04a

Water WINEP

Providing clean water while protecting and enhancing the environment

WONDERFUL ON TAP

SEVERN TRENT

Executive summary

This proposal outlines our 'no-regrets' plan to meet Severn Trent's expanded statutory obligations as defined in the Water Industry Environment Programme (WINEP), focusing on the provision of clean water (separate proposals are provided for our wastewater (04b) and bioresources (04c) WINEP programmes).

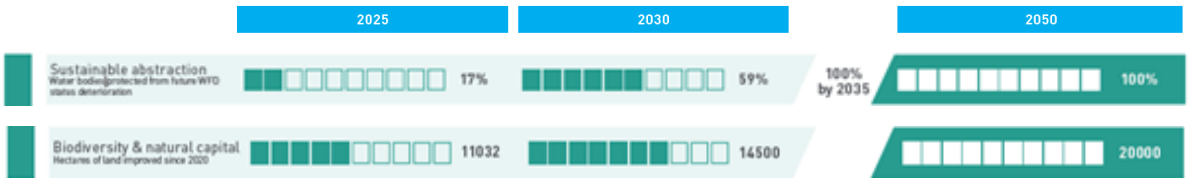
Case for change

Only 14% of rivers in England can currently claim to have Good ecological status, and the UK is not on track to meet the Water Framework Directive (WFD) requirement for all rivers to reach this status by 2027. Climate change and a growing population are adding to these pressures and without concerted action now will lead to irreversible impacts for future generations.

In response to these challenges, the Government has set ambitious goals on biodiversity and improving the nation's water environment through its 25 Year Environment Plan and 2021 Environment Act. Water companies' statutory obligations have been expanded through the PR24 WINEP to reflect these goals, including a new duty to enhance (rather than just conserve) biodiversity.

Solution

Our long-term aim is to ensure 100% of our abstractions are sustainable and that we are finding ways to enhance the environment through our operations.



AMP8 proposal

For an investment of £420m, we propose to deliver the AMP8 activities required to meet our statutory obligations to protect and enhance the water environment, along with targeted investigation activities needed to inform future WINEP investment at PR29.

Our programme is composed of 'no-regrets' investment only, and will deliver the following benefits:

- **Protect the water environment.** Prevent water quality deterioration in the water bodies from which we abstract, avoiding the need for increased water treatment in future;
- **Enhance the water environment.** Improve water quality, enhance biodiversity and support aquatic ecosystems; and
- **Prepare for future improvements.** Confirm the scale of future investment needed to achieve the Government's long-term environmental goals and mitigate future risks to water quality.

Our AMP8 WINEP programme (summarised in Table 0.1) was developed over 18 months, following the Environment Agency's (EA) rigorous process and resulting in a best value programme of work that meets our statutory obligations. The EA has marked each of our WINEP water activities as 'Proceed' in the formal PR24 WINEP record.

Table 0.1: Severn Trent AMP8 WINEP programme (water)

WINEP driver	Legislation	Activity	Cost
Drinking water protected areas	Water Environment (Water Framework Directive) Regulations	Deliver groundwater schemes (13 catchments) and surface water schemes (six catchments).	£18.9m
Water Framework Regulations		Actions to prevent WFD status deterioration at the highest priority sites by 2030: network and asset reconfiguration to accommodate abstraction licence changes at 65 sources of public water supply by 2030 plus supporting catchment restoration and protection measures.	£308.4m
Water Framework Regulations		Feasibility studies for achieving abstraction licence capping targets by 2035 across 80 abstraction sites.	£16.4m
Water Framework Regulations		HMWB investigations at Stanford and Draycote reservoirs	£0.8m
Environmental destination	Environment Act	Feasibility studies for achieving environmental destination targets across 130 abstraction sites and 12 catchments. Gather cost-benefit evidence for PR29 investment.	£23.4m
Biodiversity enhancements	Natural Environment and Rural Communities Act	Improve biodiversity across 15,000 hectares in the region by 2030, providing a more resilient water supply.	£39.4m
Remove barriers to fish passage	Natural Environment and Rural Communities Act	Investigate opportunities to remove barriers to fish passage. Remove a weir at Peakshole Water to improve 5.5 km of river.	£3.5m
Sites of Special Scientific Interest (SSSI)	Wildlife and Countryside Act	Deliver site management action plans to ensure all SSSIs are at Recovering or Favourable status.	£5.3m
Invasive non-native species (INNS)	The Invasive Alien Species (Enforcement and Permitting) Order 2019 Wildlife and Countryside Act	Implement biosecurity plans at 10 visitor sites to prevent the spread of INNS. Work with the water sector to implement enhanced national monitoring to detect and prevent the spread of INNS.	£2.5m
Eels Regulations	Eels (England and Wales) Regulations	Investigate and identify actions to improve diversion structures to prevent entrainment of eels.	£1.1m
Habitats Directive	Habitats Regulations	Investigations and options appraisal at River Clun SAC	£0.4m
Total			**£420.1m**

We have structured our AMP8 WINEP programme to take full advantage of the opportunities presented by WINEP reform, which aims to link all activity to the environmental outcomes that customers want to see.

We are confident that this proposal represents the best option for customers and that it will deliver best value overall in terms of costs, risks, affordability of customers' bills, and wider environmental and social benefits. We have proposed three price control deliverables to track delivery and to return money to customers in the event of late or under delivery.

Contents

Note: Annexes referred to sit within separate PR24 documents whereas Appendices are contained within this document

1. The need for investment

The UK is facing a climate and biodiversity crisis and we need a step change to meet these challenges. As a result, changes to environmental legislation and regulation mean that our AMP8 WINEP investment needs are materially higher than in previous AMPs. We need to change how our assets operate and the effects they have on the water environment so that we play our part in achieving the statutory objectives for water bodies across our region. We also need to implement new plans to protect and enhance biodiversity and to prevent the spread of invasive non-native species. Finally, we are required to undertake extensive investigations to understand the most effective solutions for achieving the Government's long-term environmental goals in the face of future pressures such as climate change and population growth.

Section 1 of this business case outlines the compelling drivers for our WINEP investment needs and why we need to take action in AMP8. Section 2 describes the 'no-regret' investment we will undertake to meet our environmental obligations around water abstraction and the environment.

1.1 Responding to government priorities

The UK Government's 25 Year Environment Plan (EIP) pledged that we will be the first generation to leave the environment in a better condition than we found it. The EIP set out a range of ambitious goals, including the improvement of at least three-quarters of the nation's waters to a near-natural state as soon as is practicable. These national ambitions underpin the need to increase investment in AMP8.

The Water Industry Strategic Environmental Requirements (WISER) set out the expectations of our regulators, the EA and Natural England. Legislation-specific guidance is provided by the EA in the form of WINEP driver guidance[1], which is reviewed by the Department for Environment, Food and Rural Affairs (Defra) prior to publication.

Water companies need to deliver their share of environmental enhancements to improve the state of the UK's rivers. In the most recent Water Framework Directive (WFD) assessment, only 14% of rivers achieved Good ecological status. Analysis by the EA shows that 16% of the identified causes (Reasons for Not Achieving Good Status, or RNAGS) are attributable to water sector activities.

Working with the EA, we have translated the government's long term ambitions into a programme of activities that are then defined in the WINEP for delivery in AMP8.

Water Industry Environmental Improvement Programme (WINEP)

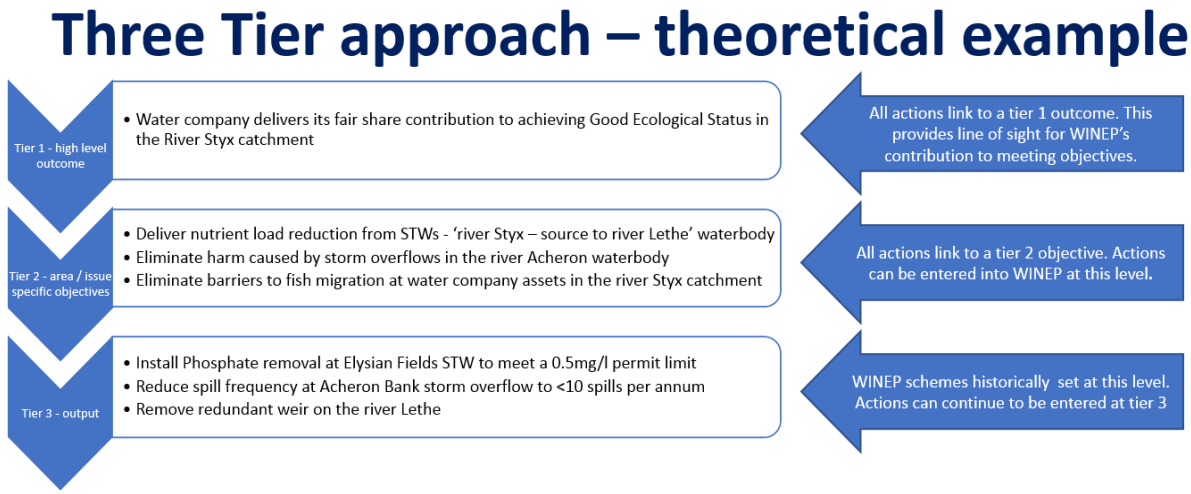
The WINEP is a wide-ranging programme of environmental improvement measures that has been in place since the 1990s. Water companies' WINEP programmes are agreed in consultation with the EA and other stakeholders through a formal process governed by a standard methodology. Historically, this methodology has focused on a programme of measures that water companies must include in their business plans to deliver specific environmental improvements. Following the WINEP Reform Taskforce, which ran from late 2020 to mid-2021, the PR24 approach has been adapted to deliver wider benefits and maximise value for money (see Appendix A for further details of WINEP reform,

[1] WINEP driver guidance is held on the Defra Sharepoint site here. Access to the site is restricted, but permission can be given on request by contacting Price_Review@environment-agency.gov.uk

including Severn Trent's contribution). At the same time, the recent Environment Act (2021) places greater emphasis on us as a landowner to conserve and enhance the biodiversity on our land.

In the reformed WINEP, actions can now be expressed as outcomes using a three-tiered approach that illustrates how outputs build up into outcomes. This gives a more meaningful measure of progress, based on the healthy, thriving environment that we, our regulators and our customers want to see. Figure 1 below outlines the new tiers using a theoretical example.

Figure 1: WINEP tiers



Severn Trent has used its extensive experience to help inform the regulators' approach to WINEP reform and outcomes-based regulation. We have been using catchment management approaches to improve raw water quality for over 20 years, developing strong partnerships and reducing the greenhouse gas impact of our water treatment processes as a result. The greater ambition of the PR24 methodology will allow us to scale up this work, meeting the needs of catchment stakeholders in new and cost-efficient ways.

In response to this opportunity, we have entered large segments of our WINEP programme as Tier 2 outcomes, where several interventions are grouped together under a single WINEP action to deliver a defined environmental outcome. These are mainly at WFD waterbody level, with some at SSSI, Special Area of Conservation (SAC), or river catchment scale.

WINEP drivers for clean water provision

Severn Trent's WINEP enhancement proposal is divided into three parts: Water, Wastewater, and Bioresources. This proposal focuses on Severn Trent's WINEP programme for the provision of clean water, and our WINEP programmes for wastewater and bioresources are outlined in separate enhancement proposals (04b and 04c respectively). Table 1 below outlines the statutory requirements of each driver, defined by the EA and Natural England, and its Tier 1 outcomes (the high-level outcomes sought by the 25 Year Environment Plan and WISER). Details of the WINEP driver codes for these activities can be found in Appendix C.

Table 1: WINEP drivers and outcomes (water)

WINEP driver	Outcomes (Tier 1)	Legislation	Statutory status[2]
Drinking water protected areas	Protect and improve abstracted water supply quality.	Water Environment (Water Framework Directive) Regulations	Statutory
Water Framework Regulations	Prevent water body deterioration from current WFD status within a catchment.	Water Environment (Water Framework Directive) Regulations	Statutory
Environmental destination	Enhance the water environment to meet the outcome of the regional water resources plan.	Environment Act	Statutory
Fish passage and screening	Ensure structures meet requirements of fish and eel legislation.	Salmon and Freshwater Fisheries Act (SAFFA)	Statutory
Eel protection	Ensure assets meet requirements of fish and eel legislation.	Eels (England and Wales) Regulations	Statutory
Biodiversity enhancements	Conserve and enhance biodiversity.	Natural Environment and Rural Communities Act	Statutory plus
Sites of Special Scientific Interest (SSSI)	Maintain or restore SSSIs to Recovering or Favourable condition.	Wildlife and Countryside Act	Statutory plus
Invasive non-native species (INNS)	Achieve waterbody status or prevent deterioration.	The Invasive Alien Species (Enforcement and Permitting) Order 2019 Wildlife and Countryside Act	Statutory

Across each of these WINEP drivers, we have worked with the relevant regulators to identify the environmental risks and issues across our region, and agreed the scope of intervention required.

Statutory drivers

The majority of the Severn Trent AMP8 WINEP programme has been defined as 'statutory' within the WISER framework. Two elements (biodiversity enhancements and SSSIs) are 'statutory plus' obligations (i.e. subject to a cost-benefit assessment) and are underpinned by customer support (see Section 1.2). All of the 'statutory' and 'statutory plus' activities and investment needs identified in this business case have been named and marked as 'Proceed' by the Environment Agency in the WINEP.

1.2 Responding to customer expectations

While all of the investment in this programme is associated with delivering our statutory WINEP obligations, we have undertaken extensive customer research to better understand their views on the

[2] Statutory obligations arise from legislative requirements and must be achieved. Statutory plus (S+) obligations are categorised as legal requirements where economic evidence (the balance of costs and benefits, and affordability considerations) forms part of the decision-making process.

need for environmental improvement to help inform our approach. A summary of their feedback is set out in Table 2 below.

Table 2: Summary of key feedback from our customer research

Our conclusions	What we heard from customers
Customers care about the environment and the impact our actions have on it	• The environment is raised spontaneously by customers as an area of core service and also as a key concern. Preventing or minimising the pollution of waterways is one of the areas customers want us to prioritise • Customers care about the environment and place a high value on visiting natural spaces for both mental and physical health • Customers can struggle to identify all the ways in which water companies impact the environment – water pollution, littering, climate change, and flooding are most often mentioned *Sources: Strategic priorities research, Tap Chat priorities and concerns, CCW – Public views of the water environment*
Customers expect us to deliver our statutory requirements. Some customers want us to go beyond this, although views are mixed	• Delivering the statutory minimum is a basic expectation of the service we deliver. There are some mixed views on how far we should go in terms of going beyond these requirements. Our early qualitative research in 20213 showed an indicative preference towards "Being an environmental champion and exceeding legal requirements" • As the cost-of-living crisis has developed this view has weakened slightly. Quantitative (uninformed) research in 2022 on the water resource management plan shows a swing towards keeping bills low4 • Research by the Consumer Council for Water (CCW) in the same year also finds a desire for water companies to go beyond the basics, particularly in relation to climate change and the decline or extinction of plant and animal life (Public views of the water environment, CCW, 2021) • In September 2021, 68% of customers thought we should exceed the legal requirements. This fell to 54% in April 2023, with a high increase in those who felt unsure. We have also seen a decline in those who believe we should prioritise the environment over cost savings (Severn Trent Social Barometer, waves 1-5)
Customers are concerned about conservation/loss of natural habitats	• Conservation and loss of natural habitats is a significant concern, following future gas supplies and prices • The impacts of climate change and levels of pollution are also of concern *Sources: Universal metering and environmental destination research*

[3] Strategic Priorities research, Community Research, December 2021
[4] WRMP deep dive survey, May 2022

	WRMP Value Stream metrics
Customers care about SSSIs and believe that Severn Trent should invest to protect them and other environmentally sensitive areas.	• Customers care deeply about these sites and value them highly • 99% of Tap Chat customers polled in favour of Severn Trent investing in protecting SSSIs from pollution. However, not many were willing to pay towards it, seeing this as Severn Trent's responsibility *Source: Tap Chat- Investing to protect SSSIs*

While delivering the obligations named in the water WINEP is a statutory requirement and is therefore compulsory, we have taken steps to ensure that we deliver these activities in a cost-effective way and to minimise costs for customers. See Section 4 Robust and Efficient costs for more information.

1.3 Management control

All measures contained within our WINEP programme have been confirmed as 'Proceed' by the EA. As such, the EA has confirmed that the need to invest is a new requirement, and not a consequence of poor management or a historic lack of investment. Severn Trent's track record of environmental leadership is outlined in Appendix B.

In all instances, the deadline for WINEP delivery is defined by the EA in the PR24 WINEP guidance, based on statutory and regulatory timetables. The environmental targets and delivery timescales are therefore largely outside our control, and we have focussed our attention on optimising the solutions in our AMP8 investment plan for cost effectiveness and best value (see Section 2).

