Accelerating environmental improvements

AMP8 WINEP – Water Framework Directive and Storm Overflows

Business case 05

Severn Trent
29 January 2021

WONDERFUL ON TAP

SEVERN TRENT

Executive summary

The Green Recovery offers a welcome opportunity to move faster and be more ambitious in response to the Government's 25 Year Environment Plan. We are committed to the objective of bringing at least three-quarters of our waters to their near natural state as soon as possible, and we have the ambition and credentials to deliver successfully. The recently published Water Framework Directive (WFD) classification shows only 14% of rivers hold 'good' ecological status. This emphasises the need to do more, faster. **This WFD and Storm Overflows proposal directly supports environmental improvement through accelerated delivery of our statutory obligations, creates around 280 sustainable jobs, stimulates economic growth and has a clear mandate from our customers.**

We have already made significant progress and are on track to invest over £500m on improvements to 3,700 km of the 6,800 km of rivers in our region between 2015 to 2025. However, there is more to do, and customer expectations of their water companies are becoming more demanding.

This proposal includes two main components that deliver a further 500 km of river improvements, five years earlier than previously planned, at a total cost of £168m. They include:

- [redacted] for WFD phosphate removal – bringing forward 35 additional phosphate removal projects that were provisionally assigned for delivery in AMP8. This involves upgrading chemical dosing and installing enhanced tertiary solids removal using modern technologies. Our solutions will maximise the use of chemical-free solutions such as enhanced biological phosphate removal (EBPR), and, at the smaller sites, include constructed wetlands and/or catchment offsetting.
- [redacted] for treating, reducing or removing storm overflows – introducing additional monitoring and investigative measures (beyond current Water Industry National Environment Programme (WINEP) requirements) at 150 overflows to inform our PR24 submission, fast-tracking improvements at 100 overflows by more than five years and improving monitoring and reporting.
- [redacted] for installing green energy generation (solar) and tree planting to ensure this proposal has a net-zero carbon impact.

This investment will deliver the following benefits:

- It accelerates our statutory obligations required as part of successful delivery of the WFD objective to bring three-quarters of our waters to near natural status, bringing forward improvements by around five years.
- It supports the creation of conditions for aquatic wildlife to thrive, allowing us to respond more quickly to our customers' growing expectations for environmental improvements.
- It provides improved amenity value by making these rivers more attractive places for people to visit and enjoy nature, which is a high priority for our customers.
- It provides much-needed investment to stimulate the economy and will create around 280 jobs.
- It will help us to save our customers money as we deliver statutory requirements at a time when we can deliver more efficiently due to the lower cost of borrowing.
- It will enable bolder action at PR24 because we will have an improved understanding of the costs and benefits of solutions to reduce storm overflows.

We have carefully reviewed the options and ensured that there is no overlap between the measures proposed in this business case and the performance commitments contained within our PR19 Business

Plan, or the associated Real Option mechanism. There is a small overlap with our green recovery proposal for Bathing Rivers in that the upgrade to Warwick STW in the bathing rivers proposal will, in part, deliver WFD outcomes proposed in this business case. In the event that the bathing rivers proposal is not approved then we would need to make a small adjustment to the costs (or scope) of this proposal. We have worked with the Environment Agency (EA) to ensure only the most certain environmental needs are included.

Contents

1. The need for investment

We are embracing the opportunity provided by the Green Recovery to accelerate delivery of projects that respond directly to the Government's 25 Year Environment Plan. We have a proven track record for delivering ambitious environmental improvements that create measurable benefits for our customers and stakeholders. Recent achievements include:

- Improving the quality of 1,600 km of rivers in our region between 2015 and 2020. Within the next five years we will address a further 2,100 km, meaning over half of the total length of 6,800 km of rivers in our region will have been improved.
- Achieving the highest four-star Environmental Performance Assessment (EPA) rating from the EA four times in the past seven years, reflecting performance across a range of environmental measures.
- Committing to enhancing the biodiversity of 5,000 hectares of habitat by 2027.
- Using catchment-based approaches to improve the quality of surface water run-off into our rivers. By the end of 2021 we will be working with 63% of farmers in our region to improve river quality and biodiversity.
- Undertaking the largest Water and Sewerage Company (WaSC) programme of storm overflow discharge improvements in AMP7, underpinned by the voluntary WFD investigations that we undertook in AMP6.
- Delivering one of the largest Combined Sewer Overflow (CSO) investigation programmes in AMP7, within which we are due to complete 105 Storm Overflow Assessment Framework (SOAF) investigations by March 2022.

1.1 Now is the right time

The Green Recovery provides us with an opportunity to do even more to drive environmental improvements. We believe that now is the right time to accelerate investment for the following reasons.

The need to accelerate achievement of Government priorities

The Government's 25 Year Environment Plan includes a commitment to improve at least three quarters of our waters to be close to their natural state as soon as possible. Currently, only 14% of rivers in England are at the desired quality. All interventions needed to ensure compliance with the Water Framework Directive (WFD) must be in place by 2027, and there is a clear opportunity to accelerate progress.

Customers expect us to do more to protect the environment

Customer expectations of their water companies are changing. It is evident that the current performance of storm overflows into our rivers is unacceptable, and more needs to be done to prepare for and prevent the worsening of this situation. Campaign groups ask that our rivers become a place where people can enjoy swimming, paddling and canoeing without fear of illness or encountering sewage debris, as has become the norm in other European countries. They want timely data from water companies on sewer overflow discharges and improved river water standards.

