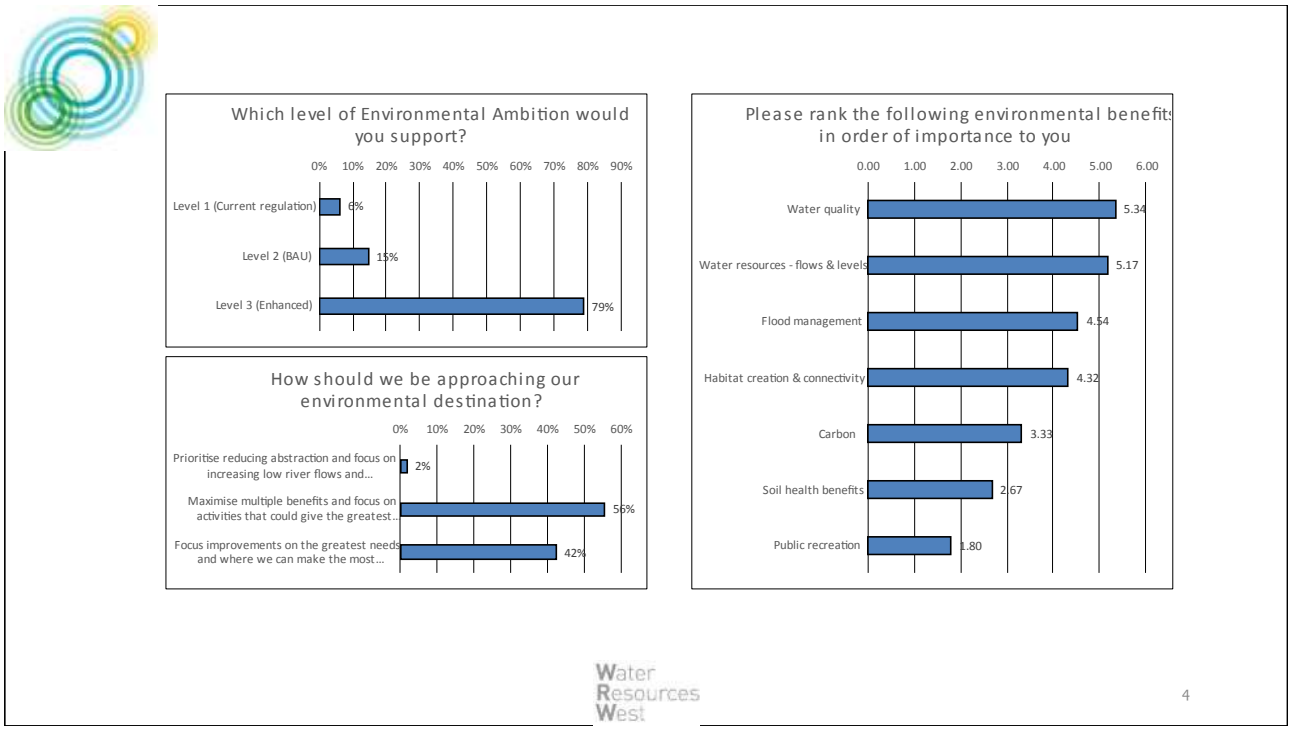


Figure D9.8: Voting results from pre-consultation WRW stakeholder workshops Jan / Feb 22



One of the objectives of the prioritisation was to identify some early options to take forwards to consider for implementation in water company AMP8 WINEP or other route. Therefore 4 options in this catchment were taken forwards to the high priority list category, and the remaining as medium priority.

During the stakeholder engagement phase, we also fill information gaps including water resource related National Nature Reserves or Local Nature Reserves Local (including Wildlife Sites, Wildlife Trust Nature Reserves, RSPB Reserves) and priority species and supporting habitats.

An evidence report has also been collated for each higher risk waterbody based on available data and existing reports provided by water companies and stakeholders. These evidence reports will be used as a starting point for refining environmental destination needs and AMP8 investigations.

Following high level screening and detailed screening we met again with the stakeholders to review the findings and gather feedback, which was used to make adjustments to the options priorities, and final prioritised constrained lists of options have been produced. These options lists are shown in Section D10. Following the section workshop in the River Idle catchment a meeting and visit with a farming abstractor group has also been undertaken to gain a better understanding of how they use and manage water and their future abstraction needs.