2. Identifying and assessing the best option for customers

Our PR24 approach has used the following steps to identify the most effective, best value solutions to achieve our statutory environmental commitments:

- We considered the scale and timing of the outcomes that need to be achieved;
- We assessed a wide range of potential options that could achieve these outcomes;
- We captured the wider environmental benefits that our different options could achieve;
- We used innovative solutions where these could help us maximise benefits and reduce costs;
- We developed a tool to quantify the monetary benefits associated with these environmental improvements; and
- We sought external challenge and assurance on the solutions we developed.

The remainder of Section 2 summarises the stages followed to develop the WINEP solutions.

2.1 Identifying the optimum scale and pace of investment

The WINEP sets us challenging delivery deadlines that need to be achieved between 2030-35. The pace of investment is, to a large degree, dictated by legislation. The EA has issued driver-specific guidance, with which we are required to comply, that assigns a latest allowable delivery date to each WINEP driver. In general, the WINEP guidelines specify that 'implementation' actions must have an completion date of 2030, while 'investigation' actions are expected to be completed in 2026/27 in order to inform the PR29 investment plan.

While we have taken these regulatory dates into account in our investment plans, in some cases we know that these deadlines will be extremely challenging. Where we have specific concerns about meeting the delivery deadlines specified in the PR24 WINEP guidance, we have fed these back to the EA along with evidence to support why these dates may not be achievable. Two significant areas of concern are:

- **Environmental destination investigations.** The WINEP guidance defines the statutory environmental destination investigations as having a delivery deadline of December 2026. However, we are concerned that this may be insufficient time to gather the environmental evidence needed to explore these complex scenarios. We have proposed an alternative, staggered delivery timeline that prioritises the highest-risk sites to inform PR29, and that recognises that additional, longer-term investigations will continue throughout the rest of the AMP; and
- **Abstraction licence changes in specific supply areas.** We have shared our specific concerns regarding the timetable for making abstraction licence changes in the Shropshire area, due to the limited number of alternative sources of water supply that could be deployed in time through our 2024 Water Resources Management Plan (WRMP24). The WINEP is currently based on the EA's preferred licence capping timetable and we continue to work with them to explore an alternative delivery plan. At a meeting with Ofwat, the EA and Defra on 25 May 2023 we highlighted that our alternative licence capping timetable could have the benefit of deferring AMP8 water resources and network investment into a later AMP period. In September 2023 we wrote to the Environment Agency with a recommended alternative timetable that could defer approximately £24m into AMP9.

2.2 Process for identifying options

The WINEP methodology requires us to produce Options Development Reports (ODRs) for all major areas of investment. This includes identifying unconstrained and constrained lists of potential interventions for each type of investment.

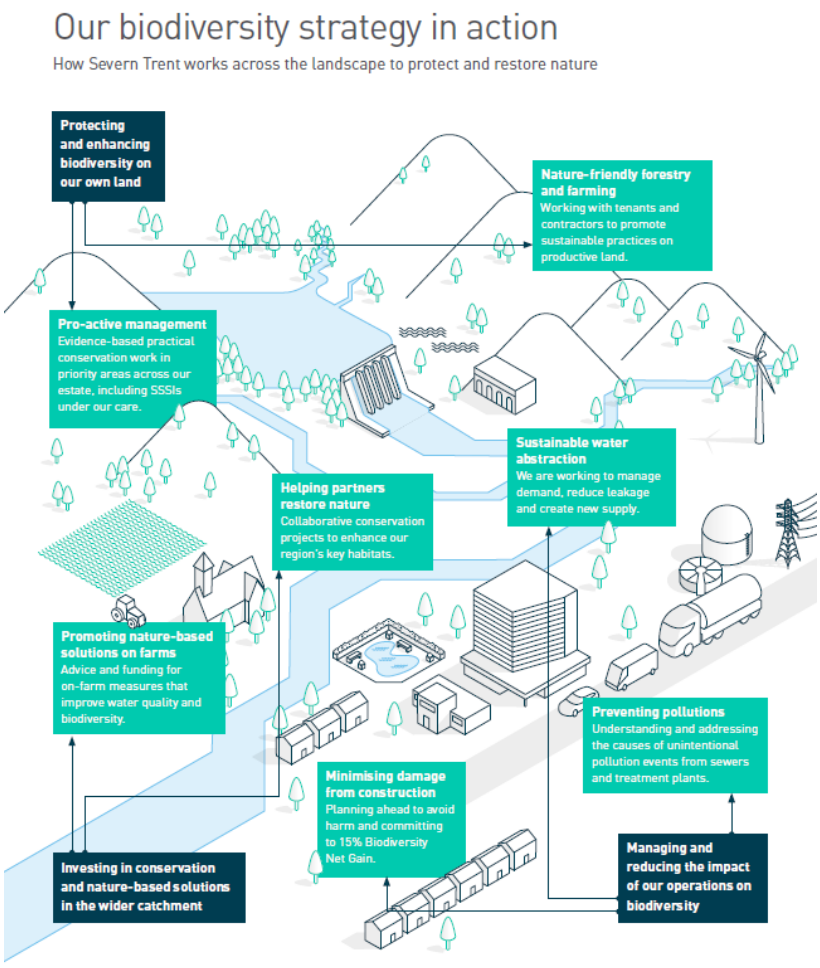
The constrained list of options identifies every intervention that could be applicable for a site of given size and level of treatment required, and is defined through the following filters:

- Is the proposed approach compliant with legislation?
- Is it technically feasible and practical?
- Will it result in unacceptable reputational damage to the industry?
- Will it result in adverse environmental impact?

The constrained list is then overlaid with site-specific constraints (e.g. land availability) to determine the site-specific options that are taken forward for assessment.

When developing our options to achieve each WINEP driver, we have considered the secondary benefits that these options could provide to other WINEP drivers. Figure 2 illustrates how our approach to assessing WINEP options takes account of the landscape across our region and our commitments to protect and restore nature.

Figure 2: Severn Trent's approach to protecting and restoring nature across our region



Using this approach, we take account, wherever possible, of the wider benefits that our options could deliver and the holistic outcomes that will be achieved.

See Section 3 for details of the options assessment process for each WINEP driver.

2.3 Maximising innovation and learning

We have sought innovative solutions that could maximise benefits or reduce costs. We have a strong track record of using innovative approaches to maximise cost-effective environmental solutions. For example, we are actively exploring the use of Farmgate Nutrient Budgets as part of our drinking water catchment protection programme. Farmgate Nutrient Budgets are holistic assessments which look at the whole farm nutrient balance. They consider all of the nutrient inputs (e.g. fertiliser, feed), outputs (e.g. grain, milk), and what is left within the farm's environment (e.g. soil nutrient status) and therefore potentially able to be lost into watercourses. Assessing holistically in this way:

- Reduces inputs at source e.g. fertilisers and manures, rather than mitigating the impact of them through disrupting nutrient pathways;
- Drives outcomes rather than outputs; and
- Allows benchmarking between farmers in a catchment and/or across farming systems.

The majority of our AMP8 water WINEP programme is focussed on investigating the scale of environmental risks and the appropriate solutions in order to better inform our long-term investment needs. The scale and complexity of investigations required in AMP8 mean we will need to use innovative approaches to gather evidence and quantify environmental targets in time to achieve the WINEP delivery dates.

We will build on the success of the innovative approaches we have taken in delivering AMP7 environmental investigations. For example, we will further evolve the hydroecology predictive model that we developed to inform our AMP7 sustainable abstraction investigations. This innovative modelling approach has allowed us to predict the likely changes in ecology that would occur under a range of different abstraction scenarios, and this has allowed us to determine efficient environmental flow targets faster than using traditional methods. We will develop this model further to help inform the environmental flow targets needed to achieve WFD and long-term environmental destination objectives, and to inform the best value solutions within the affected catchments.

See Appendix F for more information about how we are using Farmgate Nutrient Budgeting and our hydroecology model as innovative tools to help achieve our environmental targets.

2.4 Approach to assessing options

Having identified the range of feasible options that could be deployed, we have then used standardised tools to test the costs and benefits of those options.

In line with the WINEP methodology, viable options and their associated benefits have been calculated based on the NCRAT[5] tool and methodology, which results in a quantified natural capital benefit.

[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1180209/Natural_Capital_Register_and_Account_Tool_-_User_Guide.pdf

Through our Benefits Assessment Tool (BAT), we have extended the assessment to consider greenhouse gas impacts and customer preferences in the form of willingness to pay (WTP). This identifies our best value and least cost options, and supports decisions on where additional benefits justify the selection of options that are not least cost. More detail on our approach to cost benefit is provided in Annex 2 LTDS, section 4.3.

For example, our drinking water catchment protection solutions will also deliver the additional natural capital benefits, as outlined in Table 3.

Table 3: Natural capital benefits arising from our AMP8 drinking water catchment protection

Service measure	30-year value
Air Quality	£13,320
Climate Regulation	£414,470
Water Quality	£31,353,694

The use of nature-based solutions to deliver wider benefits is increasingly recognised as a cost-effective way of achieving both cost savings and environmental improvements. Through our AMP6 and AMP7 biodiversity and catchment management activities, we have established that every £1 spent on environmental improvements results in a saving of between £2 and £20 in water treatment costs and delivers an additional £4 in wider environmental benefits.

2.5 Seeking stakeholders' views on options and priorities

We have sought the views of our key stakeholders to help shape and prioritise our preferred solutions. The WINEP impacts on our strategic planning in many ways and we have been able to gauge stakeholders' views using our WRMP, DWMP and PR24 engagement workshop.

For example, at our draft WRMP24 workshops, we asked stakeholders, including environmental regulators, local authorities, eNGOs and customer representatives, direct questions about the use of nature-based solutions to manage the impacts of water abstraction on the environment. The findings have helped to inform our long-term sustainable abstraction strategy. For example, 70% of WRMP workshop attendees agreed or strongly agreed on the use of nature-based solutions and partnership activities to solve future challenges.

The discussions demonstrated that 'joined-up' approaches to solutions are considered preferable by stakeholders. Taking this in the context of flood management, for instance, it was noted by a local authority representative that planning and solutions in this area should also relate to prioritising nature-based solutions. There was a wish from stakeholders to see biodiversity taking centre stage in planning.

Looking at the types of green infrastructure and catchment proposals being put forward by Severn Trent, it was apparent to groups such as The Rivers Trust that there was a significant overlap with the objectives of other organisations and sectors.

The point was made that combined use of resources would create value. It was also felt that the third sector could be harnessed effectively to support the delivery of objectives, because it can do more with less money than the private sector. Working in partnership on issues that fall under this category was felt to be fundamental for success, and that more specialised groups could offer skillsets in environmental management (e.g. tree planting and its impact on other species).

We provide a summary of how we have balanced all of these views in Section 3.

2.6 Seeking independent challenge and robust assurance

We have sought independent challenge at every stage of this process in order to test the rigour of our assessment and the prioritisation of our AMP8 activities. This has included:

- Consultation with the EA and other stakeholders through a formal process governed by a standard methodology. In its formal feedback on our draft WINEP programme in November 2022, the EA reviewed our Option Appraisal Reports (OARs) and Option Development Reports (ODRs) and asked for further evidence to support the assumptions made in our submission;
- Working with the EA, Natural England and Natural Resources Wales throughout the WINEP development to identify risks, issues and potential improvements needed;
- Independent advice and assurance from Economic Insight on the application of the NCRAT tool;
- Scrutiny of our proposed solutions for biodiversity and SSSIs by Severn Trent's Expert Challenge Panel (ECP), a group of customer engagement experts, to ensure we were incorporating customers' views on scope, pace and affordability;
- Our sustainable abstraction licence strategy has undergone additional levels of assurance through the WRMP24 process, including public consultation in November 2022. We used the Statement of Response to show how the consultation has shaped our choices; and
- Three lines of assurance – the third being external, independent assurance to ensure correct application of WINEP guidelines as well as testing the methodologies and assumptions we have used in our investment planning.

Overall, the development of our WINEP has been a collaborative and iterative process through which stakeholders and regulators have shaped our recommended plan and have challenged our thinking along the way.

3. Summary of the 'no-regrets' investment for AMP8

Our AMP8 WINEP programme has now been finalised with the EA. The WINEP spreadsheet issued on May 2 and then reconfirmed in July and again in September includes the outcome of the EA's options assessment process and actions are only confirmed when this process has confirmed the need and agreed the solution.

Column Heading	Purpose of Column
Options_Assessment_Outcome	To capture the outcome of the Options assessment undertaken by the EA on the preferred option submitted by WC. Please assign 'Proceed' once you are happy the Action has passed the Options Assessment stage AND once there is sufficient mandatory information for the Action populated within this spreadsheet.

The WINEP spreadsheet states that the following categories are used by the EA in the Options Assessment Outcome column:

- 'Proceed';
- 'Proceed to stage 1' (for A-WINEP actions);
- 'Pending' (decision is still pending for the proposed option); and
- 'Reject Option' (environmental risk/issue to be resolved; option(s) proposed are not suitable).

Every line in the WINEP spreadsheet covered by this business case has been marked by the EA as 'Proceed', denoting that the need for action is confirmed, the preferred option has been accepted and the WINEP spreadsheet is completed correctly and this is the trigger for the actions being classed as statutory obligations.

As all the measures contained within WINEP have been agreed and confirmed with the EA, we consider this to meet the Ofwat definition of 'no regrets' investment. We and the EA have sought to ensure that, where uncertainty over the need to invest exists, we will investigate potential AMP9 interventions, to further considered at PR29.

3.1 Overall AMP8 WINEP programme

We shared our draft WINEP proposals with the EA on 30 November 2022, along with our initial estimates of the costs of delivery. Since then we have worked with the EA area teams to review and assess the proposals that have fed into the different version of the WINEP programme. In July 2023 we shared our recommendations for rephasing the delivery of a proportion of the abstraction licence capping activity, although these recommendations were not included in the final WINEP that was issued by the EA in September 2023..

There are two types of activity in our programme:

- **Investigation:** In many cases, the appropriate AMP8 response against the WINEP drivers is to carry out detailed investigations to improve confidence in the long-term environmental need and the investment solution needed. The outputs of these investigations will be used to inform Severn Trent's PR29 investment plan; and

- **Implementation:** In cases where we have sufficient confidence in the environmental needs and the preferred solutions, we have included AMP8 investment to implement those solutions. Our approach to managing investment uncertainty is in line with the long-term planning expectations set out in Defra's WINEP reform work.

AMP8 benefits

Our AMP8 programme will deliver the following key benefits:

- Protect 11 groundwater sources and five surface water sources from deteriorating water quality, avoiding the need for increased water treatment in future;
- Improve biodiversity across 262 Severn Trent sites and on third-party land;
- Implement biosecurity measures to prevent the spread of INNS across our recreation and visitor sites; and
- Investigate the scale of potential PR29 investment needed as a result of:
    - Increasing nitrate and pesticide risks at a number of our sources of supply;
    - Removing barriers to fish passage and removing risks of eel entrainment;
    - Risks to WFD waterbody status caused by our future water abstractions; and
    - The need to achieve the Environment Agency's long-term environmental destination abstraction goals as described in their National Framework for Water Resources.

Our AMP8 investigations mean we will gather the evidence needed to make the best value investment decisions in AMP9 and beyond. For example, our AMP8 environmental destination investigations will assess the long-term abstraction impacts at 130 of our groundwater sites and will gather the cost and benefit data needed to inform the right solutions to achieving the EA's long-term environmental destination goals as described in their National Framework for Water Resources. Up to 440Ml/d of our deployable output may need to be replaced to achieve these long term environmental destination scenarios and our investigations will identify the most cost-effective ways to achieve this and avoid unnecessary expenditure.

Table 4 summarises our AMP8 WINEP programme for the provision of clean water and shows the status of the activities identified. The WINEP driver codes for each activity can be found in Appendix C.

Table 4: Severn Trent AMP8 WINEP programme (water)

WINEP driver	Legislation	AMP8 activity	AMP8 totex	WINEP status
Drinking water protected areas	Water Environment (Water Framework Directive) Regulations	Groundwater schemes (total of 13 catchments): • Seven new catchment protection schemes for nitrates[6] • Four catchment protection schemes for nitrates that are within the Ofwat 10-year continuation time Error! Bookmark not defined. • Two catchment investigations for nitrates Surface water schemes (total of six catchments): • Two new catchment protection schemes for crypto and turbidity, including one on the Welsh Environment Programme (NEP) • Three catchment protection schemes for pesticides that are within the Ofwat 10-year continuation time Error! Bookmark not defined. One catchment investigation for pesticides, nutrients and metals	£18.9m	Proceed at named sites
Water Framework Regulations	Water Environment (Water Framework Directive) Regulations	Actions to prevent WFD status deterioration at the highest priority sites by 2030: network and asset reconfiguration to accommodate abstraction licence changes at 65 sources of public water supply by 2030 plus supporting catchment restoration and protection measures	£308.4m	Proceed at named sites
Water Framework Regulations	Water Environment (Water Framework Directive) Regulations	Investigate how to achieve the EA's abstraction licence capping targets by 2035 across 80 of our abstraction sites	£16.4m	Proceed at named waterbodies

[6] Previous AMP7 WINEP investigations and schemes.