There is an opportunity to get better value over the long term

The requirement to meet obligations under WFD is statutory. Investment will be required at PR24 to meet the final areas of improvement before the statutory deadline of 2027. Accelerating this investment will enable us to lock in the benefit of the current lower cost of borrowing.

Addressing storm overflow discharges is a significant long-term problem. Early action to trial nature-based solutions, such as vertical flow reed beds, will enable more decisive action at PR24 and help us identify more affordable solutions.

Creating jobs for the UK's Green Recovery

Through the delivery of our proposals, we will create around 280 much-needed jobs within our region and develop vital engineering skills for the green economy.

1.2 Accelerating the achievement of Government priorities

Accelerating completion of WFD obligations

We have removed the uncertainty that prevented action at PR19

When developing our PR19 Plan, we agreed with the EA that some projects should be postponed from the 2020-25 WINEP. This was because the content of the current WINEP needed to be largely finalised by the end of 2017 (for formal issue in March 2018), well before AMP6 improvement work had been completed.

This postponement has allowed more time for us to measure performance of the improvements that have been completed between 2015-2020. While the need to invest at these sites to meet the 2027 backstop date for delivering WFD improvements has never been in question, the required permit limits are in part dependent on how well the AMP6 upgrades are performing. In addition, a small number of improvements originally proposed for WINEP3/PR19 failed to satisfy WFD cost benefit criteria for improvement to good ecological status. We agreed to revisit these areas to see if a reduced scope of work to deliver improvement from poor to moderate status would be beneficial.

We have been feeding performance data from the last three years into water quality models to refine permit limits and identify the remaining needs at a river catchment scale to meet the 2027 WFD obligations. We have used this data to assess the benefits delivered in AMP6, factoring them into the projects being proposed in this business case. We have applied the same strict environmental assessment criteria used at PR19 to the investments proposed in this business case, to demonstrate the need for action. The criteria include:

- Is there clear and unambiguous evidence of a failure to meet environmental standards?
- Is it clear that the failure is due (at least in part) to our activities?
- Do the required improvement measures satisfy the cost benefit criteria?

We have identified 35 sewage works where performance meets these key criteria. The results of our assessments are detailed in Table 1. In assessing the environmental evidence for improvement, we drew on the following data sources:

- The 2019 WFD classification data, published by the EA in September 2020.
- The EA's Reasons for Not Achieving Good status (RNAG) data.

- The EA's Weight of Evidence (WoE) of eutrophication data produced in 2018, (this is specifically used in relation to phosphate to confirm that there is a discernible ecological impact associated with exceeding river targets).
- River quality modelling source apportionment data (from the SAGIS-based Permit Optimiser models).
- For rivers not covered by Permit Optimiser models, manual source apportionment calculations based on current actual river quality data – these have been verified with the EA and indicative permit limits supplied.

Table 1: Assessment of environmental needs to meet WFD obligations

Waterbody name	2019 WFD Phosphate class	RNAG - Phosphate failure	RNAG - caused by Sewage works	Supported by source apportionment	Weight of Evidence of eutrophication
Wood Brook Catchment (trib of Soar)	poor	Yes	Yes	yes	Very certain eutrophication problem
Soar from Rothley Brook to Long Whatton Brook	poor	yes	Yes	yes	Very certain eutrophication problem
Soar from Long Whatton Brook to Trent	poor	yes	Yes	yes	Very certain eutrophication problem
Isbourne - source to conf R Avon	moderate*	yes	Yes	yes	Very certain eutrophication problem
Avon - Tolsey Lane to conf R Severn	moderate*	yes	Yes	yes	Very certain eutrophication problem
Avon- Tramway Br Stratford to Workman Br Evesham	moderate*	yes	Yes	yes	Very certain eutrophication problem
Avon (Wark) conf R Leam to Tramway Br, Stratford	moderate*	yes	Yes	yes	Very certain eutrophication problem
Avon conf Workman Br, Evesham to conf R Severn	moderate*	yes	Yes	yes	Very certain eutrophication problem
Trent from Moreton Brook to River Tame	moderate*	yes	Yes	yes	Very certain eutrophication problem
Derwent from Amber to Bottle Brook	Moderate	yes	Yes	yes	Quite certain eutrophication problem
Alfreton Brook from Westwood Brook to Amber	Poor	yes	Yes	yes	Very certain eutrophication problem
Amber from Alfreton Brook to Derwent	Poor	yes	Yes	yes	Quite certain eutrophication problem
Amber from Press Brook to Alfreton Brook	Moderate	yes	Yes	yes	Uncertain eutrophication problem^
Alfreton Brook from Source to Westwood Brook	Poor	yes	Yes	yes	Very certain eutrophication problem
Press Brook Catchment (trib of Amber)	Poor	yes	Yes	yes	Very certain eutrophication problem
Derwent from Bottle Brook to Trent	Moderate	yes	Yes	yes	Very certain eutrophication problem
Maun from Source to Vicar Water	Good#	yes	Yes	yes	Quite certain eutrophication problem
Maun from Vicar Water to Rainworth Water	Poor	yes	Yes	yes	Very certain eutrophication problem
Maun from Rainworth Water to Poulter	Poor	yes	Yes	yes	Very certain eutrophication problem
Idle from Maun/Poulter to Tiln	Moderate*	yes	Yes	yes	Very certain eutrophication problem