We are currently taking 4 number of options forward for further assessment and cost benefit assessment. These are listed in Table D9.9. Severn Trent will consider taking two or more of these options for early Environmental Destination implementation options in the AMP8 Water company WINEP which improve catchment resilience, building on the AMP7 environmental measures that we are implementing in our current plan. The other water companies in these catchments will also be considering shorter term actions. These actions would run in parallel to further investigations that we propose to include in the AMP8 Water company WINEP.

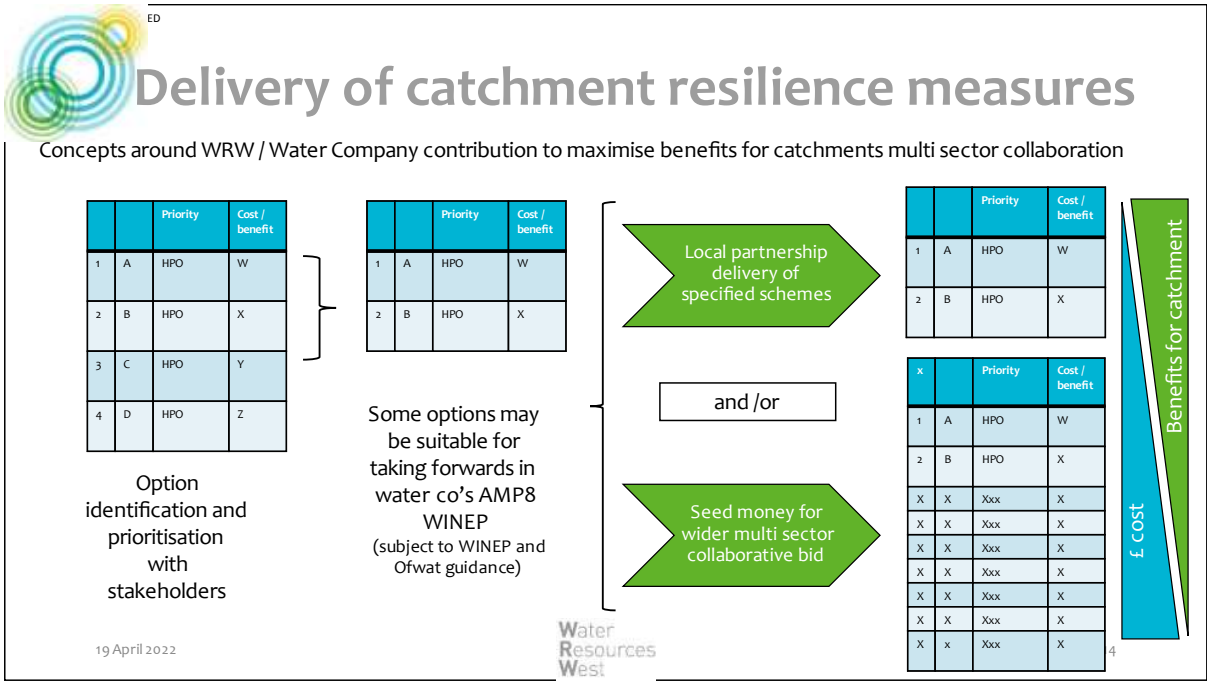
Other parties and funding routes can also be explored by other regulators and stakeholders. These initial catchment plans provide a list of options in the catchments that would contribute to the water resources improvements and future resilience of the catchments. By publishing these plans and continuing to engage with the core stakeholder group and Severn Trent and WRW strategic stakeholders we will be promoting further action by others.

Figure D9.9 outlines a concept of how funding from Severn Trent, and other water companies, via the WINEP Environmental Destination implementation driver in AMP8, could potentially be used to attract further funding and working with stakeholders in the catchment to bring catchment improvements.

Table D9.9: Catchment resilience options being taken forwards for further evaluation

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_41 (SVT)	Rainworth Water wetland creation as part of local CaBA 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

Figure D9.9: Concepts around maximising benefits and funding in catchments to bring multi benefits for the environment



D10 Catchment options

This section includes tables of the options identified through the stakeholder engagement process in the two priority catchments:

- the River Idle in the Trent River Basin District and
- the Worcestershire Middle Severn (the rivers Worfe and Stour) in the Severn River Basin District.

The process of options identification and prioritisation is described in Section D9 above.