Water Framework Regulations	Water Environment (Water Framework Directive) Regulations	Heavily Modified Water Body investigations at Stanford and Draycote reservoirs	£0.8m	Proceed at named waterbodies
Environmental destination	Environment Act	Investigate how to achieve environmental destination targets across 130 abstraction sites and 12 catchments Gather the cost-benefit evidence to support the associated PR29 investment	£23.4m	Proceed in named catchment
Biodiversity enhancements	Natural Environment and Rural Communities Act	Implement biodiversity plans developed in AMP7 across 262 sites, improving 1,530 hectares of Severn Trent-owned land across the following habitats: • 807 hectares of grassland • 85km of hedgerow • 382 hectares of woodland • 42 hectares of INNS • 42km of improved watercourses • 169 hectares of wetlands These habitat improvements will be on separate parcels of land. Work on third-party land to deliver water quality benefits via Biodiveristy Improvements: • Over 3000 hectares of peatland restoration through Moors For The Future • Over 120 hectares of woodland planting in the Cloughs separating the moorland and peatland with our reservoirs, reducing flood risk, improving water quality and increasing biodiversity, • Enhancement on over 10,000 hectares of third party land where we have been working in AMP7 to start creating and enhancing habitat in our region The above activity on both Severn Trent and third party land will improve 15,000 hectares in the region by 2030 and provide a better, more resilient water supply	£39.4m	Proceed with named actions

Remove barriers to fish passage	Natural Environment and Rural Communities Act	Investigate opportunities to remove barriers to fish passage across the Severn Trent region: Remove a weir at Peakshole Water to improve 5.5km of river length, and investigate barriers across the Derwent catchment	£3.5m	Proceed with named actions
Sites of Special Scientific Interest (SSSI)	Wildlife and Countryside Act	Deliver site management action plans to ensure 100% of SSSIs are at Recovering or Favourable status	£5.3m	Proceed at named sites
Invasive non-native species (INNS)	The Invasive Alien Species (Enforcement and Permitting) Order 2019 Wildlife and Countryside Act	Implement biosecurity plans at 10 visitor sites. Deliver cross-company projects to: • Investigate mitigation options for raw water transfers • Develop monitoring techniques at high-risk sites	£2.5m	Proceed with named actions
Eels Regulations	Eels (England and Wales) Regulations	Investigations to confirm eel entrainment and to identify barriers, actions to improve diversion structures to prevent entrainment of eels	£1.1	Proceed with named actions
Habitats Directive	Habitats Regulations	Investigations and options appraisal at River Clun SAC	£0.4m	Proceed at named site
Total			**£420.1m**	

In the remainder of this section, we detail the AMP8 activities for each of the WINEP drivers for water.

3.2 Drinking water protected areas

Drinking Water Protected Areas (DWPAs) are designated areas around water sources that are vital for drinking water supply. These areas are established to safeguard drinking water quality by preventing any contamination from sources of pollution such as agricultural run-off, industrial discharges, or storm overflows.

Water companies in England are responsible for managing and treating water to ensure it is safe for human consumption. DWPAs allow a proactive approach to protecting the sources of our drinking water from contamination, and help ensure that the water we drink is of high quality and safe for consumption.

Successful DWPAs involve a collaborative effort between multiple stakeholders, including water companies, regulators, farmers, landowners, and local authorities. These stakeholders work together to identify and address potential sources of pollution in the designated areas and implement appropriate measures to prevent contamination.

Identifying and assessing options

We identified 24 unconstrained options to reduce nitrate concentrations at seven of our groundwater sources, informed by our AMP7 WINEP investigations and options appraisals. As agreed with the EA, we have followed the guidance set out in the relevant WINEP AMP7 Investigation Measure Specification Forms.

Our AMP7 WINEP catchment investigations considered a range of different catchment management scenarios and options, including whole-catchment approaches and a lighter touch approach with a restrictive catchment measure offering. For each site, we used screening criteria to remove unfeasible options and to identify a constrained list of options including intervention across the whole catchment, targeted measures on the highest-contributing parts of a catchment, and a lowest cost catchment option. These feasible options were informed by our experiences of delivering catchment management schemes in AMP6 and AMP7.

Using the approach set out in Section 2, we assessed and compared the costs and benefits. In all cases, the preferred option is one that aims to prevent deterioration of nitrate concentrations and maintains and/or reduce average and peak levels, in alignment with the direction of WFD article 7.3[7]. The results of the assessment are outlined in Table 5.

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A32000L0060

Table 5: Cost-benefit assessment for drinking water protected areas

Option	Cost-benefit ratio	Criterion	Results
Whole-catchment approach	0.04-0.59 (site dependant)	• Does it meet/work towards our statutory obligations? • Is it technically feasible and deliverable? • Does it contribute to wider environmental outcomes?	Selected
Targeted measures	0.1-0.52 (site dependant)		Alternative option
Lowest cost	N/A – not deemed to be deliverable or able to meet statutory obligations		Rejected

Preferred option: Whole-catchment approach

The primary benefit of the whole-catchment approach is water supply, followed by water quality and climate regulation, particularly by decreasing the energy use of the farms in the catchment (e.g. through reducing use of chemical fertilisers).

Many of the catchment measures have positive impacts on agriculture, including increased resource efficiency and yield, soil quality (reducing erosion and improving soil health), biodiversity (increasing habitat areas), climate regulation (including reduced requirement for fertilisers), and hazard regulation (reducing run-off and slowing flow to watercourses to reduce flood risk).

In terms of other drivers, catchment management measures have the potential to improve the WFD status of surface waters through reducing nutrient and sediment loadings in run-off (see Section 3.3).

In adherence to the WINEP guidance, we have monetised the following benefits:

- Water quality through the length of river improved (km);
- Air quality; and
- Climate regulation.

When calculating and monetising the water quality benefit (length of river improved), a reduction factor was applied to the watercourse length to scale the benefits to something more realistic. As such, 35% of the total river improved river length was used for monetisation (e.g. 35% realistic improvement when applied to 125km watercourse length gives an equivalent 43.75km improvement during the AMP).

Benefits to biodiversity through habitat changed was also calculated, but not monetised (in accordance with the WINEP guidance).

In addition to encouraging farmers and landowners to make changes to their farm infrastructure, land and livestock, the catchment scheme will encourage and incentivise farmers to create biodiverse habitats which will also result in a reduction in water pollution. This includes installation of diverse herbal leys, creation of riverside buffer strips, installation of grassed waterways, and leaving field corners uncultivated or planting them up.

AMP8 activities

Our AMP8 plan includes £18.9m of investment in drinking water catchment protection and investigations into water quality risks.

Implementation

- Seven groundwater-focused nitrate catchment protection schemes, informed by the conclusions from our AMP7 WINEP investigations (DrWPA_ND), and another four which fall within the Ofwat 10-year scheme continuation;
- Two surface water-focused catchment protection schemes, one to reduce crypto risks at our River Severn abstractions, and another to reduce turbidity at our River Dee source (DrWPA_ND). There also another three which fall within the Ofwat 10-year scheme continuation; and
- Around £17m of ongoing drinking water catchment protection activity in 30 catchments will be dealt with through our base expenditure rather than the WINEP enhancement expenditure.

Investigation

- Two surface water catchment investigation on the River Trent and River Dee (DrWPA_INV); and
- Two groundwater investigations at sites with rising nitrate trends (DrWPA_INV).

3.3 Water Framework Regulations

The WINEP includes the actions needed to deliver the legal requirements to prevent deterioration of Water Framework Directive (WFD) status and to achieve the statutory objectives set out in our River Basin Management Plans. The WFD establishes a framework for community action to protect and improve the water environment. Water companies have a duty to take the EA's River Basin Management Plan (RBMP) objectives into account when carrying out their statutory functions. We must assess our current and future predicted abstractions to ensure they comply with and support the achievement of WFD regulations requirements and objectives set out in the RBMPs.

The WFD status is a measure of the ecological health of waterbodies and is determined by the presence of certain biological, physical, and chemical elements. These elements include the abundance and diversity of aquatic plants and animals, water quality indicators such as nutrients, and the physical characteristics of the water body, such as water flow and temperature.

Waterbodies that fail to meet the standards set by the WFD can suffer from a range of problems, including pollution, habitat degradation, and the loss of biodiversity. This, in turn, can have negative impacts on human health and wellbeing, as well as on the economy and society as a whole.

To prevent the deterioration of WFD status, it is essential we take a proactive and coordinated approach to managing our water resources. This means working together to reduce pollution from a variety of sources, including agriculture, industry, and homes. It also means implementing measures to protect and restore habitats, improve water flow and quality, and manage water abstraction in a sustainable way. Our AMP8 WINEP programme reflects our latest understanding of the need to cap abstraction licences in order to prevent WFD deterioration.

Identifying and assessing options

Investment in this case addresses the impacts and costs of accommodating abstraction licence caps by 2030 at our highest risk sites as well as completing the investment needed to accommodate the 2030 licence changes that were specified in the PR19 WINEP. These abstraction licence changes require extensive network and asset reconfiguration to ensure we can maintain security of supplies

and drinking water compliance. These network and asset changes are in addition to the enhancement case 08 meeting our future water needs, which sets out the investment needed in new and alternative sources of water supply needed to offset the deployable output that will be lost as a result of licence capping.

In 2022, we launched our Operational Area Sustainable Abstraction Strategy (OASAS) project to conduct a county-by-county review of the implications of the WFD no-deterioration and Environmental Destination licence changes. The OASAS reviews involved representatives from multiple Severn Trent teams to assess the implications for investment and asset operation at an operational area scale. For example, if a source is likely to be restricted by upcoming licence changes to prevent WFD status deterioration, then then that needs to be taken into account by the wider asset investment planning activities. Likewise, if a group of sources poses a risk of causing deterioration due to high recent abstraction rates, then operational changes will need to be made to avoid that deterioration transpiring.

For each of our seven operational counties, the stages of the OASAS project were:

1) Defining the problem – What is the size of the long-term deployable output problem that is either driven by WFD No Deterioration or Environmental Destination?
2) The Current System – How is the water supply operational area currently configured?
3) The Future System – How would the operational area have to be configured in the future to meet the challenges posed by the main drivers identified in steps 1 and 2?
4) Implementation Plan – What actions and activities would need to be undertaken to change the operational area from the current system to the future system?

The OASAS project provided an overarching view of the factors that need to be considered at an system scale when making decisions about changes to abstraction rates across multiple sites.

The OASAS project outputs have guided the options development process for the PR24 WINEP. As OASAS identified the likely operational impacts of the abstraction licence changes, we also took account of any wider planned investment. For example, the OASAS assessed any potential interactions with current or planned WRMP schemes, current or planned borehole capital maintenance projects, any source optimisation plans, any planned changes to how the network is operated, any new/refurbished infrastructure links, changes to imports/exports and any water quality blend changes that may necessitate a change in future abstraction. As a result we were able to identify options that could address multiple needs and exclude options that would duplicate or conflict with the wider asset investment plan.

Our investment plan also includes the AMP8 investigations into the remaining, lower priority sites where the EA has indicated that licence caps will be needed in 2035. Our AMP8 WINEP programme includes the statutory requirements to investigate the WFD risks at these sites and how best to accommodate the impacts of abstraction licence capping. The outputs of these investigations will inform and complement the network interventions included in the enhancement case 08.

AMP8 activities

Implementation

The phasing of when abstraction licence caps are implemented is material to our investment and delivery plans. The WINEP reflects the EA's priority timeline for implementing licence caps, with the highest priority sites to be capped by 2030 and lower priority sites by 2035.

Licence capping will result in the loss of c.187Ml/d of deployable output by 2035, which is equivalent to around 10% of the water we put into supply daily. The 08 Meeting future water needs business case addresses the supply-demand investment needed to replace the deployable output lost due to licence capping.

This 04a Water WINEP business case includes the investment needed to carry out extensive reconfiguration of our supply networks to maintain resilience of supply and drinking water quality under the new abstraction licensing regime. The first phase of licence changes will affect 70 of our existing groundwater sources and their associated distribution networks by 2030. In AMP9, a further 93 groundwater sources will be affected. Alongside the network reconfiguration, we will manage the environmental risks in the affected water bodies by preventing net growth in abstraction and implementing catchment protection measures. Our assessment is that £463m of network reconfiguration will be required by 2035, £308m of which falls in AMP8.

Because the licence capping policy affects nearly 75% of our groundwater sources, the solutions require a system-wide reconfiguration of our networks, as well as providing new, replacement sources of deployable output. The system-wide investment is due to the cumulative effects of licence capping across multiple sources in our network. For example, our Shelton water resource zone currently operates as a conjunctive system, balancing abstraction throughout the year between our Shelton River Severn abstraction and 18 different groundwater sources. Through the licence capping policy, each of these groundwater sources faces an abstraction licence cap of between 2030 and 2035 which will deteriorate our zonal deployable output and will put supply resilience and drinking water quality compliance at risk.

To maintain supply resilience, we need to invest in network reconfiguration and water treatment processes that mean our assets are able to comply with the new constrained abstraction licence conditions. Therefore, an integrated system-wide investment plan needs to be delivered before multiple abstraction licence caps can be introduced across our groundwater sources.

Delivering a network reconfiguration programme of this complexity and scale without impacting security of supply will take careful coordination. We are developing delivery plans to ensure we fully explore and mitigate risks to service, and through this work we have identified extremely complex network changes that will be needed in our groundwater fed water resource zones. As an example of the scale of investment needed, Appendix G lists the network and asset changes that will be required by 2030 across our Shropshire water resource zones to accommodate the WFD No Deterioration abstraction licence caps. The equivalent activities are required across all of our water resource zones that have groundwater fed systems.

Investigation

Our AMP8 WINEP programme includes £16.4m investment to investigate the risks that our water abstractions pose to future WFD status, and to understand what we need to do to prevent deterioration occurring. The conclusions of these investigations will inform our PR29 water resources and supply investment plans.

There are two types of water resource activities that have been identified for no deterioration investigations for PR24: firstly, unused licences and, secondly, sources that have been assessed as Priority C or D using the EA's risk categories. For these 80 C and D sources, our WINEP investigations have a primary WFD_NDINV_WRFlow driver which is allocated to the surface waterbody with the assumed largest impact (based on the EA's datasets). For all groundwater sources (excluding spring sources), a secondary WFDGW_NDINV driver has been added.

The majority of the sources proposed for AMP8 investigation have had no prior investigation, so the available data is likely to be limited. Our AMP8 work will provide an opportunity to refine abstraction growth estimates, understand environmental risks, and identify solutions to prevent deterioration.

Each investigation will include some variation of a desk study, a monitoring programme, an impact assessment and, if required, an options appraisal (including cost-benefit assessment) to allow for a cost-effective solution to be defined for PR29 or beyond.

3.4 Fish passage and screening

Fish passage is a necessity for a healthy river ecosystem, allowing fish to travel their migratory or transitory routes along the watercourse. Assets of various landowners have, over time, caused impassable barriers that prevent the effective movement of species. Maximising the length of watercourse available for species is a key factor in achieving WFD Good ecological status and increasing resilience to other pressures.

Identifying and assessing options

Since AMP6, there has been increasing focus on our contribution to improving fish passage and screening. A list of risks and issues was compiled by the EA's fisheries and biodiversity teams, identifying a number of our assets in river reaches that may require action. Through the WINEP engagement process, we worked with the EA to refine this list.

For the majority of sites identified, it was agreed with the EA that, because retrofitting a solution is likely to be complex and costly, more detailed investigations were needed to better understand the nature of the risk and to define the costs and benefits.

In addition to the list of sites to be investigated, the EA identified one structure at Peakshole Water as their priority for implementation in AMP8, outlined in Table 6 below.