Waterbody name	2019 WFD Phosphate class	RNAG - Phosphate failure	RNAG - caused by Sewage works	Supported by source apportionment	Weight of Evidence of eutrophication
Idle from Tiln to Ryton	Poor	yes	Yes	yes	Very certain eutrophication problem
Idle from Ryton to Trent	Moderate*	yes	Yes	yes	Very certain eutrophication problem
Salwarpe - conf Elmbridge Bk to conf R Severn	Moderate*	yes	Yes	yes	Very certain eutrophication problem
Mease from Source to Gilwiskaw Brook	poor	yes	Yes	yes	Very certain eutrophication problem
The Cam R source to conf Glos and Sharpness Canal	moderate	yes	Yes	yes	Very certain eutrophication problem
Hampton Loade Bk - source to conf R Severn	poor	yes	Yes	yes	Very certain eutrophication problem
Tuxford Beck from Source to North Beck	Poor	yes	Yes	yes	Very certain eutrophication problem
North Beck Catchment (trib of Trent)	Poor	yes	Yes	yes	not recorded^
Laughton Drain from Source to River Trent	poor	yes	Yes	yes	Quite certain eutrophication problem
Wheatley Beck Catchment (trib of Trent)	poor	yes	Yes	yes	Quite certain eutrophication problem
Radbourne Brook	poor	yes	No	yes	Very certain eutrophication problem
Syston Brook Catchment (trib of Wreake)	moderate	yes	No	yes	Very certain eutrophication problem
Eau from Manton Sewer to Trent	moderate	yes	Yes	yes	Very certain eutrophication problem
Eau from Source to Northorpe Beck	poor	yes	Yes	yes	Very certain eutrophication problem

** Denotes anticipated class once AMP6 and AMP7 improvements are accounted for in the data.*

 # To be queried with the EA – reported class inconsistent with RNAG and model data. This does not affect the proposed investment as the improvements are still required to deliver downstream benefits.

^ improvements to these waterbodies are incidental consequences of upstream improvements.

The need to take action to reduce storm overflow discharges

To meet the ambition in the 25 Year Environment Plan, we must accelerate action to address storm overflows. Climate change, population growth and urban creep will all significantly increase the load on the sewer network, which will in turn increase the frequency and volume of water discharged back to the rivers through storm overflows. The sector is estimating that the cost to address this challenge will have significant impact on bills. There is a clear urgency to accelerate progress to find more affordable and sustainable solutions, and action now would enable bolder action to be taken at PR24.

1.3 Customers expect faster, bolder action

Enjoying the environment

Our customers consistently tell us that the natural environment is very important to them. The rivers are a vital part of our heritage, they sustain the natural environment and provide us with fresh tap water, as well as being the perfect habitat for wildlife and a place for recreation. The local environment has an intrinsic connection with our customers and communities. Third party research tells us that connection to nature is a significant factor in wellbeing and pro-environmental behaviours.

How Covid-19 has changed society, and our focus on local recreation, health and wellbeing

Our PR19 research underpinned the importance of the natural environment to people, and how local green and blue spaces provide opportunities for escapism, relaxation, improving health and wellbeing, spending time with friends and family, and building connections with the local community. This has been heightened by the Covid-19 pandemic, which highlighted how the public have embraced the local environment, with concern – and appreciation for – local natural spaces.

Independent research (from Britain Thinks) on the impact of Covid-19 on people's lives showed that one of the three key takeaways from the pandemic has been the value of feeling connected to where you live. Our own research showed that people have become more aware of the natural world during lockdown, and this has brought a lot of pleasure. Customers valued a slower pace of life, spending more time with family, and noticing more kindness and sense of community.

Storm overflows

Despite storm overflows being part of the sewer system, and a means to avoid sewer flooding in homes, our research indicated that some customers are appalled that raw sewage is ever discharged into rivers. They expect us to invest in infrastructure that avoids this.

"No wastewater should go into rivers under any circumstance, it's time to stop this everywhere. Anybody contaminating any water course should be made to pay in full for the clear up and be fined." **– Customer, Tap Chat**

A WWF report (2017) found that the public want rivers to be safe to swim in and believe regulators and companies should do more to tackle pollution. However, awareness is low; half were not aware that raw sewage could be released into rivers and 35% have flushed or put something down the drain that they should not have in the past month. 80% think that it is never acceptable to release raw sewage into rivers and 87% think the public must be told when this happens.

Reflecting this public sentiment – proposed new legislation

A new Private Members' Bill is being put forward by the chair of the environmental audit committee, Philip Dunne. The Bill is seeking a duty on water companies to take all reasonable steps to ensure that untreated sewage is not discharged into inland waters, and requires the Secretary of State, the EA and Ofwat to use their powers to ensure compliance with that duty. The second reading of this Bill is expected to in January 2021. While we think it unlikely that the Government will support this Bill into law, we anticipate that the Government will seek to incorporate elements of this Private Members' Bill into Government-led legislation.

There has been considerable adverse coverage in the media about storm overflows and rivers failing to achieve WFD objectives. Philip Dunne's Private Members' Bill is a justified reaction to the public's dissatisfaction with the health of the country's rivers, and clearly signals a need to accelerate activity.