These options are included for information. Currently STW is taking 4 options forwards for further assessment (see Table D9.9) to consider for inclusion in the AMP8 WINEP for implementation to build catchment resilience in the short term, in parallel to undertaking an extensive investigation programme and options appraisal for the longer term Environmental Destination for our region.

Table D10.1: Idle Prioritised 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/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_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	Intention to adjust abstracting groundwater further away from the outcrop areas and move East with boreholes.	HPO	Improved water quality for PWS (lower Nitrate). Abstraction impact on waterbodies potentially lower as more spread out and buffered by storage of aquifer; may help with conjunctive use.	Other water quality issues arising from older, deeper water?

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
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'.
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.

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
Idle_22	Calverton to ASR in Idle and Torne	dWRMP24 option 202. Collaboration with the Coal Authority to transfer 10-30 Ml/d that they need to abstract due to rising mine water to ASR in the currently over abstracted 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 Ml/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 Ml/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 downstream.	MPO	10-30 Ml/d that could replace future reductions in groundwater abstraction.	Water quality impact on Trent
Idle_24	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?
Idle_41	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	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

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
		the current delivery project, incorporating further environmental measures building upon previous work.			
Idle_42a	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
Idle_42b	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)
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)	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. Measures include: -Protection of areas vulnerable to erosion -Leaky willow dams in agricultural drainage ditches -Diversification of channel morphology and flow conditions by: a. creation of vegetated in-channel pool-riffle sequences, b. installation of woody debris, meanders and berms in a widened riparian corridor along the length of the watercourse	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)	Phosphate stripping of sewage effluent.	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 D10.2: WMS Prioritised Options Table

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: The River Worfe catchment has ongoing land management issues resulting in ongoing WFD waterbody failures of all waterbodies within the catchment	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 by 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	
WMS_04	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.
WMS_10	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 form 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.	
WMS_19	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
WMS_01	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.
WMS_08	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.
WMS_20	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
WMS_13	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.
WMS_27	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
WMS_30	Battlefield Brook Water vole Habitat Creation	Creating backwash pools and water vole refuges along with providing FRM benefits	MPO	Water vole habitat.	None known
WMS_24	Catshill Marsh Development	With NWWM and WWT look at improving the development to improve the remaining	MPO	Flood alleviation, Wetland improvement – biodiversity.	None known

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
		marsh e.g., throttle brook to create a better marsh area			
WMS_12	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.
WMS_31	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
WMS_16	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.
WMS_36	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
WMS_37	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 Ml/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 towards surface water - groundwater sources are an important asset.
WMS_06	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 Ml/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

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
					review holistically and consider outcomes of Severn Reg Review. Also resilience concerns for water supply if balance shifts too much towards surface water - groundwater sources are an important asset.
WMS_07	New source on Borle Brook	Make use of c. 6 Ml/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 Ml/d. Could utilise this to replace groundwater abstraction in Worfe.	Potential for impact on Borfe Bk. 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.
WMS_14	Blakedown Brook augmentation	Revisit augmentation options rejected in AMP6 OA. Either: [2] New borehole adjacent to Ganlow or Clent Brook in upper catchment [3] New borehole at Roundhill or adjacent to pipeline [10] Pipeline from Broome Lodge (existing augmentation borehole)	LPO	More effective way of improving flow regime than large scale abstraction reductions.	Uncertainty whether flow regime requires augmenting. Uncertainty around GW quality and impact on SSSIs. Would need to reduce some GW abstraction anyway to provide licence for augmentation.
WMS_15	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.
WMS_32	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

Option ID	Option Name	Option Description	Priority	Benefits	Disbenefits
WMS_38	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.
WMS_40	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

D11 Defra Abstraction Plan

Defra first published its Water Abstraction Plan in May 2018 which sets out its approach in some detail up to December 2022 and ultimately to 2027. The measures described in our dWRMP24 will support the achievement of the Water Abstraction Plan goals. The approach has three main elements:

- making full use of existing regulatory powers and approaches to address unsustainable abstraction and move around 90% of surface water bodies and 77% of groundwater bodies to the required standards by 2021;
- developing a stronger catchment focus – bringing together the EA, abstractors and catchment groups to develop local solutions to existing pressures and to prepare for the future. These local solutions will:
    - protect the environment by changing licences to better reflect water availability in catchments and reduce the impact of abstraction;
    - improve access to water by introducing more flexible conditions that support water storage, water trading and efficient use;
- supporting these reforms by modernising the abstraction service, making sure all significant abstraction is regulated and bringing regulations in line with other environmental permitting regimes.