Table 6: EA assessment of fish passage at Peakshole Water

Scheme	Assessment	Preferred option
Improving passage at a weir on Peakshole Water	Structure is relatively small and improvements could be made at low cost. The intervention will not change the water body WFD status and so the benefits cannot be monetised, but 5.5km river will be enhanced and wide-ranging wider environmental outcomes for fish, biodiversity and recreation	Removal of structure

AMP8 activities

Investigation

Our AMP8 plan includes £3.7m to investigate opportunities to improve fish passage in the waterways across our region, enhancing the biodiversity of the affected rivers. We will proactively identify Severn Trent assets that cross or are adjacent to watercourses across the region, highlighting those that are causing issues for fish passage. This will allow us to identify future opportunities, and to prioritise options, to remove or adjust the assets to ease fish passage, not only improving accessibility within our catchments for fish, but also bringing wider biodiversity and geomorphology benefits.

In addition, the EA has an ambition to improve fish movement in the Derbyshire River Derwent in the Peak District National Park. It has identified a number of specific Severn Trent assets and reaches influenced by our water resources activities for investigation in AMP8. These include barriers and

intakes associated with our critical river abstractions at Ambergate on the Derwent that feeds Carsington and Ogston reservoirs, and on the rivers Ashop and Noe, which provide water to the Upper Derwent Valley reservoirs. The investigations will determine whether these assets impact on fish populations, and whether intervention is needed. The structures currently do not fall within the Eels or Salmon and Freshwater Fisheries Act (SAFFA) regulations. The near-term driver would be to improve resilience of brown trout (Salmo trutta), allowing better access to the habitats within the river that are needed for their lifecycle. There may also be a future benefit for migratory salmon, trout and eels, as passage at downstream barriers continues to be addressed.

One barrier at Peakshole Water in the Derbyshire River Derwent was identified by the EA as its priority for addressing in AMP8, and our plan includes the EA's preferred option to remove the structure. This would enhance the entire 5.5km of the waterbody, as well the wider catchment, allowing free movement for fish species, including trout, to access new spawning habitat. Restoring the river to a more natural state will bring wider biodiversity benefits through positive impacts on the local food web and improved natural sediment movement, and also benefit walkers using the adjacent Peak District footpath.

3.5 Environmental destination

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 a near-natural state as soon as is practicable. These long-term goals are reflected in the EA's latest draft RBMPs and its National Framework for Water Resources (NFWR).

To achieve these goals, Severn Trent will need to make large-scale changes to the ways we abstract water from our sources of groundwater supply. By the 2030s, the EA's abstraction licensing policy means that many of our existing groundwater abstraction licences will be capped and we can no longer assume that any spare licence capacity will be available to meet future needs. The cost of replacing the deployable output lost as a result of these licence caps is addressed in enhancement case 08.

By 2050, the EA's current guidance on achieving the long-term WFD environmental destination goals means we will need to go beyond licence capping and reduce groundwater abstraction to achieve the NFWR targets. Our revised WRMP24 describes how the BAU+ environmental destination scenario would require us to reduce our deployable output by approximately 418Ml/d by 2050.

Identifying and assessing options

The potential impacts on our water supply-demand capacity are material, but the NFWR scenarios are also highly uncertain due to the potential impacts of climate change and local hydroecology needs. We have tested our WRMP24 using a range of environmental destination scenarios to inform our adaptive planning approach to demand management and water resource scheme delivery.

Rather than committing to significant new water supply schemes and expenditure in AMP8, we propose an extensive investigation programme to reduce the uncertainty around the scale of abstraction reductions that will be needed, and to develop catchment-scale solutions. We have worked with the EA to agree the scope of the required AMP8 WINEP investigation programme, and to align the approach across the Water Resources West (WRW) region.

AMP8 activities

Investigation

Our AMP8 WINEP programme includes £23m to investigate the potential impacts of the EA's environmental destination scenarios, and to identify solutions to achieve those goals. The outputs of these investigations will inform our PR29 investment plan and WRMP29.

Consistent with other English water companies, we are using the latest best estimate of the Environment Agency's 2050 BAU+ locally verified scenario (referred to as BAU+ in the plan). This scenario uses existing policy and regulatory approaches now and into the future. It also includes applying flow targets required for European designated riverine sites by 2050 at the latest. Locally verified refers to the analysis we have carried out with Water Resources West to refine the scenario data developed at national scale by the EA for the National Framework. This incorporates the discussions held locally with stakeholders and regulators together with work that has already happened or is in progress to ensure the right level of protection and enhancement is being applied.

Severn Trent's revised WRMP24 shows that the impact of the EA's BAU+ environmental destination scenario is potentially very material, representing a deployable output loss of approximately 418Ml/d. However, there are significant uncertainties around both the scale of impact and the appropriate solutions. Therefore, during AMP8 we will undertake extensive investigations to properly understand and define the water abstraction changes needed to achieve the scenario goals, while also investigating the asset reconfiguration implications for our water supply systems.

The scope of the AMP8 investigations will include:

- Reducing uncertainties in understanding how to achieve the NFWR environmental destination goals;
- Potential unintended consequences (e.g. flood risk related to abstraction reductions);
- Specific schemes that could significantly increase ambition;
- Pilot schemes to understand the potential benefits from solutions which are novel or innovative (e.g. nature-based solutions);
- Groundwater modelling under a range of potential future climate scenarios;
- Quantifying the environmental benefits and costs arising from achieving the environmental destination goals; and
- Engineering options to reconfigure public water supply systems in areas where significant abstraction reductions would be required to achieve the environmental destination scenario.

The outcome of these investigations will be a series of environmental flow and abstraction targets for the catchments across our region and a defined investment plan for achieving these improvements without deteriorating security of water supplies.

Implementation

We will target action in the two priority catchments that have been highlighted through our regional stakeholder engagement: in the River Idle and in the Worcestershire Middle Severn catchments. We will deliver partnership schemes in these catchments that will:

- Improve the resilience of catchments (including nature-based solutions and habitat restoration);

- Improve the efficiency of interaction with the water cycle in catchments, including options to change abstraction and discharge locations. For example, moving abstractions downstream of Severn Trent discharges to a location where the impact of abstraction is smaller; and
- Identify where abstraction reductions could make some additional water available for abstraction downstream and assess whether this can be used to offset deployable output lost to upstream abstraction reductions.

We will use the learning from these two multi-sector catchment improvement schemes to develop similar solutions to help achieve the long-term environmental destination objectives across our region in future AMPs.

3.6 Eel protection

The Eels Directive is designed to protect and conserve the European eel population, which has experienced a significant decline in recent years. One of the key issues facing the eel population is entrainment, which occurs when eels become trapped in water intakes and are unable to escape. This can result in significant mortality rates, exacerbating the decline of the eel population.

To address this issue, it is essential that investment is made in measures that prevent eel entrainment. This can include the installation of screens or other forms of mitigation to prevent eels from becoming trapped in water intakes, and the modification or replacement of existing infrastructure to make it more eel-friendly.

Failure to take action to prevent eel entrainment not only threatens the survival of the eel population, but can also result in non-compliance with the Eels Directive.

Identifying and assessing options

We have been working in AMP5 and AMP6 to address assets that the EA has classified as high and moderate risk for eels. For our PR24 WINEP, a list of risks and issues was compiled by the EA's fisheries and biodiversity teams, identifying areas of lower or unknown risk to eel entrainment or passage. We collaborated with the EA to refine this list. For the PR24 WINEP, it was agreed that a wider investigation in AMP8 was needed to better understand the nature of the risk, to identify possible options, and to define the costs and benefits.

AMP8 activities

Investigation

The AMP8 WINEP investment plan includes £1.1m to investigate whether eels are present in Severn Trent's raw water reservoirs and whether existing reservoir infrastructure presents a risk of eel entrainment. Our plan also includes an investigation into whether existing infrastructure at Eathorpe presents a barrier to eel passage in the River Leam.

3.7 Biodiversity enhancements

The Environment Act 2021 introduced changes to the Natural Environment and Rural Communities (NERC) Act and introduced new statutory duties that we should conserve and enhance biodiversity. This change imposes new enhancement obligations on us that go beyond the previous NERC Act requirement to conserve biodiversity. The aim of this change is to provide for the enhancement or improvement of biodiversity, not just maintenance in its current state.

This change requires water companies to consider what action they can take to further the conservation and enhancement of biodiversity. These new legal duties will result in an increase in AMP8 expenditure to deliver the new obligations defined in the WINEP. The actions needed to fulfil these new duties may involve:

- Conserving, restoring or otherwise enhancing a population of a particular species; and
- Conserving, restoring or otherwise enhancing a particular type of habitat.

Identifying and assessing options

As a significant landowner, biodiversity audits and subsequent enhancement plans have been completed for a number of our sites in AMP7, and the expectation under this driver is we will be able to commence implementation of the recommendations and findings to be able to deliver our statutory biodiversity duties. These audits have been undertaken by ecologists and environmental experts with suitable qualifications to be able to suggest the most appropriate interventions required to enhance the sites.

These biodiversity options have been assessed and approved by both the Environment Agency and Natural England and have been marked as 'Proceed' in the PR24 WINEP.

These biodiversity enhancements will provide a range of natural capital benefits and raw water quality improvements. Figure 3 below provides a worked example of the wider benefits that these biodiversity improvements will deliver, using Natural England's Environmental Benefits for Nature Tool. In this example the simplest enhancement has been used to demonstrate the impacts of converting the 807 hectares of grassland from improved grassland to semi-natural grassland.

Figure 3: Example of wider benefit assessment

Potential impacts of on-site and off-site habitat change at three time points (not cumulative): Whole area

Select area of interest:

Whole area	1 year	10 year	30 year	Confidence	Interpretation (Expand / Collapse)
Food production	↘	↘	↘		The results 30 years after development indicate a decrease in the ecosystem service of food production.
Wood production	→	→	→		
Fish production	→	→	→		
Water supply	↗	↗	↗		
Flood regulation	↗	↗	↗		
Erosion protection	↗	↗	↗		
Water quality regulation	↑	↑	↑		
Carbon storage	↗	↗	↗		
Air quality regulation	→	→	→		
Cooling and shading	→	→	→		
Noise reduction	→	→	→		
Pollination	↑	↑	↑		
Pest control	↑	↑	↑		
Recreation	→	→	→		
Aesthetic value	↑	↑	↑		
Education	↑	↑	↑		
Interaction with nature	↑	↑	↑		
Sense of place	↑	↑	↑		

Change in average score per hectare

Large decrease (more than -2.5 points out of 10)	↓
Decrease (-0.25 to -2.5 points out of 10)	↘
Minor change (-0.25 to 0.25 points out of 10)	→
Increase (0.25 to 2.5 points out of 10)	↗
Large increase (more than 2.5 points out of 10)	↑

Confidence

	The relationship between the provision of the ecosystem service and habitats is complex. Evidence for scoring/multipliers is partial, although may be stronger for some habitats than others. Evidence gaps have been filled by consulting experts and with a degree of subjectivity, particularly for cultural services.
	We have some suitable evidence to calibrate our range of scores across habitats and multipliers and/ or scoring applied to a limited range of habitats/ multipliers for which there is a sound and simple rationale.
	We have a strong evidence base upon which to base scores across the range of habitats and multipliers used for this ecosystem service.

In this simple example, the Natural England tool demonstrates how these simple changes to grassland will deliver a wide range of further ecosystem service benefits over time.

AMP8 activities

Our AMP8 plan includes £38m of investment to enhance biodiversity across the Severn Trent region and to investigate further opportunities to improve in future.

Implementation

By 2025 we expect to have completed audits on 262 sites that will inform the programme for delivery into AMP8. Each individual site assessment will produce its own bespoke habitat management recommendation. The sites have been identified based on the below selection criteria and as outlined in our Biodiversity Strategy:

- Sites greater than 1ha with 100m buffer applied for:
  - Sites of Special Scientific Interest (SSSIs);
  - Special Areas of Conservation (SACs);
  - Local Wildlife Sites (LWSs);
  - Bug Life B-lines;
  - Sites where bird ringing is taking place for monitoring;
  - Engaged site managers;
  - Adjacent to third-party Severn Trent-funded projects; and
  - Sites where a PEA (Preliminary Ecological Appraisal) has been completed or is upcoming.

Selection of priority sites for subsequent phases is also being influenced by work that we have carried out to better understand our landscape as a whole. As part of the Action Specification Forms (ASFs) the sites identified will be assessed jointly, including by specialists and regulators from the Environment Agency and Natural England. Based on the work completed in previous investigations on 62 sites, we estimate the average cost per hectare (ha) or kilometre (km) as outlined in Table 7:

Table 7: Average unit cost assumed for different biodiversity improvement activities

Habitat type	Area of improvement (ha/km)	Cost	Cost (£ per ha/km)
Grassland	266.58	£1 369 925	£5 138
Hedgerow	15	£33 179	£2 211
Woodland	226	£372 156	£1 646
Invasive Non Native Species (INNS) Removal	21	£200 454	£9 545
Watercourse	7	£377 217	£53 888
Wetlands	90	£2 272 698	£25 252
Total	**625.58**	**£4 625 631**	**£7 394**

Using the current UK Habitat Classification (UKHab) and biodiversity net gain (BNG) assessments to understand the potential biodiversity creation, we anticipate delivering an average of approximately 1.25 BNG units per hectare. Overall, while there is uncertainty around the specific sites we will be working on, we anticipate that our WINEP biodiversity commitments will deliver up to 1,912 biodiversity units across our region by the end of AMP8.

The time it takes to achieve the target condition using BNG assessments will vary depending on condition and habitat type, and will be a multi-AMP process. However, using the current BNG valuation of £22,300, this would generate approximately £42.6m in BNG unit value over the forecast 1,530 hectares on Severn Trent land.

Based on our AMP7 experience, our AMP8 investment plan anticipates we will be successful in enhancing biodiversity across 30% of the area of the 262 sites being surveyed. This is in line with the 30-by-30 pledges[8] made by leading UK organisations.

In addition to our own sites, our AMP8 plan includes £21m to also enhance and protect biodiversity on third-party land throughout the Severn Trent region. This will continue to provide a nature-based, catchment-wide solution to water quality and treatment. As outlined in Section 2.3, the wider benefits of enhancing biodiversity throughout the catchment has a direct benefit on water quality and quantity.

During AMP7, we expect to deliver approximately 10,000ha of biodiversity improvement, but these largely fall under five-year agreements. Upon cessation of these agreements, it is likely that the biodiversity improvements implemented will revert back, or will no longer be maintained. We need to ensure there are mechanisms in place to support these projects beyond AMP7, so they can continue to provide biodiversity and wider environmental benefits. The aim of our AMP8 WINEP investment is to sustain the interventions that have been previously deployed with third-party land owners. Without ongoing investment and support, there is a likely risk that the landowner would no longer be incentivised to maintain the habitat, resulting in a biodiversity loss and reversion to previous land use/condition.

Investigation

The 2021 Environment Act places greater emphasis on landowners to conserve and enhance the biodiversity on their land. The investigation into species recovery projects will identify opportunities that will allow us to comply with this obligation. It will also identify opportunities for reintroducing ecosystem engineers such as beavers and water voles, which play an important function in water quality and thus have a direct impact on our function as a water company. Our species recovery investigation will look into Severn Trent landholdings and identify those sites and areas that could support 'Ark' site activities such as providing refuge for white-clawed crayfish populations to recover away from any risk of the non-native species that decimate their populations. There are numerous endangered and at-risk species in the catchment and so we shall investigate what further we could do on our sites to help them.

We will undertake two biodiversity-centric investigations in AMP8 looking at the impact of Severn Trent-owned fish barriers within the catchment, and identifying opportunities to contribute to species recovery programmes and to improve catchment-based solutions for water quality. These investigations are likely to include some pilot implementation of actions but will be focusing on identifying the appropriate delivery items for AMP9. As part of the investigation into fish barriers we will identify all the Severn Trent assets crossing or adjacent to watercourses within the catchment. This will be the baseline that will be used and then enhanced to identify those that are causing issues for fish passage. The ability to identify any fish barriers will allow future AMP cycles to look at options available to either remove or adjust the asset, provide alternative relief/passage for fish and/or

[8] https://committees.parliament.uk/committee/515/environment-and-climate-change-committee/news/196726/we-urgently-need-to-protect-englands-nature/

remove any redundant assets. Removal of weirs and other barriers does more than simply open up the range of fish. It can have a wide range of impacts on the environment and local communities, including on biodiversity, unblocking fish migrations, unlocking trapped sediment and nutrients to maintain habitat and estuary health, and altering flow patterns that drive the productivity of downstream floodplains and wetlands. These impacts can affect public safety, food and water supplies, livelihoods, recreation and overall community wellbeing[9].

3.8 Sites of Special Scientific Interest (SSSI)

As an owner of over 500 hectares of Sites of SSSIs across 72 sites, we have a duty to protect them from detrimental activity. As a statutory body, we also have a general duty to further the conservation and enhancement of the special features of our SSSI land. This duty is designed to protect the site, in turn protecting the UK's most precious species and habitats.