1.4 Securing best value for the long term

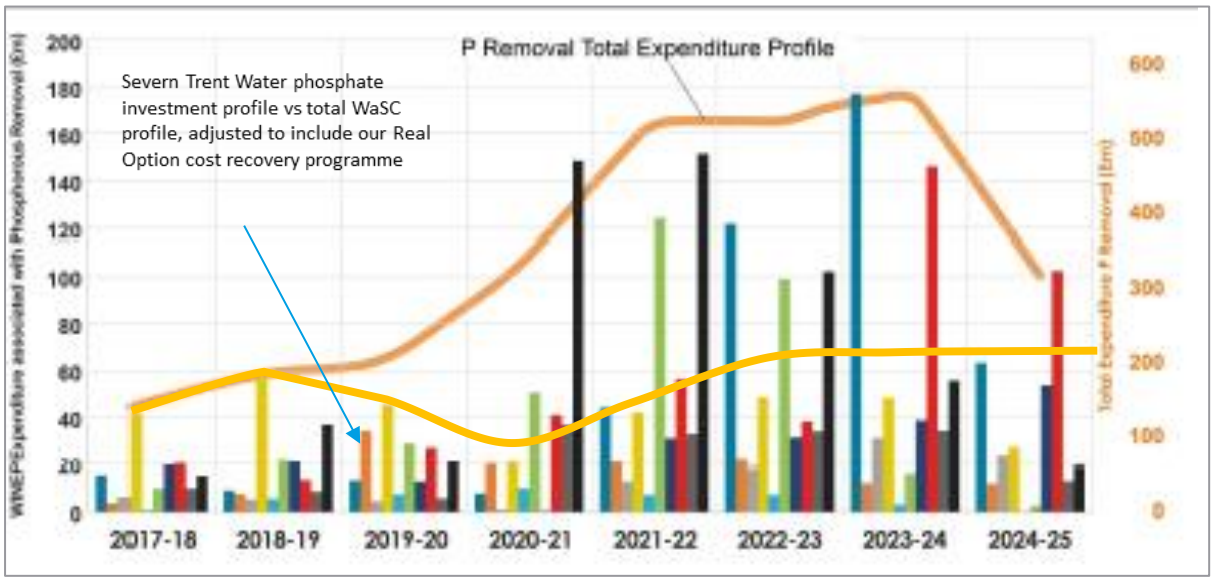
Supporting better river quality and delivery of the WFD

Around ten years ago, in partnership with the EA, we developed a coherent 'source to estuary' strategy for addressing phosphate pollution. As phosphate is a persistent pollutant; benefits delivered in the

top end of a river catchment trickle down into the lower reaches. It is therefore essential that investment at works lower down the river system take full account of the improvements delivered upstream. This strategy has underpinned ten years of WFD investment and was made possible by our innovation trials conducted at Packington STW in 2014/15. These trials enabled us to start accepting sub-0.5mg/l phosphate permit limits in AMP6. This was an essential component of the strategy given that several rivers in our region have large sewage works in the upper part of the catchment.

While our industry as a whole is showing a significant ramping up in WFD phosphate removal investment in AMP7, we have been able to maintain a relatively flat investment profile, minimising the impact on customer bills. The benefit of our systematic approach can be clearly seen in Figure 1.

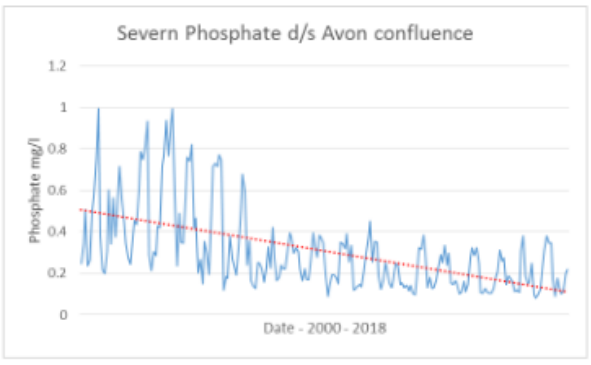
Figure 1: Our approach to investing in phosphate removal has minimised impact on customer bills



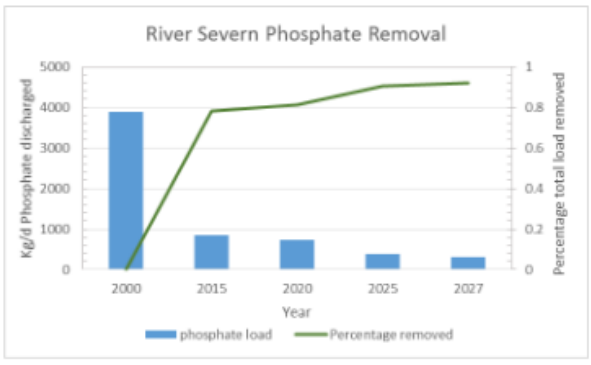
- *Vertical bars denote individual companies' investment in WFD phosphate removal*
- *The P removal total expenditure line is the industry total, scaled off the right axis*
- *The amber line is Severn Trent's investment profile, scaled off the left axis*

By the end of AMP7 (through delivery of our PR19 plan) we will have tackled around two thirds of the sewage works discharges causing WFD failure. We will have begun making significant inroads into those storm overflow discharges and unsustainable abstractions that are causing adverse environmental impacts. The benefits of this WFD investment, and preceding work under the Urban Wastewater Treatment Directive, is evidenced in recorded river quality data (see Figure 2).

Figure 2: We have achieved consistent improvement in phosphate levels in the Severn since 2000



River Severn water quality



Phosphate load removed at STWs in Severn catchment

This proposal aims to continue this approach as we start to tackle the mounting issue of storm overflow discharges. By accelerating investment and trialling more sustainable solutions, it means we can address the uncertainty and concerns that the EA may have about moving from traditional solutions to more nature-based ones. If the trials are successful it will enable bolder action at PR24. The delivery of this proposal means we will have tackled all the rivers to WFD good status that are cost beneficial. There will remain a small proportion of non-cost beneficial rivers, but we will continue to look for options within our AMP8 plan.