The two most relevant aspects of the Water Abstraction Plan are moving the water resources regulatory regime into the Environmental Permitting Regulations (EPR) and the continuing need to take action on unsustainable abstraction.

A further government consultation on moving water resources regulation into EPR closed on 22 December 2021. In that consultation, there were no proposals to reduce licence quantities as abstraction licences transition to being EPR permits. The Water Abstraction Plan goes on to state that: 'The Environment Agency will make full use of its existing powers over the coming years to amend abstraction licences to protect the environment and will prioritise changes to licences having the greatest impact'.

Water Resources Planning Guidance for England and Wales states that:

> "You should not retain unused water on your licences that poses a risk of deterioration and is not justified by your water resources management plan. If you have any licences that fall in this category, you should plan to give them up. For companies in England or affecting England, see the supplementary guidance 'actions required to prevent deterioration - England' for further information. Where companies have any licences within Wales, you should consult Natural Resources Wales."

For the water industry a number of mechanisms exist whereby abstraction licences can be changed:

- Through the Water Industry National Environment Programme (WINEP) mechanism we agree voluntary changes, to permanent or time limited licences, following investigation and options appraisal.
- Through time limited licence renewal process which includes a sustainability assessment;
- Through the application of variations to licences, for example when we undertake borehole capital maintenance on sites and need to vary aspect of the licences to reflect changes to the site infrastructure, when a sustainability test will also be applied;
- Voluntary revocation of disused licences;
- EA can use its powers under Section 52 of the Water Resources Act to revoke disused licences;
- If it is likely that deterioration will occur before an alternative solution can be implemented, the EA uses its powers under Section 52 of the Water Resources Act 1991

Time limited licences

For previous WRMP there has been a presumption for renewal for time limited licences (TLLs). There have been a number of policy changes since this time and the latest guidance on licence capping gives clear indication that the EA will use the renewal mechanism to make changes to abstraction licences to make them more sustainable. The January 2018, EA guidance 'Guidance on water resources investigations into the risk of WFD water body deterioration' does allow a risk based approach relating to the timing of the risk of no deterioration. This should impact when a licence change is made or when any new conditions come into force.

Severn Trent have 51 TLLSs, covering 9 surface water abstractions and 42 groundwater abstractions. The renewal dates for these range between 2022 and 2034.

On renewal as with all abstractors we have to produce a justification of need and sustainability assessment. As part of our strategy to manage abstraction, to ensure that we do not cause environmental deterioration, we will provide a risk assessment relating to recent actual abstraction and growth predictions in line with our monitoring and risk assessment as outlined in section D4.

We have undertaken a risk assessment on the TLLS and for the most part anticipate being able to retain our current licences up to 2030 in line with our planning assumptions.

Borehole capital maintenance

Our groundwater sources for the most part are from borehole structures. These boreholes, like other structures, deteriorate over time and periodically we need to maintain or construct new boreholes to ensure the water quantity and quality from these sources of water. Where we substantially modify the structure or drill replacement boreholes we also need to make variations to our abstraction licences and in some circumstances undertake testing to evaluate any resulting environmental impact. Variations to licences provide the opportunity to review licence quantiles and no deterioration risk. We will work with the EA to ensure that we can continue to maintain our assets and the security of our public water supplies while we evaluate the risk and timing of any required l licence changes to prevent deterioration of the water environment. A list of the sources under consideration in AMP7 and AMP8 are shown in Table D7.1.

Disused licences

We will assess our unused licences and where they pose risk of deterioration will undertake more detailed evaluation. Where we can see no future use for the sources we will look to surrender these licences as soon as is feasible.