As part of our commitment to enhance biodiversity, we are putting in place management plans for all sites during AMP7 and identifying the work required to bring them back into Favourable condition. Improving the condition of our SSSIs will deliver the best outcomes for the environment and represents the best use of resources and whole-life value. Proactive action tends to be more cost-effective than recovery: for example, robust INNS monitoring and management that prevents the spread of INNS will be less expensive than later mitigation of INNS spread. The proposals as submitted will exceed the plans set out by the Government in their Environment Improvement Plans which are:

- All SSSIs will have an up-to-date condition assessment by 31 January 2028;
- 50% of SSSIs to have actions on track to achieve favourable condition by 31 January 2028; and
- Restore 75% of protected sites to favourable condition by 2042.

Our programme will ensure 100% of our protected sites are under a management plan and will be in Recovering or Favourable condition by 2030.

Identifying and assessing options

We have considered a wide range of options to improve and restore biodiversity under the NERC_IMP and SSSI_IMP WINEP drivers, while also taking into consideration the benefits that these options could also provide to the other WINEP drivers.

Based on the condition assessments completed by Natural England, only 70ha of the SSSIs we own are in Favourable condition (14%). Figure 4 shows the site condition of SSSIs owned or managed by Severn Trent, and the types of habitat this land supports.

[9] Stephen Addy, Susan Cooksley, Nikki Dodd, Kerry Waylen, Jenni Stockan, Anja Byg and Kirsty Holstead (2016) River Restoration and Biodiversity: Nature-based solutions for restoring rivers in the UK and Republic of Ireland.

Figure 4: Site condition of SSSIs on land owned or managed by Severn Trent, and by habitat type[10]

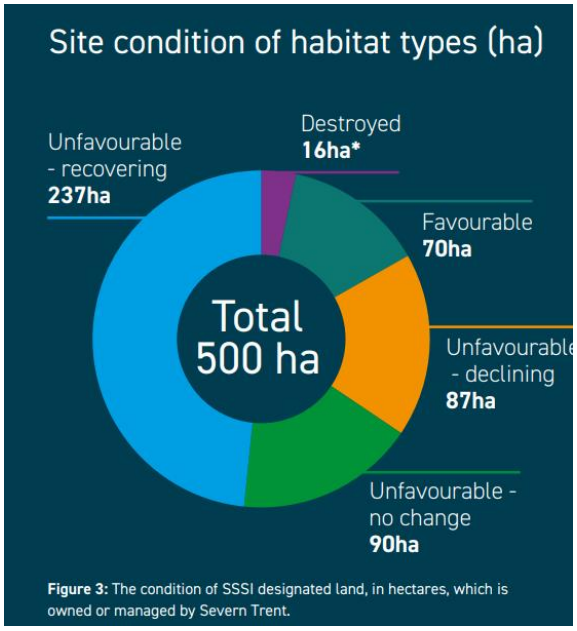


Figure 3: The condition of SSSI designated land, in hectares, which is owned or managed by Severn Trent.

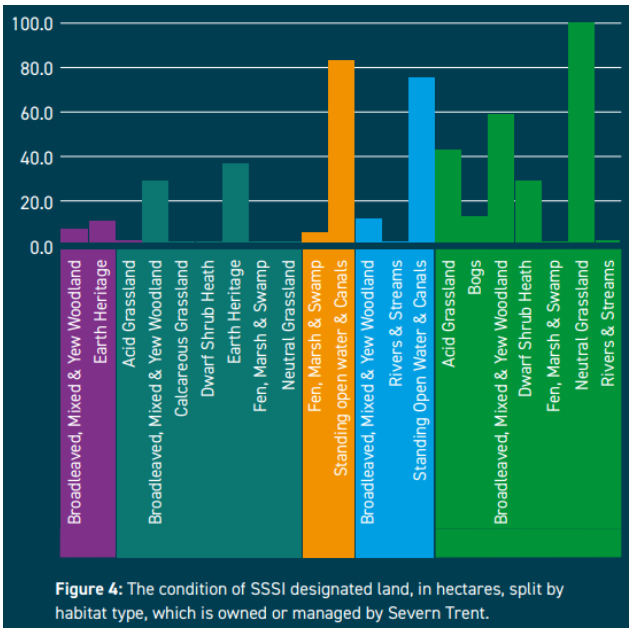


Figure 4: The condition of SSSI designated land, in hectares, split by habitat type, which is owned or managed by Severn Trent.

While this means there is 70ha in Favourable condition, the remaining 435ha all require a comprehensive management plan to play our part in returning them to Recovering or Favourable status by 2030. Returning SSSIs to good condition will result in diverse and ecologically complex landscapes that are better at providing the range of ecosystem services, such as clean water and carbon sequestration, that we depend on to deliver our wider performance targets.

Our unconstrained options were derived using the principles identified in RBMPs, WRMPs, Drainage and Wastewater Management Plans (DWMPs), Flood and River Management Plans, The Lawton Review (2010), The Dasgupta Review (2021), and Defra's Biodiversity 2020. We took into account the following considerations:

- Delivery of protected site improvements across the entire SSSI portfolio within the Severn Trent catchment, as long as a portion of our land overlaps with the SSSI. This covers a range of ownership models, conditions, and access requirements/limitations;
- Both terrestrial and aquatic habitats. The SSSI improvements within Severn Trent's ownership are largely terrestrial; and
- The assumption that accountability for the SSSI rests with Severn Trent (rather than calculating our fair share), even where there is a relatively minor overlap with Severn Trent land. This could prove either prohibitively expensive, or would be unadvisable due to the nature of the sites and the association with other landowners, their responsibilities, and the potential for the significant negative contributors to a site's condition being outside the Severn Trent boundary.

We set the following parameters and observations during option development:

[10] Note that the asterisk next to 'Destroyed' in Figure 5 refers to the geological interest only. The woodland feature is in Favourable condition and the acid grassland is in Unfavourable (Recovering), but the Natural England reporting system does not allow this to be recorded.

- Based the assumed extent of area improved on the existing habitat type and condition using the site condition assessments undertaken by Natural England and available on Site Search (naturalengland.org.uk); and
- Biodiversity enhancement activities do not provide instantaneous results, and therefore qualification of output should be based on areas of land/watercourse that have been ring-fenced for biodiversity enhancements and are under a management plan. This has been agreed with the regulator, Natural England.

We assessed our unconstrained list using the following criteria, to produce a list of constrained options:

- Expected to meet statutory obligation(s) with a high degree of confidence (>98% certainty);
- Contributes to the WINEP wider environmental outcomes;
- Legal, technically feasible and deliverable; and
- Meets the AMP7 Biodiversity performance commitment definition (as detailed in our internal Process Description Template).

Based on our catchment-wide approach to delivery of biodiversity enhancements, we have not ruled out any options that are deemed to be aligned to our current cost-benefit approach of £3,630 per km/ha of intervention. Using the Lawtonian principles[11], we recognise that projects can combine to provide benefits that are orders of magnitude greater than their individual contributions. Therefore, our approach is to focus on a total average cost of activities within the NERC and SSSI programmes totalling less than £3,630 per km/ha.

Our constrained list of options to protect and enhance SSSIs has been reviewed and approved by the regulator, Natural England, as they are required to assess and approve the management plan that will ensure the site is moving towards Favourable condition.

AMP8 activities

Implementation

Our AMP8 programme includes £3.6m of investment to protect and improve the SSSIs that exist on Severn Trent's property, as well as improving SSSI status on third-party land associated with Severn Trent's activities (e.g. Sutton Park, the River Teme, etc.).

The investment will enable substantial improvements to the condition of our SSSIs. We will focus on all sites within our control, working towards Favourable status for those sites in poor condition, and securing Favourable status for those in optimum condition (e.g. through improvements to monitoring). Our selected option is supported by Natural England.

For the SSSIs within Severn Trent's ownership, we will have management plans agreed and signed off by Natural England that ensure we are working toward Unfavourable (Recovering) as a minimum by the end of AMP7. The figures below show that only a small proportion of our existing portfolio is in Favourable status.

Our AMP8 projects on third-party land are focused on sites that are associated with our activities. A summary of two of these projects is given below; see Appendix D for further details.

[11] Can we reference these?

- At Sutton Park SSSI, 50% of the units are currently assessed as Unfavourable (Declining). While the sewerage infrastructure around the park has already been upgraded, the proposed work in AMP8 will support the improvement of the site to Unfavourable (Recovering); and
- At Doley Common SSSI, Severn Trent's abstraction has contributed to negative impacts on of the SSSI site. As we have no management role in the site, we will provide grant schemes to support its recovery to Favourable status, building on our AMP7 experience of incentivising landowners to enhance biodiversity on their sites.

Investigation

Our AMP8 plan includes £0.8m to investigate Severn Trent's contribution to meeting Favourable condition targets for flow, focused on groundwater abstractions in the River Teme catchment (functionally linked to the River Clun SAC and Teme SSSI) and, if required, options appraisal to define options for PR29.

3.9 Invasive Non-Native Species (INNS)

An invasive non-native species (INNS) is any non-native animal or plant introduced outside its natural (past or present) distribution that causes damage to the environment, economy or health. After the loss and destruction of habitat, INNS are considered the second biggest threat to biodiversity worldwide. INNS can have a significant impact on our aquatic ecosystems, causing damage to native species, altering habitat and disrupting ecosystem functioning.

There are many parts of English legislation that are relevant to INNS[12], including the Wildlife and Countryside Act 1981 and The Invasive Alien Species (Enforcement and Permitting) Order 2019. Water companies also have an obligation under the WFD that our activities do not cause deterioration of the environment. This legislation places a legal obligation on water companies and other stakeholders to take action to prevent the spread of INNS and to manage their impacts, including the implementation of biosecurity measures to prevent the accidental introduction of INNS into our aquatic environments.

While complying with these legal duties forms part of our day-to-day operations, the PR24 WINEP includes new measures to achieve the regulators' new expectations to prevent the mechanisms of INNS spread. The Environment Agency's wider policy aim to prevent the arrival of new or new to area INNS, including those that may might not yet be listed in regulations. In AMP8, the EA require us to assist with this national initiative by understanding pathways that all life histories and types of INNS could be spread through our activities, in particular through raw water transfers and activities at visitor sites. While the PR19 WINEP included investigations to understand these risks, the PR24 WINEP includes the actions that came out of those risk mitigation investigations.

Identifying and assessing options

Our AMP8 interventions are based on the recommendations that were made in our AMP7 INNS WINEP investigations. These investigations included a risk assessment across all Severn Trent's business activities and the development of Biosecurity Plans (BSPs) for operational sites.

The AMP8 plans were agreed with EA in AMP7, and include a large number of small and low-cost actions required across all sites and activities to prevent deterioration and to meet our statutory obligations. Two unconstrained options were developed for AMP8 based on the timing of

[12] A comprehensive list can be found on the GB Non-Native Species Secretariat webpages

implementing the BSP recommendations: including all recommendations (low, medium and high priority) in AMP8, or including only those recommendations rated as high priority.

We assessed our unconstrained list of two options using the following criteria:

- Expected to meet statutory obligation(s) with a high degree of confidence (>98% certainty);
- Contributes to the WINEP wider environmental outcomes; and
- Legal, technically feasible and deliverable.

We set the following parameters and observations during option development:

- A full review across all assets has not yet been completed, so costs are based on the best available information. See Section 4.1 for details;
- BSPs are working documents rather than fixed strategies, so it is assumed that some of the recommendations will be refined, suspended, or removed during the programme of implementation;
- Stakeholder engagement (e.g. with staff, recreation providers and the public) will be included within the scheme implementation rather than at this development phase; and
- The options to prevent the introduction of new INNS will not change current status of any WFD waterbodies. It is expected that the intervention will improve the amenity and recreational value of our visitor sites, but this benefit cannot currently be quantified.

Our preferred option is to address all high, medium and low priority recommendations from our BSPs in AMP8. This option provides a higher confidence that we will meet our statutory obligations, is aligned with our RBMP, and follows best practice from the Non-Native Species Secretariat.

AMP8 activities

Implementation

Our AMP8 WINEP programme includes £1.8m on biosecurity measures to prevent the spread of INNS across our recreation and visitor sites. These measures are based on the BSP developed during AMP7 through asset-based INNS risk assessments.

Investigation

Our AMP8 plan includes £0.5m to investigate options to mitigate INNS impacts at existing raw water transfers and £50,000 INNS monitoring at a number of Severn Trent sites. Development of the techniques and approaches needed for both the raw water transfer mitigation options and INNS surveillance will be cross-company projects, coordinated nationally and focused on key species. The aim is to provide a standardised and costed set of techniques (including eDNA assays where suitable) to create a national surveillance programme at high-risk sites.

Our WINEP plan includes Severn Trent's contribution to these cross-company projects (see Section 4.1 for details), together with a small additional budget for project management and to pilot monitoring methods at two sites.

4. Robust & efficient costs

4.1 Cost robustness

This enhancement proposal covers addresses our extensive water network reconfiguration programme needed to accommodate statutory abstraction licence changes, as well as a wide range of biodiversity improvement, catchment protection and environmental investigation WINEP drivers. The associated expenditure has been costed appropriately for the different drivers using best available evidence and market information. We outline below the costing approaches taken for the different WINEP drivers.

Drinking water protected areas

The costs of our AMP8 catchment protection schemes (DrWPA_ND) have been informed by our extensive AMP6 and AMP7 proactive catchment management experience. However, the costs of our AMP8 catchment schemes reflect a more innovative approach to drinking water catchment protection, designed around the five principles of regenerative farming: conservation and enhancement of soil health, promotion of biodiversity, integration of crops and livestock, promotion of ecosystem services, and support of resilient farming communities.

The methodology for assessing AMP8 catchment protection delivery costs is as follows:

1. The Defra Agricultural Census is used in conjunction with Severn Trent's farmer database to establish the number of arable, livestock and mixed farms within each of the catchments;
2. The average costs of specific catchment measures are derived from our AMP7 catchment cost records and/or a wider literature review; and
3. The costed activities are aligned to the five principles of regenerative farming, and the average cost of undertaking all five principles is calculated for each type of farm. This cost is aggregated for each farm sector (arable, livestock and mixed) and Severn Trent catchment.

Our AMP7 experience tells us we typically achieve 20-30% uptake of our schemes (conversion from initial engagement through to uptake of catchment measures), so the costs are scaled to a 30% uptake value. This gives the final cost for catchment protection measures per Severn Trent catchment.

Biodiversity enhancements

The costs associated with our AMP8 plans to improve biodiversity are based on our AMP7 experience of delivering projects on third-party land through strategic partnership grants, as well as recent commercial tenders for grassland and woodland management on Severn Trent-owned land.

On third-party land, we have been delivering projects over the last three years, spending over £14m to improve over 7,000ha of land. Table 7 below shows the breakdown of these projects along with the average cost per hectare:

Table 8: Cost per hectare of Severn Trent biodiversity projects, 2020-2023

Project type	Area improved	Cost	Cost per hectare
Boost for Biodiversity 2019	78	£93,280	£1,197
Boost for Biodiversity 2020	343	£372,992	£1,089
Boost for Biodiversity 2021	261	£229,798	£880
Boost for Biodiversity 2022	68	£160,920	£2,373
Common wealth	169	£370,000	£2,187
GBNB	151	£600,064	£3,964
P-reduction	313	£45,000	£144
Severn Trent land	502	£795,949	£1,585
Severn Trent Environmental Protection Scheme	2,451	£2,472,997	£1,009
Strategic partnerships	2,761	£6,589,885	£2,386
WINEP	629	£1,390,699	£2,209
Total	**7,727**	**£13,121,583**	**£1,698**

We have also recently appointed woodland and grassland contractors for our own sites after competitive tendering. Our grassland tender improved 36ha at a cost of £185,000, equating to £5,138/ha, and our woodland tender improved 344ha at a cost of £550,000, equating to £1,599/ha.

Invasive Non Native Species (INNS)

Investigation and monitoring costs for INNS represent our contribution to cross-company projects that have been agreed between the EA and Water UK. The EA has estimated that the total AMP8 industry cost of the national raw water transfers investigations project will be £5m, and the INNS monitoring project will be £300,000. All water companies with raw water transfers, or with surface water assets, have agreed to contribute to these national AMP8 projects using a standard apportionment formula agreed with Water UK.

The cost of implementing our AMP8 INNS biosecurity plans were developed through our AMP7 INNS investigation project. The AMP8 budget consists of dedicated staff costs to implement the BSP recommendations, the purchase of small capital equipment such as pressure washers, and the costs of making improvements to drainage/washdown facilities. The unit cost of purchase and implementation of suitable equipment was provided by our consultants, based on market prices (2021).