1.5 An opportunity to stimulate the economy and create jobs

The Government has set out its objective of a 'new and more resilient future' (Defra, July 2020). As a socially purposeful company, we are committed to responding proportionately to the call for action and meeting the expectation to design innovative, long-term solutions.

Our proposals will unlock significant economic, social and environmental benefits in both the short and long term. By taking action now, we will also create jobs and the new skills required for the recently announced green industrial revolution. Our proposed investment will generate around 280 jobs across our business and partners to deliver the schemes, with approximately 270 further indirect jobs created through the multiplier effect. This will provide much needed economic stimulus to local communities and businesses. We set out the full analysis and evidence to support this view in Annex 05 Creating jobs and improving skills.

2. Best option for customers

Delivering our proposed WFD phosphate removal measures is a continuation of the AMP6 and AMP7 enhancement programmes. We have already delivered over 100 improvements in AMP6 and are well underway to deliver another 150 in AMP7. We therefore already have a good understanding of which solutions are suitable for each circumstance, and we have applied this learning when considering options to meet the needs in this proposal.

2.1 Solutions for meeting WFD obligations

We have used our previous experience to cost the most likely option needed to address the reason for not achieving 'good' status. Where appropriate, we have selected processes with a view to mitigating future challenges (such as hazardous substance and pharmaceutical regulation). For the initial costing exercise, we have drawn on the costs of the AMP6 schemes and Ofwat's PR19 cost assessment data. In all cases, we considered compatibility with our longer-term strategic ambition of creating safe bathing rivers across our region.

At all the sites proposed, we considered whether it would be possible to deliver the same outcome via partnership working within the catchment using offsetting measures. However, we determined that this is not a viable approach as there is insufficient diffuse pollution load available to fully offset the load removals needed at the sewage works. However, at the two smallest sites, Dalbury Lees and Hungarton, it may be feasible to implement a low energy, nature based solution. We have not ruled out the possibility of hybrid solutions where phosphate removal targets are delivered through a mix of catchment offsetting solutions and sewage works upgrades to less exacting permit standards. This will be explored as part of detailed feasibility.

We have also looked to see if adopting tighter standards at sewage works higher up in the river catchments would enable lower cost interventions to be made at the sites covered by this business case. No opportunities were identified through the modelling work that underpins this case, but further work will be undertaken to see if there are any opportunities to deliver more cost efficient measures at the catchment scale.

Cost benefit analysis of proposed investments

We undertook an initial cost benefit analysis on the proposed investments using both our PR19 'willingness to pay' benefit figure and the EA's National Water Environment Benefits Survey (NWEBS) data (see Table 2). To make these assessments we aggregated individual waterbodies so that costs and benefits were assessed at the catchment scale. This is in line with our PR19 approach and consistent with the methodology used by the EA for RBMPs. The lengths of river improved are drawn from the EA's catchment explorer database.

We have cross-referenced the waterbody data that underpins our AMP7 performance commitment (and the outcomes delivered in AMP6) to ensure no double-counting of benefits.

Table 2: Assessment of cost vs benefits of the proposed investments at catchment scale

Catchment	Length of river improved		capex £m 17/18 PBD	opex £mpa 17/18 PBD	60-year Totex	CBA ratio STW WTP	CBA ratio NWEBS
	Poor to Moderate (km)	Moderate to Good (km)					
Soar	38.2	39.9	[redacted]			0.9	1.4
Avon	0.0	158.4				3.0	4.9
Amber/Derwent	38.6	51.6				1.1	1.9
Maun/Idle	57.2	65.4				2.1	3.0
Trent and Tribs	63.8	111.9				4.8	7.0
Mease SAC	5.0	5.0				1.2	2.1
Severn Tribs	10.8	34.5				1.1	1.3
Programme contingency @[redacted]%							
Total	213.6	466.6	150.0	2.2	390.5	1.7	2.6

In all cases, our assessment shows that the measures are cost beneficial when using the EA's NWEBS benefits values. In all bar one catchment the improvements are cost beneficial against our PR19 willingness to pay criteria, with the one exception being marginal.

We have included an overall programme cost allowance in the total shown above, which has not yet been allocated to individual projects to account for site-specific issues that will arise. As we have not been able to carry out initial site investigation work (as was the case at PR19), we have not identified where such activities as: demolition of redundant assets, land purchase and uprating of power supplies will be necessary to deliver these projects.

What we plan to deliver

We propose to deliver treatment process upgrades to 35 sewage treatment works. The sites are selected on the basis that:

- investment is supported by environmental evidence;
- the measures meet cost benefit criteria; and
- we can model permit requirements with sufficient accuracy to cost solutions.

Some projects will need to span AMP8 as several of these works (notably Leicester Wanlip STW), have significant capital maintenance and supply demand investment needs in AMP8. These 'business as usual' activities are out of scope for the Green Recovery initiative and are therefore not included in this business case. Where it is necessary to span multi-driver projects across AMP7 and AMP8, our proposal is to deliver investment in AMP7 equivalent to what the quality enhancement element of the project will cost (determined using standard proportional allocation rules).

For example, the overall cost for the Wanlip project is estimated at [redacted], of which 45% will be proportionally allocated to WFD quality enhancement. This business case only includes [redacted] against this site, all of which will be invested by March 2025. The remainder of the project will be covered by the base maintenance and supply demand allowances in our PR24 price determination.