Table D11.1: sources with planned borehole capital maintenance in AMP7 and sources under consideration for maintenance in AMP8

AMP7	AMP8
The Hollies	Ompton
Cresswell	Budby
Lilleshall	Amen Corner
Milford (AMP6)	Boughton
Audley	Hayton
Bratch	Markham Clinton
Woodfield	Diddlebury
Westwood	Shelton
Milford (AMP7)	Rednall
Tattenhall	Fulford
Caunton	Mossgate
Lambley	Peckforton
Mount Nod	Towerwood
Newport	The Hollies
Halam	Swynnerton
Shelton	Ryon Hill
Clungunford	Mount Nod
Washingstocks	Warwick Road
Wildmoor	August Hill
Sunnyside	Burcot
Norton Racecourse Lane	Webheath
Chaddesley Corbett	Washingstocks
	Buckshaft
	Brockhill
	Llandinam

D12 Invasive Non-Native Species (INNS)

Invasive non-native species (INNS) are animals or plants that have the ability to spread outside their native range, which are having a detrimental impact on the economy, wildlife or habitats. Of particular concern are species that are:

- New to the country;
- On the list of European Union concern;
- Listed on schedule 9 to the Wildlife and Countryside Act (1981), or;
- Not ordinarily resident in the wild.

Some of the activities that we undertake have the potential to create pathways to spread INNS. These activities include recreational activity at our sites and some of the activities we undertake when we treat water and waste water. As part of our supply network we transfer raw water between waterbodies and this can be a potential pathway for spreading INNS.

In AMP7, we have reviewed our current abstraction operations and future solutions to determine the risk spreading INNS or create pathways which increase the risk of spreading INNS.

For our existing operations we have completed a risk assessment across all of our assets and business activities in AMP7. A Business Wide Biosecurity Plan has been developed that covers all our activities, as well as plans for our visitor sites. Our biosecurity plans identify realistic, pragmatic and cost-effective procedures and behaviours that reduce the risk of INNS introduction and establishment.

We have undertaken individual risk assessments on most of our existing raw water transfers using the INNS risk assessment tool developed by the EA. The licences reviewed are listed in Table D12.1 Transfer biosecurity plans have been developed, which include actions such as biosecurity measures and longer term plans to continue to test and develop feasible mitigations measures.

Table D12.1: Major raw water transfers in our region

Licence	Description of transfers
3/28/38/18	River Ashop and River Noe into Derwent reservoirs (Derwent and Ladybower)
18/54/10/0717, 18/54/10/07 & 18/54/12/053	River Avon to Draycote Reservoir and Leam catchment
03/28/40/121	River Derwent to Ogston and Carsington Reservoirs
03/28/36/147 & 03/28/36/148	River Dove to Staunton Harold & Foremark reservoirs in Trent catchment
03/28/56/030	Rothley Brook and Swithland Reservoir to Cropston Reservoir
n/a	Elan Valley Aqueduct from Elan Valley Reservoirs to Frankley

D13 Wales

D13.1 Policy context

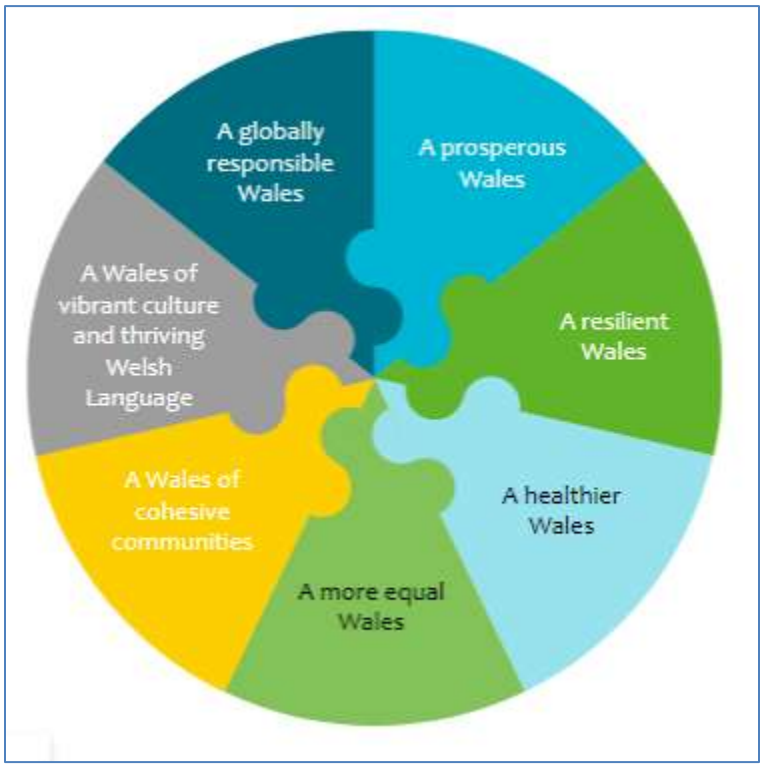
This section outlines some of the main Welsh policies, regulation and guidance, pertinent to the Environmental Destination for Wales.