Impacts of abstraction licence capping

As a result of the system-wide implications of the licence capping policy, our long-term investment plan addresses the full multi-AMP costs of accommodating the expected licence caps between 2030 and 2035. For WINEP and PR24 purposes, we have apportioned those costs across our forecast of AMP8 and AMP9 expenditure. Therefore, the AMP8 investment profile to accommodate the 2030 caps in a zone has been informed by the expected further caps in that zone for 2035. For example, if a new link main or water treatment process is required, it has been sized to accommodate any expected subsequent licence reductions that have been signalled by the EA's timing policy for 2035

caps. This approach minimises the whole life cost of accommodating the full impacts of the licence capping policy.

We have a well-established cost estimating approach and long history of cost data from completed projects over the last 20 years. To derive the estimates, we have used a combination of historic outturn costs (from our system called STUCA) and bottom-up estimates using what we term a non-standard approach (where we do not have sufficient information in our cost data base). The project estimate accuracy improves as projects progress through our internal capital delivery gated process, and the database was updated in Spring 2023 to include the latest AMP7 costs and the latest inflation forecasts, to ensure all costs are reported in 22/23 price base.

The 2030 statutory abstraction licence changes will result in extensive network and asset reconfiguration across multiple infrastructure and non-infrastructure assets. We have assessed the site-by-site implications of the expected abstraction licence changes as well as the system-wide implications of making multiple abstraction licence changes. We then assessed the available options for making sure our infrastructure and non-infrastructure assets will be able to comply with these new abstraction licence constraints. Examples of the steps we have taken to ensure our approach to cost estimates are as robust as possible for this stage in the process include:

- We held county-by-county OASAS workshops involving multiple teams to build an understanding of the system impacts of the expected licence changes and to identify the critical assets and affected, the impacts on expected performance and intervention options;
- The costs of borehole changes have been informed by our PR24 borehole pricing spreadsheet, giving us a consistent approach across the WINEP and wider borehole capital maintenance programmes;
- Where changes to treatment processes are required we used standard assumptions for pumps, dosing rigs, etc.;
- A standard cost allowance has been made for all sites affected by abstraction licence changes to allow for new operational control philosophies and contingency plans to be defined using network modelling, etc.;
- Outline pipeline routes have been assessed using GIS mapping tools to identify and minimise potentially difficult pipeline crossings, such as motorways, railways, streams, and rivers;
- The pipeline crossings have been evaluated to identify the most appropriate construction technique, e.g. pipe jacking, directional drilling, etc.;
- Pipeline scheme costs have been built using the STUCA, with Cost Tool Lite inputs where applicable, and include a reduced optimism bias (OB) which in earlier stages was 66% and is now 10%;
- An initial assessment of ground conditions along pipe routes has been assessed to ensure the appropriate construction technique has been selected for costing;
- We have identified the optimum pipe route to minimise potential for reputation damage or engineering difficulties;
- Pump sizes have been calculated based on initial flow estimates; and
- We have sent completed cost estimates to our commercial project estimating team for initial assurance on our assumptions and approach.

There are 70 different sites that will be affected by WFD-led abstraction licence changes by 2030, resulting in a large number of borehole, treatment and distribution interventions needed and Appendix G illustrates the example of the system-wide costs for our Shropshire operational county.

We have reviewed these system-wide interventions against our wider AMP8 investment planning drivers, such as resilience, drinking water quality, WRMP and capital maintenance. In instances where investment has been identified against these other drivers, we have ensured that our investment plan reflects these synergies in the designed solution. Through our integrated PR24 investment planning analysis we have explored the potential overlaps with other investment drivers and where we could apply proportional cost allocation across other drivers.

For example, our WINEP system plan for Nottinghamshire has identified the need for a 15km pipeline from Sunnyside to Fox and Hounds at a cost of c.£27m, while we have also identified the need for a similar AMP8 supply resilience scheme in this part of the network. Therefore, the full costs of this scheme have been proportionally allocated between the WINEP driver and the AMP8 resilience enhancement driver.

Investigations

Our AMP8 WINEP programme includes extensive investigations into the role that our assets play in achieving our statutory environmental obligations such as:

- Preventing WFD status deterioration;
- Complying with the Eels Directive;
- Furthering the protection and enhancement of SSSIs;
- Conserving and enhancing biodiversity; and
- Achieving environmental destination goals.

These investigations cover a range of simple and complex monitoring and modelling studies, depending on the complexity of the WINEP driver.

Our investigation costs are derived from our extensive AMP7 investigations experience, market testing, and the best available information. Our AMP8 environmental investigation activities will be carried out using consultants procured via our specialist Water Resources and Environmental Solutions Qualification Systems. These Qualification Systems are subject to a regulated tender process, as per the Utilities Contract Regulations 2016, and are subject to robust market testing and cost efficiency challenges following the top level process below:

- Full PQQ Process with general risk based questions and category specific technical questions tailored to requirements;
- Feedback process;
- Compilation of successful consultants, onboarding and internal communication;
- Compiling forecast of demand, supplier/stakeholder communication;
- RFP Stage (all approved consultants for the relevant category) for all requirements that fall within the parameters of the Qualification System focussing on contract specific questions and commercials;
- RFP Response and Commercial review/negotiations;
- Standstill; and
- Contract Award.

For our Water Resources and Environmental Solutions consultancy appointments, we run a price and competency qualification system as covered by clause 77 of the Utilities Contract Regulations 2016, these systems are live at all times enabling new participants to apply for approval. A Qualification System is reviewed on an annual basis to ensure all requirements to allow the consultants to remain qualified are met.

After reviewing the Strategic Priorities Document for Ofwat in PR24, the Severn Trent procurement team has identified an opportunity to create a new supply chain to support our nature, carbon and environmental ambitions in AMP8. The Environmental Solutions Qualification System aims to encourage specialist organisations of any size and nature which are able to support them in a variety of design, build and maintenance activities for wetland treatment, chemical reduction solutions and natural flood management solutions. Engaging with specialist suppliers who have the skills and expertise will enable the utilities to achieve greater value in AMP8 through developing an enhanced understanding of the new technologies and innovations in the market, creating further opportunity for cost efficiency and designing a new delivery route which will enable the streamlining of resource.

In order to attract specialist suppliers in the market, we have released a PIN notice, undertaken extensive stakeholder engagement and hosted a workshop. The market research obtained from these activities has been fundamental in developing the Environmental Solutions tender strategy.

In summary, we are confident that this unique yet proactive procurement approach will build on our successful AMP7 delivery and ensure even more cost efficient solutions in AMP8.

4.2 Demonstrably efficient costs

The majority of the Water WINEP is made up of bespoke solutions that make it extremely difficult to benchmark, although we have carried this out where possible. For example, we have undertaken high-level benchmarking on key aspects of our catchment programme against other water companies, as well as benchmarking with the agricultural sector. This includes:

- Benchmarking forecast average costs against actual spend; this applies to both the whole programme as well as to individual work streams and catchment measures;
- Annual benchmarking of catchment measure costs against the John Nix Pocketbook for Farm Management, an industry standard guide to support farming decisions and industry direction. This ensures our catchment programme remains competitive;
- Annual benchmarking of average values using spatial data in geographic information systems (GIS), to ensure that our approach and cost plan is commensurate with what is on the ground; and
- Benchmarking of specific catchment measure costs against industry reports and literature. For example, Defra Agricultural Census, Agriculture and Horticulture Development Board (AHDB) reports, and/or farming media.

Ad hoc benchmarking with other water companies through industry-wide trials and Water UK. For example, water companies have contributed data to understand the effectiveness, costs and benefits of undersowing maize with cover crops to reduce nitrate leaching to aquifers and runoff to watercourses.

Another important area where we have sought to carry out benchmarking is on the components that make up our WFD licence capping programme, which represents almost 75% of the total cost in this

business case. This programme is made up of multiple components of pipeline, treatment, pumps and borehole investment across 70 different sites and their associated networks to accommodate the future licence changes. These multiple, site-specific projects build up to a £297m programme of network and asset reconfiguration needed to accommodate the new abstraction licence constraints that will come into effect in 2030.

We have never had to carry out a network reconfiguration programme of this scale and complexity before which makes meaningful cost benchmarking extremely difficult. This will be the first time that we have had to accommodate groundwater abstraction licence changes over such a high number of sites in such a short space of time. However, an example of an individual project cost benchmarking review is shown in table 9 for the asset investment needed at our Eastwall groundwater site. The scope of this example project is to install a new, larger borehole pump, install a new washout and pipework and test pump the borehole at new flow rates. There is a risk that the existing borehole will be unable to operate at the new flow rates in which case a new borehole would need to be drilled, although the cost of a new borehole is not currently included here.

Table 9: Example project level cost benchmarking output

Project Ref:	A8W88060
Project Name:	EASTWALL
Cleint:	Severn Trent Water
Construction Mid Point	Sep-22
Issue Nr	1

Benchmark Summary

Target Cost Comparison	ST Estimate		Benchmark		
Assets	D&B Cost		Low	Mean	High
	£ 1,185,556.08		£ 1,114,730.84	£ 1,327,453.52	£ 1,558,602.19
Distribution	£ 472,947.70		£ 597,198.69	£ 734,322.42	£ 895,852.77
Borehole/s	£ 550,530.74		£ 448,402.56	£ 491,490.11	£ 527,486.33
Site Specifics	£ 162,077.64		£ 69,129.59	£ 101,640.99	£ 135,263.09
D&B Construction Cost	*£ 1,185,556.08*		*£ 1,114,730.84*	*£ 1,327,453.52*	*£ 1,558,602.19*
Project OnCosts	*£ 318,793.05*	*26.89%*	*£ 177,205.19*	*£ 275,951.69*	*£ 377,431.97*
Total Project Cost	**£ 1,504,349.13**		**£ 1,291,936.02**	**£ 1,603,405.21**	**£ 1,936,034.16**

The overall project costs are slightly below upper-quartile, but given the complexity and significant amount of temporary works needed to keep the systems fully operational during the construction phase across so many sites we think the benchmarking clearly shows our costs are efficient.

For the other, more bespoke elements of our water WINEP, we have built on learning from the current programme to drive efficiency either through scope improvements or more efficient delivery. Where possible, we have sought to develop solutions that deliver against multiple drivers to maximise environmental benefits and minimise cost.

Synergies with other elements of our PR24 plan have also been sought out. For example, we have applied the learning from our successful drinking water catchment protection scheme and applied this to our river water quality programme to develop solutions using catchment nutrient balancing for phosphate reduction.

We will continue to map out the synergies between the different elements of our overall WINEP programme to ensure that we maximise the benefits that our solutions can deliver.

4.3 Data table mapping

The costs for this business case are allocated across a number of CW3/CW12 data lines. Table 10 details the data table mapping of the costs associated with this enhancement case. We have indicated all PR24 tables where cost information on the schemes/programmes within this enhancement case can be found.

Table 10: Data Table Mapping

CW3 ref	Line description	capex/ opex	Total (£m)
CW3.1	Biodiversity and conservation	Capex	29.2
CW3.2	Biodiversity and conservation	Opex	14.2
CW3.10	Invasive Non Native Species	Capex	0.5
CW3.11	Invasive Non Native Species	Opex	1.4
CW3.13	Drinking Water Protected Areas	Capex	17.0
CW3.14	Drinking Water Protected Areas	Opex	1.7
CW3.16	Water Framework Directive	Capex	297.0
CW3.17	Water Framework Directive	Opex	11.4
CW3.31	Investigations (WINEP/NEP) – survey, monitoring or simple modelling	Capex	13.8
CW3.34	Investigations; (WINEP/NEP) – multiple surveys, and/or monitoring locations, and/or complex modelling water totex	Capex	23.0
CW12.31 (transition)	Investigations (WINEP/NEP) – survey, monitoring or simple modelling	Capex	6.0
CW12.34 (transition)	Investigations; (WINEP/NEP) – multiple surveys, and/or monitoring locations, and/or complex modelling water totex	Capex	5.0
		Total	**420.1**

4.4 Direct Procurement for Customers

Eligibility for delivery through DPC has been assessed against the Size and Discreteness tests set by Ofwat. There are no individual schemes in this case with a whole lifecycle totex great than the eligibility threshold of £200m. We also considered the possibility of creating work packages to meet the £200m DPC eligibility threshold, for example by combining all the WFD licence capping obligations. These schemes were then put forward for the Discreteness test. Given the complexity and vast number of existing assets where modifications and new connections into the water supply system will be needed, we do not consider any aspects of that programme are discrete. KPMG has acted as an

objective third-party in interpreting and applying Ofwat's guidance on DPC and where appropriate we have followed their recommendations.

For a detailed explanation of our interpretation of the Ofwat guidance and the process we followed to assess schemes against the DPC criteria please refer to Annex 4d Supporting Markets and Direct Procurement for Customers.

5. Customer protection

5.1 Holding ourselves to account for delivery

We have been careful to protect customers from:

- **Paying twice.** Many of the actions in our AMP8 WINEP programme have multiple benefits and are linked to more than one statutory duty. We have applied proportional allocation rules to all WINEP activities to ensure that they are funded through base expenditure where appropriate (see below), and prioritised activities that deliver wider environmental benefits while ensuring there is no double-counting;
- **Paying without experiencing the intended benefits.** We have structured our AMP8 WINEP programme to take full advantage of the opportunities presented by WINEP reform, which aims to link all activity to the environmental outcomes that customers want to see. Large segments of our programme have been entered as Tier 2 outcomes, allowing us to design better interventions that ensure customers experience the intended environmental benefits. We also have proposed three PCDs which track and then compensates customers if the benefits are not delivered; and
- **Paying for an unfair share compared to future customers.** Our AMP8 WINEP programme for water will deliver our statutory obligations to protect and improve the environment, and is therefore composed of 'no-regrets' investment only. This means that customers are paying for only those actions we are certain are needed during AMP8. The investigations required to inform future plans are also confirmed as 'statutory' by the EA and are therefore 'no-regrets' investment.

5.2 Proportional allocation

We have been careful to protect customers from paying twice and have applied proportional allocation rules to all of our WINEP solutions to ensure that any elements of scope that entail replacement or refurbishment of existing process capacity are removed from our enhancement costs and reallocated to base expenditure.

5.3 Managing uncertainty

Severn Trent's WINEP obligations form a significant programme of AMP8 investment. That means we need to balance our commitment to delivering environmental enhancements (in line with our statutory obligations and, wherever possible, incorporating wider environmental benefits) with protecting our customers from unnecessary expenditure.

Throughout the development of our WINEP programme, we have worked closely with the EA and other regulators to ensure our AMP8 activities will deliver the outcomes that we, our regulators and our customers want to see. Where the delivery of the outcome is uncertain – for example, relating to the requirements to meet long-term environmental destination scenarios – we have discussed the challenge with our regulators to find the best outcome.

Where possible, we have agreed with the Environment Agency that, rather than committing to significant investment before we have all the information we need, the best solution for AMP8 is further investigation or a trial project. This means we can gather more evidence, test our assumptions,

or explore the best way to deliver our activities before committing to significant new investment. This approach means we can reduce uncertainty and increase our chances of delivering the most effective environmental solutions while keeping our customers' bills as low as possible.

For example, our draft WRMP24 highlights that the impact of achieving the EA's long-term environmental destination scenario is potentially very material, representing a deployable output loss of approximately 440Ml/d. Our WRMP shows how we would need to develop large-scale alternative strategic sources of water supply over future AMPs to accommodate these abstraction reductions. However, there are significant uncertainties around these long-term environmental targets and the most effective solutions to achieving them. Therefore, rather than commit to large-scale water resources projects at this stage, during AMP8 we will carry out extensive investigations to properly understand and define the water abstraction changes needed to achieve the scenario goals. We will also understand the asset reconfiguration implications for our water supply systems. This low-regret approach to investment planning means that we can avoid unnecessary water resource expenditure.

5.4 Proposed price control deliverables

In line with the PR24 methodology requirements we have proposed three Price Control Deliverables (PCDs), which set out the outcomes customers can expect as a result of this enhancement expenditure, and we have taken into account outcome delivery incentives where appropriate.

Our aim is to ensure customers are protected from under or late delivery through easy to measure, track and verify deliverables.

We have taken account of existing regulatory reporting mechanisms and have aligned our deliverables with these mechanisms where appropriate.

We will continue to develop the detailed measurement methodology which will include third line assurance review to ensure there is sufficient specificity in the definition to meet the repeatability and reporting accuracy required as part of the APR requirements.