The approach to measuring WFD outcome delivery will be the same points-based mechanism we used for both PR14 and PR19. This scores a point for each classification improvement delivered (as assessed on a fair share load removal basis). We have detailed the anticipated outcome for each of the

waterbodies put forward, set out in Table 3. The proposed delivery dates are for waterbody improvement and are by necessity the product of a 'lowest common denominator' assessment. The improvement is only considered 'delivered' when the last project that impacts on the river is completed alongside all others.

Table 3: Summary of anticipated benefits and WFD points

Waterbody name	Current class	Future class	Points	Anticipated delivery date
Wood Brook Catchment (trib of Soar)	Poor	Good	2	Dec 2027
Soar from Rothley Brook to Long Whatton Brook	Poor	Good	2	Dec 2027
Soar from Long Whatton Brook to Trent	Poor	Good	2	Dec 2027
Isbourne - source to conf R Avon	Moderate*	Good	1	Mar 2025
Avon - Tolsey Lane to conf R Severn	Moderate*	Good	1	Dec 2027
Avon- Tramway Br Stratford to Workman Br Evesham	Moderate*	Good	1	Dec 2027
Avon (Wark) conf R Leam to Tramway Br, Stratford	Moderate*	Good	1	Dec 2027
Avon conf Workman Br, Evesham to conf R Severn	Moderate*	Good	1	Dec 2027
Trent from Moreton Brook to River Tame	Moderate*	Good	1	Mar 2025
Derwent from Amber to Bottle Brook	Moderate	Good	1	Mar 2026
Alfreton Brook from Westwood Brook to Amber	Poor	Moderate	1	Mar 2026
Amber from Alfreton Brook to Derwent	Poor	Moderate	1	Mar 2026
Amber from Press Brook to Alfreton Brook	Moderate	Good	1	Mar 2026
Alfreton Brook from Source to Westwood Brook	Poor	Moderate	1	Mar 2026
Press Brook Catchment (trib of Amber)	Poor	Good	2	Mar 2026
Derwent from Bottle Brook to Trent	Moderate	Good	1	Mar 2026
Maun from Source to Vicar Water	Good#	Moderate	1	Mar 2027
Maun from Vicar Water to Rainworth Water	Poor	Moderate	1	Mar 2027
Maun from Rainworth Water to Poulter	Poor	Good	2	Mar 2027
Idle from Maun/Poulter to Tiln	Moderate*	Good	1	Mar 2027
Idle from Tiln to Ryton	Poor	Good	2	Mar 2027
Idle from Ryton to Trent	Moderate*	Good	1	Mar 2027
Salwarpe - conf Elmbridge Bk to conf R Severn	Moderate*	Good	1	Mar 2026
Mease from Source to Gilwiskaw Brook	Poor	Good	2	Mar 2025
The Cam R source to conf Glos and Sharpness Canal	Moderate	Good	1	Mar 2026
Hampton Loade Bk - source to conf R Severn	Poor	Good	2	Mar 2025
Tuxford Beck from Source to North Beck	Poor	Good	2	Mar 2025
North Beck Catchment (trib of Trent)	Poor	Good	2	Mar 2025
Laughton Drain from Source to River Trent	Poor	Good	2	Mar 2025
Wheatley Beck Catchment (trib of Trent)	Poor	Good	2	Mar 2025
Radbourne Brook	Poor	Good	2	Mar 2025
Syston Brook Catchment (trib of Wreake)	Moderate	Good	1	Mar 2025
Eau from Manton Sewer to Trent	Moderate	Good	1	Mar 2025
Eau from Source to Northorpe Beck	Poor	Good	2	Mar 2025
Total			**48**	

* See section 4 on accounting for existing performance commitments.

There is evidence to show that this waterbody is wrongly classified. RNAG data supports a class of 'poor' for phosphate.

2.2 Solutions for storm overflow discharges

In AMP6, we delivered a substantial programme to install Event Duration Monitors (EDM) on most of our storm overflows. This was an NEP obligation initiated by Richard Benyon MP (the then minister for the Natural Environment and Fisheries) in a letter of 18th July 2013 in which he stated that "water companies need to introduce monitoring for the vast majority of their CSOs by 2020". This direction was implemented by the Environment Agency using a risk-based approach and included a requirement to make an annual data return detailing overflow event numbers and durations.

In parallel, the water industry has worked with the EA to develop the SOAF, which provides a standardised methodology for assessing the impacts of high frequency spilling overflows and quantifying the benefits of intervention. Based on the data returned from EDMs installed in the early part of AMP6, we have an obligation to complete 105 of these SOAF investigations in AMP7 (by March 2022).