The Environment (Wales) and Wellbeing of Future Generations Acts

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 principles are defined in the Act 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." Linked to these principles, SMNR has four main aims:

1. Stocks of natural resources are safeguarded and enhanced
2. Resilient ecosystems
3. Healthy places for people
4. A regenerative economy

Figure D13.1: The wellbeing of future generation act goals



The Wellbeing of Future Generations Act pursues several goals (see Figure D13.1) link closely to the SMNR aims(i.e. 'a resilient Wales'). At a national level, the priorities for applying SMNR are established through the National Natural Resources Policy. Natural Resources Wales investigate and publish reports on the State of Natural Resource Report (SoNaRR) to provide an evidence base for the National Natural Resources Policy. Natural Resources Wales have developed Area Statements as a response to the National Natural Resources Policy. These statements were shaped by stakeholders and reflect the key challenges facing each area of Wales, set out what the wider public can do to meet those challenges and how everyone can better manage natural resources for the benefit of future Welsh generations. We will reflect the findings of the recent SoNaRR report, the National Natural Resources Policy and Area Statements relevant to our regional plan and consider the contribution in our dWRMP24. Further details of how the SMNR principles are reflected in our plan are given in Appendix A.

Welsh Government's Water Strategy for Wales

The Water Strategy for Wales sets out a long-term policy direction in relation to water; it aims to ensure a more integrated and sustainable approach to managing water and associated services in Wales. This strategy contributes to the implementation of the wider natural resource management policy in Wales. It also complements a range of policies and programmes across Welsh Government, such as the Well-being of Future Generations (Wales) Act 2015. Further details of how the provisions of the Water Strategy for Wales are reflected in our plan are given in Appendix A.

Nature Recovery Action Plan

The Nature Recovery Action Plan (NRAP) identifies the biodiversity issues that need to be addressed, the objectives for action and the set of actions which, through the Well-being of Future Generations (Wales) Act 2015and the Sustainable Management of Natural Resources, will contribute to reversing the loss of

biodiversity in Wales. The plan links to and complements The Well-being of Future Generations (Wales) Act 2015 and the Environment Act (Wales) 2016 by:

- providing the best available evidence to prepare area statements, reflecting local pressures on biodiversity and priorities for species and habitat recovery
- providing evidence and information to prioritise biodiversity action within the National Natural Resources Policy
- identifying and reporting on biodiversity status and trends and indicators, to inform the SoNaRR.

The aims of the Nature Recovery Action Plan are closely linked to other legislation and guidance around biodiversity, preserving and enhancing habitats and protecting wildlife. We are working to produce a regional plan which supports the achievement of the Nature Recovery Action Plan's objectives.

D13.2 State of the environment

According to the latest SoNARR, the key issues affecting freshwaters in Wales are:

- climate change
- physical modification
- pollution
- decline in freshwater biodiversity
- lack of connectivity between rivers and floodplains
- invasive non-native species.

Although over-abstraction is not a concern on its own merit in Wales, abstraction for public water supplies can add stress to freshwater ecosystems during periods of low flows. Low flows during dry weather periods can lead to:

- increased water temperatures which in turn can stress fish populations
- siltation which can damage habitats and prompt changes in the composition and diversity of macroinvertebrate and fish communities
- less dilution capacity for pollutants, which in turn can prompt a decline in water quality, with adverse effects on aquatic flora and fauna.

D13.3 Environmental Destination for Wales

The Water Resources Planning Guidance covers both England and Wales. There are specific elements for consideration in Wales that are pertinent to Environmental Destination. This include the supplementary guidance for Environmental Destination in Wales *"Setting an environmental destination for water resources: Enhancing ecosystems in Wales".*

Welsh Government has evidence of biodiversity decline in Wales. It is looking for an ambitious strategy for ecosystem resilience and wants water companies to work with regulators to help enhance biodiversity through their water resources activities whilst ensuring a plentiful supply to customers – this strategy is also known as your environmental destination. The flexible framework allows a long-term environmental destination that reflects local, regional and national priorities and can be reflected in a number of plans and processes.