PCD 1	EPA Water WINEP Investigations
Description	Our Water WINEP includes 121 investigations. The EA will track the delivery of these investigations according to an agreed delivery programme and complete an annual assessment of performance as part of the Environmental Performance Assessment
	Measure Delivery of Investigation obligations in the Water Water-Industry National Environment Programme (WINEP) **Measurement** Each financial year we will evidence EA sign-off of WINEP obligations completed against the planned investigations up to that point in the 5-year plan.
Conditions on scheme	None
Assurance	Assessment and assurance of programme deliverables and completed milestones in line with EPA process. The company will ask the Environment Agency to confirm that performance has been correctly reported. The view of the Environment Agency will be definitive.
Cost sharing incentive payments	Cost Sharing Incentive rates have been calculated using the Ofwat PCD payments model using the following assumptions: • A cost-sharing rate of 50/50 is used for underspends and overspends • WACC = 3.23% • The time incentive rate is set at 3.5% of totex • Totex = £48m • Deliverable = Number of investigation obligations (121) *PCD rate = £0.152m / obligation* *Time Incentive rate = £0.0138m / obligation*
Impacts on performance in relation to performance commitments	*None*

Deliverable	Unit	25/26	26/27	27/28	28/29	29/30
Schemes completed as part of 5-year plan	Number	0	32	13	18	58

PCD 2	Biodiversity Enhancement
Description	Our Biodiversity plan is the largest element of the Water WINEP and includes the assessment and enhancement of biodiversity at 262 of our sites. We will track the delivery of this element of the WINEP by monitoring the hectares subject to the completion of a biodiversity assessment (baseline and re-assessment)
	Measure hectares of land subject to a Biodiversity assessment (baseline or reassessment) **Measurement** Each year we will measure the area of our land subject to a biodiversity assessment by an appropriately qualified person
Conditions on scheme	The allowance for the scheme described here is conditional on the company completing assessments (baseline or reassessment) of at least 82 Ha of land no later than the 31st of March 2030 and in accordance with the deliverability profile below. The scheme is applied to the activity described above which lies beyond the coverage of the common PC for biodiversity.
Assurance	The company must commission an independent 3rd-party to complete assurance of the completed biodiversity assessments. These assessments will carry out in line with guidance in the Biodiversity Common PC and be evidenced by reports detailing the results of the assessment.
Cost sharing incentive payments	Penalty rates have not been calculated as the ODI rate for Biodiversity has not been published.
Impacts on performance in relation to performance commitments	*Biodiversity*

Deliverable	Unit	25/26	26/27	27/28	28/29	29/30
Area subject to a Biodiversity assessment	Ha	6.339	31.017	4.869	33.266	6.333

PCD 3	EPA Water WINEP Licence Capping
Description	Our Water WINEP includes work to facilitate 70 abstraction licence modifications required to prevent WFD status deterioration in 75 waterbodies. The EA will track the delivery of these schemes according to an agreed delivery program and complete an annual assessment of performance as part of the Environmental Performance Assessment

	Measure Delivery of abstraction licence capping obligations in the Water Water-Industry National Environment Programme (WINEP) **Measurement** Each financial year we will evidence EA sign-off of WINEP obligations completed against the planned schemes up to that point in the 5-year plan.
Conditions on scheme	The delivery of 20 obligations (Estimated Totex £24m) by 2030 will be challenging and we are negotiating a revised delivery programme with the EA. Our delivery profile for this PCD shows a programme which is compliant with the statutory obligation. The PCD will be subject to change if the EA revise the current obligation delivery profile
Assurance	Assessment and assurance of programme deliverables (abstraction licence modifications) and completed milestones in line with EPA process. The company will ask the Environment Agency to confirm that performance has been correctly reported. The view of the Environment Agency will be definitive.
Cost sharing incentive payments	Penalty rates will be calculated using the Ofwat PCD payments model using the following assumptions: • A cost-sharing rate of 50/50 is used for underspends and overspends • WACC = 3.23% • The time incentive rate is set at 3.5% of totex • Totex = £308m • Deliverables = Number of obligations (70) *PCD rate = £2.2m / obligation* *Time Incentive rate = £0.154m / obligation*
Impacts on performance in relation to performance commitments	*None*

Deliverable	Unit	2025/6	2026/7	2027/8	2028/9	2029/30	Total
Number of Obligations completed as part of 5 year plan	No.	0	0	0	0	70	70

5.5 Overlap with other statutory instruments

Delivery of WINEP obligations is a measure included within the EA's annual Environmental Performance Assessment (EPA). From this year, Green status against this metric has required 100% delivery of all WINEP obligations within that financial year, with less than a 98% delivery resulting in Red status. Progress and delivery will be monitored in detail by the EA.

The WINEP investigations described in this business case will be critical for PR29 and our next statutory WRMP because they will provide the evidence needed to quantify the long-term supply-demand needs for our region. Government has set challenging future environmental destination targets and our AMP8 investigations will ensure that the long-term solutions are robust and cost effective.

For the elements of this programme that are statutory, the EA has powers to take action in the event of non-delivery. Notwithstanding the fact that both the EA and Defra will be tracking delivery of the WINEP programme, there would be huge reputational damage to Severn Trent (and the wider water sector) associated with non-delivery of the largest programme of environmental improvements in the last 30 years.

5.6 Deliverability

We have strong, in-house capabilities with a proven track record of delivering ambitious catchment, biodiversity and sustainable abstraction improvement schemes over several AMPs. We are also supported by specialist consultants and contractors through our specialist commercial framework agreements. Our AMP8 delivery plan will call on this in-house expertise and experience.

We acknowledge that concerns about the deliverability of the sector's ambitions is also in part a reflection of the pressures caused by the wider UK infrastructure plans. Recognising this, we have removed ourselves from the fight for resource and support the outlook for others. Specific actions include:

- Making an early start on these ambitious plans using transitional spending. In October we will be announcing an acceleration of our AMP8 plans, pulling forward around £400m of planned AMP8 delivery into 2023-24 to 2024-25, including the far-reaching WFD and Environmental Destination investigations. This is made possible by our low gearing and excellent financeability. This means that, overall, we will be investing at a forecast £1.25bn per year from March 2024, which is beyond the expected run rate throughout AMP8;
- Over the next 12 months we will be insourcing around a further 1,000 roles to further reduce reliance on the market. This will cover a wide range of roles, including additional engineers, project managers, wastewater technicians and mains renewal pipe laying gangs; and
- We have invested heavily in a framework management team to reduce wasted time on construction sites, including up-to-date design and construction standards, the use of prefabricated elements, and digital construction rehearsals as standard practice. Activities such as these improve efficiency and improve safety of the build phase. All of these steps mean that our draw on the supply chain will be less, which frees up more resource for others.

Despite our strong overall AMP8 delivery position, we have previously highlighted to the EA and Ofwat that the 2030 abstraction licence capping deadline will be difficult to achieve simultaneously across all areas of our network and could put security of water supplies at risk.

In this business case we have explained how extensive reconfiguration of our supply networks will be required to maintain resilience of supply and drinking water quality. Delivering this level of complexity and scale of reconfiguration without impacting security of supply will take careful coordination and should not be under-estimated. We are developing delivery plans to ensure we fully explore and mitigate risks to service and, through this work, we have identified extremely complex network changes that will be needed in our groundwater-fed water resource zones across Shropshire and Staffordshire, which represent 34% of the total AMP8 licence reductions. In our August 2023 response to the EA we proposed an extension to the licence cap deadlines in these water resource zones out to March 2033, which would reprofile £24m into AMP9. The EA are considering the information and requested that we continue to assume delivery will be required by 2030, which we confirm we have done.

In Appendix G we show the individual asset interventions that will be required across the water resource zones in Shropshire and list the interdependencies and timescales associated with delivering a coordinated system-wide reconfiguration on this scale. For each site, we show the current WINEP licence change date, the estimated cost and where we are recommending rephasing to 2033.

This recommended rephasing includes licence changes and AMP8 expenditure associated with completing the second phase of the 10-year WINEP programme agreed with the Environment Agency at PR19. The existing PR19 WINEP requires licence changes to be in place by 2030, and the AMP8 investment plan to achieve these is dependent on the latest PR24 requirements to cap licences across the rest of the zone. Our recommendations are consistent with the proposals we made in our 15 May 2023 response to Ofwat's query on WINEP costs.

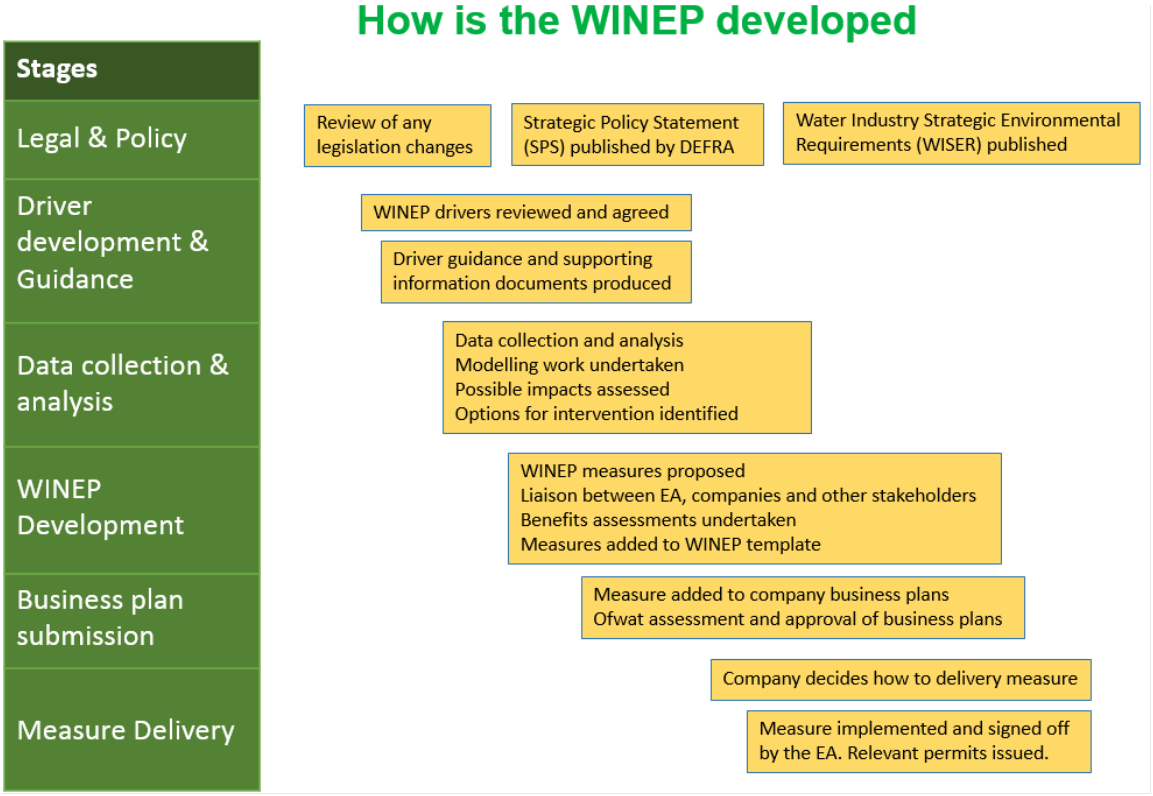
Our proposal is to maintain the 2030 deadline for the strategic WRMP schemes but to then de-couple dependencies with the groundwater licence caps in order to reduce delivery risk. We are continuing to develop detailed delivery plans on the basis of the 2030 deadline and will continue to engage with the EA and if necessary utilise the EA change control process.

6. Appendices

Appendix A: WINEP reform

The role of the WINEP is to turn the statutory obligations for water companies, as set out in environmental legislation and government policy, into actions. Historically, it has done this by setting out a programme of measures that companies must include in their business plans to deliver environmental improvements. Figure A.1 below outlines the stages of development of a water company's WINEP programme.

Figure A.1: How WINEP programmes are developed



WINEP reform

Although WINEP and its predecessors have delivered significant environmental improvements over the last 25 years, the approach has been adapted for PR24 in order to deliver wider benefits and maximise value for money. Water companies have also expressed the desire for a more sophisticated WINEP approach that recognises their significant capability to contribute to enhancing the UK's natural environment.

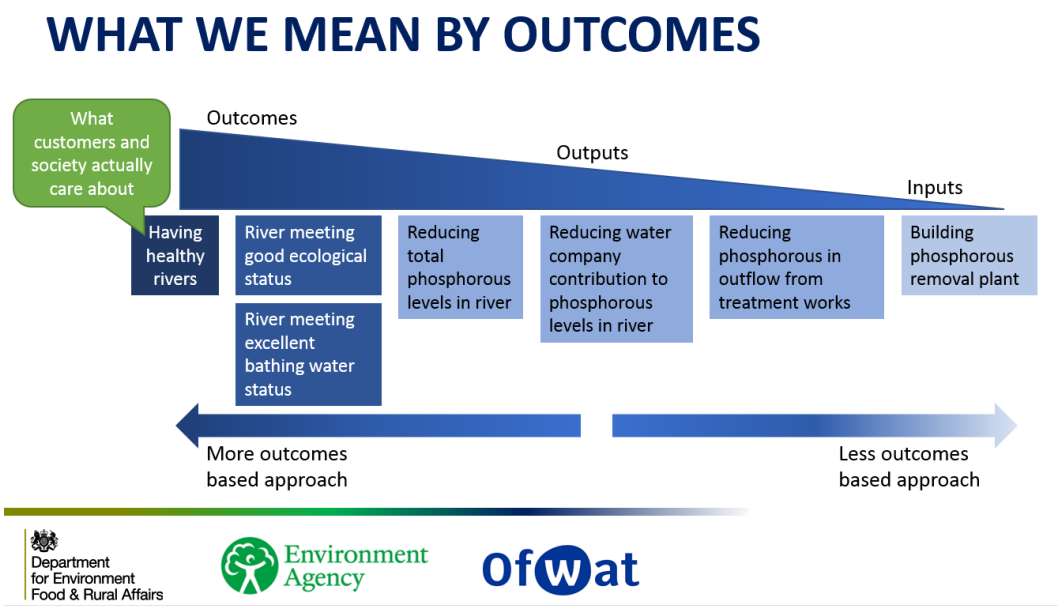
The WINEP Reform Taskforce ran from late 2020 through to mid-2021, with the overall goals of enabling a step change in the quality of the water environment and delivering greater value for money. The taskforce identified six key objectives for WINEP reform that will deliver these goals:

1. Outcomes-driven with less prescription;
2. Enables wider environmental outcomes to be supported;
3. Accommodates longer-term planning horizon;

4. Accommodates a more systems- and catchment-oriented approach, including facilitating a greater use of nature-based solutions, which accommodates more innovation and company collaboration;
5. Allows relevant parties to co-design, co-deliver and co-fund; and
6. Makes the best use of and improves available data.

The first key objective of the agreed reforms was to make the WINEP more outcomes-driven and, ultimately, more meaningful to customers. What our customers actually want to see is a healthy, thriving environment, and WINEP therefore needs to be more explicit about how the measures included deliver this outcome. In the reformed WINEP, actions can now be expressed as outcomes using a three-tiered approach that illustrates how outputs build up into the outcomes that we, our regulators and customers want to see. Figure A.2 below outlines the new tiers.

Figure A.2: WINEP outcomes



Severn Trent's contribution to WINEP reform

Severn Trent has been an enthusiastic supporter of WINEP reform and outcomes-based regulation, and an active member of the regulators' WINEP reform project. We provided evidence throughout the process to help shape the PR24 approach to long-term, risk-based environmental improvement.

We have sought to structure our WINEP programme in a way that takes full advantage of the opportunities presented by the reform process. Large segments of our WINEP programme have been entered as Tier 2 outcome measures, where several interventions are grouped together under a single WINEP action to deliver a defined environmental outcome. Entering WINEP actions at Tier 2 has key benefits for everyone: customers have a clearer view of what they are getting for their money and water companies have greater flexibility to explore alternative interventions that deliver the outcome.

Appendix B: Showing environmental leadership

We are proud of our track record of environmental leadership within the region we serve, as well as the role we are playing in tackling the global challenges of climate change and biodiversity loss.

Our approach to sustainability and environmental improvement is built on four fundamental pillars:

- Ensuring a sustainable water cycle;
- Enhancing our natural environment;
- Making the most of our resources; and
- Mitigating climate change.

The natural environment is intrinsically linked to every aspect of what we do and how we do it. Our sustainability framework integrates our environmental, social and governance ambitions and establishes sustainability as an integral part of our business plan.

Our customers expect us to ensure a sustainable water cycle, and we are committed to doing so while maintaining and supporting the health of our natural environment. We have also made specific pledges to restore and protect our rivers. We make the most of our resources through conservation and innovation and aim to mitigate climate change by achieving net zero emissions by 2030.