In this section, we set out proposals to go beyond these AMP6/7 monitoring and assessment requirements, deliver some 'quick win' improvements, and lay the groundwork for a substantial programme of storm overflow improvements over the next two AMP periods. Our proposed measures are:

- **150 additional SOAF investigations**: This will be over and above the 105 WINEP obligations we are already committed to in AMP7. Focusing on high frequency spilling overflows, we will undertake 120 'standard' category SOAF investigations and 30 'complex' category SOAF investigations, including detailed river quality modelling The total of 150 additional SOAF investigations is based on an assessment of our supply chain capacity to complete the work in time to inform our PR24 business plan. We have also just completed a review of our event duration monitor data returns and concluded that 150 is a good approximation of all the additional CSOs that will meet the trigger criteria for a SOAF investigation.
- **Increasing EDM coverage and reporting from 78% to 100% of sewer overflows**: Of the 646 storm discharges not currently subject to formal EDM reporting, 586 already have some form of overflow monitor installed (on a non-statutory basis) as part of our pollution control strategy. Minor works are required to incorporate data from these monitors into the EA's annual EDM report. Discharge permits will also need to be amended to reflect the reporting requirement. There are approximately 60 overflows remaining that are unmonitored where installation of an EDM monitor is required to deliver the 100% coverage objective.
- **IT improvements to facilitate near real-time CSO spill reporting to the general public**: Other European countries are providing this effectively. For example, Copenhagen offers a state-of-the-art app providing real-time information on bathing water quality. South West Water also operates a similar system, Beachlive.
- **Install 25 permanent river water quality monitors in high amenity areas**: Our proposal is to install two monitors per site, one upstream of the storm overflow of concern and the other downstream, in line with the latest EA thinking.
- **Implement 100 low unit cost measures that will deliver significant spill frequency reductions**: Based on 2019 EDM data, we identified 167 overflows with an average spill duration of less than 20 minutes and we expect more to come to light when the 2020 data return is compiled. This indicates that many spill events are short duration, low volume events. Minor adjustments, such as raising weir height or marginally increasing pump capacity, could deliver significant spill reductions without detriment to the downstream system. Our initial estimate is that around 100

overflows could benefit from these low cost interventions. The unit cost for these low-cost interventions is estimated at £50,000. This is split approximately 50:50 between detailed hydraulic modelling (to ensure that intervention does not cause flooding or more overflow events downstream) and minor engineering works to modify or even close the overflow.

- **Trialling and introducing innovative methods and technologies**: In preparation for the anticipated programme of storm overflow improvement work in AMP8/9, we are proposing to trial innovative storm overflow treatment processes. The first of these is a vertical flow reed bed process (Figure 3), similar to one recently installed in Cowdenbeath by Scottish Water (although our trial will be gravity fed, not pumped). Gravity-fed vertical flow reed beds are a passive, low energy and carbon treatment system that can deliver a good quality effluent, with a reported biochemical oxygen demand (BOD) removal rate of around 80%. In recognition of the fact that space around some of our storm overflows will be limited, we also intend to conduct a full-scale trial of a compressible filter process that we believe will be similarly capable of delivering the high levels of BOD and suspended solids removal that will be required. We will be engaging with the EA on the permitting of storm overflow treatment systems, as treatment is a departure from the traditional storage approach.

  This approach to mitigating the impacts of stormwater spills will not be applicable to our entire estate of 2960 permitted overflows as land availability is constrained, especially in urban areas. Approximately one third of our permitted storm overflows are at sewage treatment works or pumping stations, where land availability is unlikely to be a constraint. Our initial estimate is that a treatment intervention could be viable at 25% of overflows and is likely to be especially useful at sewage works where storm spill frequencies and volumes tend to be higher (and storage solutions correspondingly expensive).

Figure 3: We will trial the effectiveness of vertical flow reed beds for reducing BOD levels

Image source: https://www.enviropro.co.uk/entry/129486/ARM-Ltd/Aerated-vertical-flow-wetland-for-CSO-effluent/

3. Robustness and efficiency of costs

3.1 WFD phosphate removal

We have generated the costs for WFD phosphate removal using our standard unit cost estimating tool, carried out by our capital delivery and commercial teams. This database creates unit cost curves based on the costs of projects delivered over the last ten years. This is the same, established cost estimating tool used to generate our PR19 estimates for this activity. The total capital cost for this proposal is £150m. We have benchmarked our costs against Ofwat's phosphate removal models used at PR19, which shows that our costs are efficient relative to the other WaSCs.

We have estimated the revenue effect of capital (REOC) at [redacted] per annum. These costs have been estimated through analysis of data generated for PR19 using a 'nearest equivalent' approach. There will be minimal additional operating cost incurred within the AMP7 timeframe, which we will accommodate within our PR19 base expenditure allowance. The earliest likely commissioning dates for the improvements proposed is mid- to late 2024, for smaller sites with low REOC implications. The larger schemes will not be commissioned until 2026/27 and 2027/28. This means the full effect of the anticipated REOC will not materialise until the latter half of AMP8. All the REOC implications of this Green Recovery proposal will be included in the PR24 submission.

We have quantified the additional energy use that will result from these proposals and included [redacted] for the provision of new green energy, in the form of solar generation, to make this proposal net zero carbon. We have also included a further provision of [redacted] for the planting of 41,000 trees to offset the embodied carbon associated with the new assets that we will be providing. Full details on the carbon neutrality measures can be found in Annex 06 Net-zero carbon.

3.2 CSO investigation and monitoring costs

At a total cost of [redacted] capex and [redacted] opex, we have included a number of measures to address emerging public concerns about sewer storm overflows:

- 150 additional SOAF type investigations to inform PR24.
- 100 'quick win' interventions in AMP7 to improve performance of high spill frequency overflows.
- Additional monitors to give 100% coverage on our overflows by March 2023.
- Near real time, publicly available data reporting before the end of AMP7, including river quality monitoring at 25 high amenity sites.
- Innovation trials on storm overflow treatment systems to inform PR24.

Table 4 shows a cost breakdown of each element, Table 5 gives an overview of total project costs.