Given the interconnected nature of water resources and ecosystems the environmental destination can be included as part of another plan or process, as long as the elements within the guidance have been included and are discernible.

D13.4 Welsh Regional prioritisation

To understand the water resources pressures in the catchments upstream of WRW and STW we undertook an evaluation of Welsh catchments. The WRW boundary (based on the combined outlines of the water company Water Resource Zones) wholly encapsulates 26 WFD Management Catchments in England and Wales. For the purposes of Environmental Destination, we have also included three Welsh upstream catchments that are partly within the WRW boundary (Severn Uplands, Wye, Dee).

We have developed a separate prioritisation for catchments in England and for catchments in Wales. This is primarily to account for differences in legislation and regulatory approach between the two countries, as well as subtle differences in data availability and format.

- The environmental legislation in Wales (and guidance from Natural Resources Wales (NRW)) encourages a more holistic approach that provides wider environmental and social benefits to local stakeholders.
- We have considered the Climate Change Risk Assessment (CCRA) in Wales, however it was agreed with NRW that this should be excluded from our prioritisation scoring;
- NRW Opportunity Catchments have a range of drivers, not all related to water resources.

When considering 'catchments' we are primarily referring to WFD Management Catchments, as this is the largest scale unit that is defined in both England and Wales. However, we also make reference to other 'catchment' definitions for different purposes. WFD Operational Catchments, which are a sub-division of Management Catchments, have been used as the building block for the Wales regional prioritisation. This is because some of the datasets used for Wales (Opportunity Catchments, Climate Change Risk Assessment (CCRA)) are defined at an Operational Catchment scale.

Stakeholder engagement was undertaken to inform the prioritisation process. This is described Section D9. The main forums included:

- WRW Environmental Destination Task and Finish group monthly meetings which included the water companies and regulators;
- Welsh regional prioritisation workshop with NRW on 29th June 2021;
- Area statements were reviewed.

The Regional prioritisation datasets and assessment process is summarised in section D9. The weighting for Wales prioritisation scoring was even between environmental features, RNAG and the Welsh priority catchments.

Table D13.1 summaries the prioritisation of the Welsh catchments. For Severn Trent the Severn Uplands is the highest priority upstream Welsh catchment. There are two significant reservoirs in catchment that are utilised directly for public water supply or support abstraction through river regulation. These are owned by water companies and present areas of opportunity. Some of the Strategic Resource Options under consideration in regional planning also utilise this catchment and as such will be an area of opportunity should these be taken forwards.

Table D13.1: Priority order of catchments in the Severn Trent region

NRW ledger area catchments * Indicates catchments relevant to STW	
1. **Severn Uplands***	6. Clwyd
2. **Dee***	7. Severn England TraC*
3. Usk	8. Tawe to Cadoxton
4. South East Valleys	9. Lower Wye*
5. Wye*	

For the Severn Uplands the numerical scoring of this catchment is low as there are a small number of designated environmental features. There are water resources related RNAG issues related to water industry identified in the WFD datasets. There are two significant reservoirs in catchment that are utilised directly for public water supply or support abstraction through river regulation. These are owned by other water companies and present areas of opportunity:

- Clywedog reservoir main source of regulation water for River Severn regulation which support both PWS (STWL, SSW) and non PWS abstractions. Opportunity for further environmental enhancements.
- Vyrnwy also used for PWS and opportunities for further environmental enhancements. Well established work with stakeholders in catchment. Proposed water resource options and strategic resource options (SRO) in the catchment.

The Dee catchment is an Opportunity Catchment (NRW) and includes a water resources driver. It has high environmental features. WFD RNAG does not identify water industry water resources pressures. STW has one abstraction in this catchment, other water companies have a significant interest in this catchment (HD, DCWW and UU). This catchment is linked to the potential water resource and SRO at Vyrnwy (UU). The multi partner Dee Life project is active in catchment.
There are also other well established catchment forums which include water companies.

The River Wye has high environmental value catchment, SAC river. The abstractions have undergone a review of consents and licence changes made to support environmental objectives.

D13. 5 Wales and 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 and operated by Hafren Dyfrdwy, 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. We will work with stakeholders, including the River Severn Partnership to promote catchment resilience solutions in this area.

Severn Trent recognise the importance and value of the upstream catchments and is working with the other water companies through WRW to understand opportunities for enhancing the upstream catchments.