We demonstrate our leadership through delivering real and meaningful environmental improvements. For example:

- We have secured the highest EPA 4 star status from the Environment Agency for four consecutive years;
- Our Great Big Nature Boost is improving biodiversity across 5,000 hectares of land in the Severn Trent region by 2027, working with many of the Trusts across the region to enhance and create habitats. We committed to work with partners to plant 1.3 million trees, which will contribute to natural flood management, sequester carbon, and encourage the proliferation of wildlife;
- We are rewetting peatlands (some of the most effective carbon sinks on Earth) in our region. Working with the Moors for the Future Partnership, we have restored over 3,400 hectares of degraded peatbogs, and we are continuing to work on over 600 hectares in the Peak District;
- We are investing to expand Farming for Water, our catchment management programme that works directly with farmers to boost biodiversity and improve water quality by reducing pollutant run-off. Our expanded plan involves 44 catchments and 432,000 hectares by the end of 2025 – which is more than two-thirds of regional farmers;
- In 2022 we launched our Get River Positive plan, which set out our specific commitments to restore our rivers for present and future generations. Overall, we are aiming to improve the quality of over 2,100 km of river, and have made the following five pledges:
    - Ensure storm overflows and sewage treatment works do not harm rivers;
    - Create more opportunities for everyone to enjoy our region's rivers;
    - Support others to improve and care for rivers;
    - Enhance our rivers and create new habitats so wildlife can thrive; and

    - Be open and transparent about our performance and our plans.
- We have made stretching river water quality performance commitments for AMP7. By 2025 we will:
    - Improve 211 WFD points (water quality improvement against Water Framework Directive);
    - Demonstrate 100% treatment works compliance; and
    - Achieve a 29% reduction in pollution incidents to 19.5 incidents per 10,000 km of waste network.
- Our Water Resources Management Plan sets out our commitments to reduce unsustainable abstraction and to take proactive action that will protect and improve water bodies across our region.

Our AMP8 WINEP investment plan builds upon this strong track record of delivery.

Appendix C: WINEP driver codes

Table C.1 below outlines the WINEP driver codes for our activities in this enhancement proposal. Please note that some of these drivers were applied to our WINEP actions as secondary or tertiary drivers.

Table C.1: Water WINEP driver codes

WINEP driver	Description	WISER category
DrWPA_INV; DrWPA_ND)	Drinking water protected areas: investigations to identify actions to prevent deterioration and/or reduce treatment; and schemes with actions to prevent deterioration of drinking water quality, improve following a deterioration, or to improve water quality and reduce treatment	Statutory (INV and ND), Statutory+ (IMP)
WFD_ND_WRFlow; ; WFD_IMP_WRFlow; WFD_INV_WRFlow; WFD_INV_WRHMWB; WFD_NDINV_WRFlow;	Water Framework Regulations addressing surface water bodies and Heavily Modified Water Bodies: investigations to determine the impacts of abstractions and options to achieve good status, investigations to determine the likelihood that future abstraction will cause deterioration, implementation of actions to improve ecological status and actions to prevent deterioration of status.	Statutory (INV and ND), Statutory+ (IMP)
WFDGW_NDINV; WFDGW_ND; WFDGW_IMP	Water Framework Regulations addressing groundwater bodies: investigations relating to risk of groundwater body deterioration, implementation of actions to prevent deterioration.	Statutory (INV and ND), Statutory+ (IMP)
SSSI_IMP; SSSI_ND; SSSI_INV	Sites of Special Scientific Interest: investigations into impacts of activities or on a SSSI, implementation of actions to restore a SSSI to favourable condition, actions to prevent deterioration of a SSSI.	Statutory+
NERC_IMP; NERC_INV	Natural Environment and Rural Communities Act: investigations into actions that would contribute to achieving biodiversity duties, implementation of actions to achieve biodiversity duties.	Statutory+
INNS_INV; INNS_ND; INNS_MON	Invasive Non-Native Species: investigations to prevent deterioration and achieve conservation objectives, improvement schemes to reduce impacts of INNS, actions	Statutory (INV and ND) Statutory+ (IMP and MON)

	to prevent deterioration by reducing risks and impacts of spread of INNS, surveillance programmes.	
EE_INV	Eels: investigations to confirm eel entrainment and identify barriers, actions to improve diversion structures to prevent entrainment of eels.	Statutory (INV) Statutory+ (IMP)
EDWRMP_INV;	Environmental Destination/Water Resources Management Plan: investigations into actions identified with the WRMP to meet regional planning requirement that do not fit with WFD drivers, actions identified within WRMP to meet regional planning requirements that do not fit with WFD drivers.	Statutory (INV),

Appendix D: Details of SSSI improvements on third-party land

Our projects to improve Sites of Special Scientific Interest (SSSI) on third-party land are focused on sites impacted by Severn Trent's actions.

Sutton Park SSSI

At Sutton Park SSSI, 50% of the units are currently assessed as Unfavourable (Declining), due in part to legacy pollution issues associated with Severn Trent. A significant enforcement undertaking and upgrade to the sewerage infrastructure around the park has delivered positive impacts and that enforcement undertaking has now been deemed completed.

However, there is more that could be done to make the site more resilient to potential adverse impacts in the future. Supporting tree planting will help manage some of the site's nutrient-enriched water issues that prevent it from improving from Unfavourable (Declining).

While the enforcement undertakings have dealt with the pollution history, the proposed enhancement option would provide more natural resilience and the potential for nature-based filtration if trees are planted/utilised in the appropriate way. Figure D.1 below outlines the condition of the individual units across Sutton Park.

Figure D.1: Condition status of Sutton Park SSSI (Natural England)

Sutton Park SSSI

Condition of Features

Feature name	Condition date	Condition status
Eutrophic lakes	19/09/2014	Unfavourable - Declining
Lowland dry acid grassland (U4)	08/02/2017	Unfavourable - Recovering
Lowland dry acid grassland (U5/U6)	19/09/2014	Unfavourable - Recovering
Lowland dry heath	08/02/2017	Unfavourable - Declining
Lowland fens, including basin, flood-plain, open water transition and valley fens	19/09/2014	Unfavourable - Declining
Lowland mire grassland and rush pasture	08/02/2017	Unfavourable - Declining
Lowland mixed deciduous woodland	08/02/2017	Unfavourable - Declining
Lowland wetland including basin fen, valley fen, floodplain fen, waterfringe fen, spring/flush fen and raised bog lagg	19/09/2014	Unfavourable - Declining
Outstanding dragonfly assemblage	19/09/2014	Unfavourable - Recovering

Natural England's assessment of the condition of the site demonstrates that our activities have impacted the site:

"*Surface water entering the site at Thornhill is often nutrient rich, helping to eutrophy the site and preventing restoration of a more natural hydrological regime within the wet heath – i.e. ditch-blocking in some areas is not possible for fear of creating a eutrophic mire, rather than the oligotrophic wet heath target*.

"*The appearance of Typha in the M10 base-rich mire at SP0943198322 indicates more eutrophication. Source unknown, but might be related to historic and ongoing sewage spills (latest on 2nd October 2016) and other nutrient inputs into groundwater and/or surface-water. Until investigations reveal the source and a remedy are found recovering trajectory is untenable. In addition restoration of a more natural hydrological regime by ditch-blocking in the wet wood and heath is too risky whilst water quality is dubious*."

Doley Common SSSI

Doley Common is a low-lying, agriculturally-unimproved pasture in the flood plain of the Doley Brook. The major interest is a nationally rare and threatened acidic marshy grassland community, which is extremely scarce in Staffordshire. Severn Trent's abstraction has led to dewatering of this site, contributing to its Unfavourable (Recovering) status, outlined in Figure D.2.

Figure D.2: Condition status of Doley Common SSSI (Natural England)

Doley Common SSSI

Condition of Features

Feature name	Condition date	Condition status
Lowland mire grassland and rush pasture	23/06/2016	Unfavourable - Recovering

As Severn Trent has no management role for the site, we will provide grant schemes to support its recovery, building on our AMP7 experience of incentivising landowners to enhance biodiversity on their sites. This approach encourages the landowner to introduce appropriate grazing, or to allow Severn Trent to undertake grazing on their behalf through our existing contacts.

Our site investigations have shown that, while our current operations are not impacting the site, our historic abstraction may have contributed to negative impacts. Therefore, by funding the work via the tenants/landowners, we can contribute our fair share to return the site to Favourable status.

As well as improving biodiversity, the enhancement and restoration will further protect the site and its listed species. The improved management and application of the suggestions will also have direct benefits to the water quality of the brook, and reduce the flooding risk if the common is allowed to take winter flows and manage downstream issues for our customers.

Appendix E: Evidence to support nature-based solutions

A recent study found that increasing hedgerows on arable land can increase crop yields by 10% and reduce the need for pesticides by 30%. Defra confirms that the benefits of hedgerows include improving water quality by trapping sediments, nutrients, pollutants before they reach the watercourse.

Other examples include a recent RSPB study demonstrating how improving woodland and grasslands reduces sediment run-off, improves water quality and reduces water treatment costs. This study goes on to outline the benefits to flood risk, which will support our wastewater treatment performance.

The Dasgupta Review (2021)[13] outlines in chapter 12 that the Gross Ecological Product (GEP) for the case study of Qinghai, China is heavily skewed toward water-related ecosystem services: "*It is not surprising that water-related ecosystem services were found to constitute nearly two-thirds of the value of GEP, given they benefit downstream communities by providing a clean, reliable water supply. In 2000 GEP was higher than GDP (¥81.5billion for GEP compared with ¥26billion for GDP)*."

Table A12.3 Proportion of Ecosystem Services provided by Key Ecological Function Zones

Ecosystem service	Percent of ecosystem services provided
Carbon sequestration services	78%
Soil conservation services	75%
Sandstorm prevention services	61%
Water resource conservation service	61%
Flood mitigation services	60%
Natural habitat for biodiversity	68%

Source: Ouyang et al. (2019).

The Dasgupta Review also demonstrates that the benefits of expanding protected areas would provide benefits in avoiding flooding and prevention of soil loss.

[13] https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

Appendix F: Innovation examples

1. Farmgate Nutrient Budgeting

Farmgate Nutrient Budgets are holistic assessments which look at the whole farm nutrient balance. They consider all of the nutrient inputs (e.g. fertiliser, feed), outputs (e.g. grain, milk), and what is left within the farm's environment (e.g. soil nutrient status) and therefore potentially able to be lost into watercourses. Assessing holistically in this way:

- Reduces inputs at source, e.g. fertilisers and manures, rather than mitigating the impact of them through disrupting nutrient pathways;
- Drives outcomes rather than outputs; and
- Allows benchmarking between farmers in a catchment and/or across farming systems.

Much research has gone into Farmgate Nutrient Budgets and they are recognised as being highly effective in driving down nutrient inputs. However, the tools in the UK are limited and not user-friendly such that farmers can utilise them easily themselves. As such, we have been working collaboratively with OVERSEER©, a New Zealand company, to adapt their software platform for the UK context. OverseerUK will be a major step in helping farmers drive down their nutrient usage, and through our exclusive collaboration, we will be piloting it in the Severn Trent region.

OVERSEER® Nutrient Budgets provides users with a tool to examine the impact of nutrient use and flows within a farm (as products, fertiliser, effluent, supplements, or transfer by animals) on nutrient use efficiency and on probable environmental impacts. The model calculates a nutrient budget for the farm, and blocks within a farm, taking into account inputs and outputs and some of the internal recycling of nutrients around the farm. It covers dairy, sheep, beef, deer, and a wide range of vegetable, arable and horticultural crops. It deals with a wide range of nutrients, and it calculates maintenance fertiliser nutrient and lime requirements for a block.

An important feature is that Overseer estimates environmental impacts of the farm (N leaching/runoff, P-runoff and risk index and gaseous emissions, including the greenhouse gases CH4, N2O, CO2). The model is also able to represent a wide range of management options and mitigation practices and enables the user to analyse "what if" scenarios.

2. Severn Trent's hydroecology model to inform decision-making

Hydrological and water quality models are already well-established, but usually focus on single stressors and do not translate flow, water quality and habitat changes into ecological outcomes. Our hydroecology model relates ecological responses directly to abstraction pressure, rather than inferring abstraction impacts from historic flow variability.

In 2018, a collaborative project was established between Severn Trent (assisted by Stantec and APEM) and the EA to develop our hydro-ecology modelling approach. The aim of the project was to improve confidence in our collective ability to understand the link between abstraction stress and the condition of the aquatic ecology. Since then, Severn Trent has further developed the modelling approach, and it has been reviewed and agreed by technical experts from the EA's hydroecology team.

The model focuses on macroinvertebrates because they are the most well-established biological indicator of the impacts of flow alteration on river ecosystems.

Some of the ways the model outputs have been used to inform our abstraction investigations include:

- Assessing impacts of current groundwater abstraction;
- To assist in understanding and predicting the impacts of future groundwater abstraction;
- In decision-making, when appraising future management options, e.g. by comparing predictions under alternative future abstraction or augmentation scenarios;
- Identifying reaches or parts of the catchment where monitoring is required and locating suitable river reaches to make interventions; and
- When used as a risk-based tool, this evidence can provide a starting point for prioritising investment in further investigation or implementation schemes and subsequent adaptive management.

We will continue to collect information through a comprehensive monitoring programme, along with relevant EA data, to continue to explore and improve our understanding of the relationships between flow, ecology and other pressures for streams influenced by sandstone aquifers.

Appendix G: List of AMP8 and AMP9 investment schemes needed to accommodate planned abstraction licence caps in and around Shropshire

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Site/investment	WRZ	Summary of notional solution	WINEP date	Dependencies	STUCA estimate £m*	Estimated delivery time (design, build and commission) (months)	Recommend rephasing
Shelton expansion (18Ml/d)	Shelton and supports new links to surrounding Shropshire WRZs	Expand Shelton WTW treatment capacity with support from United Utilities' (UU) Lake Vrynwy releases	WRMP assumes 2030	Engineering of new treatment processes, new abstraction licence on the River Severn and the ability of UU to make releases from Vyrnwy Reservoir	See 08	60	No
Cosford	Shelton	Changes to borehole pumps to operate over a wider performance range and accommodate the new abstraction licence constraints	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin. Capital work will require extensive planned outage with associated SDBI performance risk	£1,442,248	27	Yes
Grindleforge BH	Shelton	Further network modelling required to determine how the borehole will perform over the new, wider performance range – this analysis is needed to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin. Capital work will require extensive planned outage with associated SDBI performance risk	£32,705	18	Yes
Hilton BH	Shelton	Changes to boreholes, pumps and treatment process to operate over a wider performance range and accommodate the new abstraction licence constraints	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin. Capital work will require extensive planned outage with associated SDBI performance risk	£9,677,990	60	Yes

Lilleshall	Shelton	Further network modelling required to determine how the borehole will perform over the new, wider performance range – this analysis is needed to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin	£32,705	18	Yes
Neachley	Shelton	Changes to fluoride dosing. Unclear how the borehole will perform over the new, wider performance range – network modelling to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin. Capital work will require extensive planned outage with associated SDBI performance risk	£9,444,636	27	Yes
Puleston BH	Shelton	Unclear how the borehole will perform over the new, wider performance range – network modelling to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin	£32,705	18	Yes
Rodway BH	Shelton	Unclear how the borehole will perform over the new, wider performance range – network modelling to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin	£32,705	18	Yes
Woodfield BH	Shelton	Unclear how the borehole will perform over the new, wider performance range – network modelling to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin	£32,705	18	Yes
Copley	Shelton		2030		£1,048,955	36	Yes

		Changes to borehole pumps to operate over a wider performance range and accommodate the new abstraction licence constraints		Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin. Capital work will require extensive planned outage with associated SDBI performance risk			
Beckbury	Shelton	Unclear how the borehole will perform over the new, wider performance range – network modelling to determine new control philosophy	2030	Completion of Shelton WTW expansion to provide alternative source of supply before on-site work can begin	£95,377	24	Yes
Lee Brockhurst	Whitchurch and Wem	No changes	2030	No dependencies	£-	0	No
Overton Scar	Whitchurch and Wem	Changes to treatment process to operate over a wider performance range and accommodate the new abstraction licence constraints	2030	Preston Brockhurst and Overton Scar are linked – both cannot be done at the same time. Capital work will require extensive planned outage with associated SDBI performance risk	£10,698,033	42	Yes
Preston Brockhurst	Whitchurch and Wem	New network boosters	2030	Preston Brockhurst and Overton Scar are linked – both cannot be done at the same time. Capital work will require extensive planned outage with associated SDBI performance risk	£1,076,870	42	Yes
Kinsall	Kinsall	No changes	2030	No dependencies	£-	0	No