Table 4: Cost breakdown of all elements of CSO investigation, monitoring and trials

[redacted]

Table 5: Total costs for CSO monitoring and trials proposal

[redacted]

4. Customer protection

For each business case it will be necessary to ensure that it can be integrated into the regulatory framework, so that (i) customers are protected and avoid paying twice for service improvements and (ii) we are appropriately remunerated for successful delivery of the proposals. Our approach to managing these issues is set out in Annex 11 - Customer protection, which explains:

- how we propose to be held accountable to deliver each green recovery proposal, and in turn be remunerated for successful delivery (and includes the description of each new PC we propose to implement this using the PR19 template).
- what overlaps exist across each of our existing suite of PCs and the green recovery schemes how we will adjust for these to avoid any double remuneration.
- how the totex costs sharing should be applied to better protect customers.
- how the funding of the green recovery proposals could be implemented within the current AMP.

4.1 WFD commitments

We quantified WFD improvements using an established mechanism that has remained largely unchanged since PR14. We count one point for every change in classification on a per parameter improved basis. Our improvements are calculated on a fair share load reduction basis, not an overall class change. If we undertake all our measures required to improve the class of a river (e.g. for phosphate) but other sectors do not, then the overall class is likely to remain unchanged.

To avoid double-counting of benefits already delivered in AMP6, or contained in our AMP7 performance commitment, it is necessary to manually adjust the EA's WFD classification data to account for benefits already delivered or committed. We do this by manually inflating the class of the river to match previously made commitments.

In Table 3 in section 2, six waterbodies are flagged as 'moderate*' because they were subject to partial improvement in our AMP6 programme to deliver our fair share of a 'poor to moderate' improvement. A further three waterbodies that are 'moderate*' are where improvements that make up part of our AMP7 performance commitment (or form part of our Real Option) will deliver our fair share towards moving from 'poor' to 'moderate' status. All nine of these waterbodies currently have 'poor' status in the latest classification – in essence we have manually overwritten the published classification data to account for improvements we have already made or are committed to. The measures proposed in this business case then deliver the additional load removal required to meet our fair share of the good status objective in all these waterbodies.

We are proposing that the WFD points-based metric should be used as the basis for a cost recovery mechanism at PR24, similar to the mechanism agreed for the Real Option 'amber' projects. In the case of this package of improvements, the cost recovery rate would be around [redacted] per point. This is higher than the unit cost in the Real Option mechanism, largely because the average population served by these 35 sites is greater than for those in the Real Option.

The proposals will result in 48 additional points. At a cost recovery rate of [redacted] per point this equates to [redacted], the forecast cost of the improvements.

Note that delivery of four of these ODI points on the river Avon is in part dependent on the upgrade of Warwick Sewage Treatment Works, which is included in the Bathing Rivers business case. In the event

that this investment proposal proceeds but the bathing rivers does not, it will be necessary to transfer [redacted] of investment onto this business case and adjust the recovery rate accordingly.

Appendix 1: Long term vision

Our vision for 2045 is to be operating a set of assets that make a positive difference to the environment. We will deliver our share of improvements to bring 75% of rivers to near natural state and address all our WFD reasons for failure. This will create the conditions for aquatic wildlife to thrive and, with improved amenity value, make these rivers more attractive places to visit and enjoy nature. Our **environmental strategy** for rivers can be summarised as follows:

- All rivers should meet environmental objectives, and our activities should not negatively impact them.
- We are proactive in playing our part to ensure at least 75% of rivers in our region achieve WFD good ecological status, in line with the Government's 25 Year Environment Plan. We will also work with other sectors to ensure that the target is delivered.
- We will take action to significantly reduce Combined Sewer Overflow (CSO) spill frequency and duration, with a specific focus on high amenity areas.
- We will ensure all our water abstraction activities are environmentally sustainable, even under drought conditions. This will include investigating options for beneficial indirect reuse of sewage effluent to reduce abstraction pressures on rivers.
- We will take steps to proactively address emerging issues of concern such as microplastic pollution, pharmaceutical residues in sewage effluent and anti-microbial resistance.
- We will implement measures to create safe bathing areas at selected rivers through enhanced sewage treatment and improvements to the system, to reduce sewer overflow events.
- We will work in partnership with other organisations to deliver improved flood prevention measures within our region.

Storm overflows are used to relieve the pressure on the sewerage system. They have become an increasingly contentious practice, subject to significant media scrutiny in recent years. Following introduction of the Storm Overflow Assessment Framework (SOAF) and the installation of Event Duration Monitors, our industry as a whole is now taking steps to identify and improve problem overflows. However, more needs to be done to address public concerns. Our strategy for CSOs and the wider sewer network is summarised below:

- We will fully implement the SOAF process to ensure all of our overflows are compliant with the requirements of the Urban Waste Water Treatment Directive.
- We will improve any overflow that is responsible for a failure to meet WFD 'good' status where it is cost beneficial to do so.
- We will achieve zero uncontrolled discharges from sewers by 2050 (aligned with the vision outlined in one of the 12 Big Questions set out by UK Water Industry Research).

Delivery of these objectives will be challenging. The traditional approach of piecemeal, overflow-specific interventions is not going to deliver the desired outcomes. We are ambitious and believe in our proposals for catchment measures, e.g. surface water separation and infiltration reduction, and the blue-green infrastructure measures proposed in our flood resilience business case.

Frequent operation of CSOs is potentially the biggest impediment to the successful delivery of bathing standard water quality in rivers. This means the successful delivery of our vision to create safe bathing areas within our region is inextricably linked to the delivery of our CSO strategy.