

SVE4.29

Waste WINEP inland bathing waters

Draft Determination representations

28 August 2024

Executive summary

This proposal for £1.3bn, £82.8m of it in our draft determination response, outlines our plan to meet Severn Trent’s expanded statutory obligations towards three newly designated inland bathing waters in our region; Ludlow, Ironbridge and Shrewsbury. It represents the activity needed between 2025 and 2033 years to enhance our assets to meet the inland bathing river standards.

Case for change

Clean, healthy rivers have the potential to support ecosystems, biodiversity, communities, health and wellbeing, and the local and national economy. In May 2024, Defra added 27 new sites to the list of designated inland bathing waters in England that will be monitored with effect from the 2024 bathing season. Of these, three are inland bathing waters within the Severn Trent area:

- River Teme at Ludlow, Shropshire.
- River Severn at Shrewsbury, Shropshire.
- River Severn at Ironbridge, Shropshire.

Our statutory obligations at these sites have therefore expanded to include the SODRP targets to protect public health in designated inland bathing waters. Table 0.1 below outlines the key changes in requirements for designated bathing waters sites.

Table 0.1: Key changes in statutory requirements for the three sites, pre and post PR24 submission.

Requirement	Action required pre PR24 submission (WINEP & SODRP)	Action required post PR24 submission (SODRP Bathing Waters)
Ecological health	Storm overflows to be brought down to 10 spills in a typical year following full company prioritisation.	No storm overflow discharging near a designated bathing water spills more than 1 time on average per bathing season (15 May to 30 September).
	Storm overflow discharges to be reduced so there is no ecological harm.	
Human health	Ecological focus only.	Harmful pathogens from storm overflows discharging near bathing waters are significantly reduced.

Solution

Our aim is to improve Severn Trent assets and the wider treatment work drainage system between 2024 and 2033, moving forward at pace for the elements that can be completed in a ‘no-regrets’ approach. We will work closely with the EA, Lead Local Flood Authorities and the local councils to improve the full drainage system in these areas.

Our proposal is for an investment of £1.3bn in total, split between £82.8m set out within this case and a further £1.26bn as part of the large, gated projects process. This investment will deliver the following benefits:

- Protect public health and the environment. Significantly reduce storm overflow spills in the area of designated inland bathing waters, and meet the required ecological and public health standards.
- Restore customer trust. Deliver clear, real-time customer communications on storm overflows, improving their confidence in river health and ability to swim in nature.

The proposed AMP8 and AMP9 activities (summarised in Table 0.2) are supported by lessons learned from our Green Recovery Bathing Rivers project in the Rivers Avon and Teme, due for completion in March 2025.

Table 0.2: Proposed activities between 2025 and 2033.

Inland Bathing Water area	At pace improvements	Longer term solution
Ludlow	• Implement 400 waterbutts / rainwater planters at household / non-household properties. • Close Fishmore View CSO. • Install innovative flap valves at all other storm overflows.	• Surface water separation upstream of the Linney storm overflow • A pipe upsize downstream of the Linney storm overflow • Localised separation upstream of Temeside storm overflow and pumping station • Additional storage at Temeside storm overflow and pumping station Pump increase at Ludford storm overflow and pumping station
Ironbridge	• Implement 184 waterbutts / rainwater planters at household / non-household properties. • Install innovative flap valves at all other storm overflows. • Implement smart system to actively manage storm response within the system • create a Bathing Forecasting system for our customers to be able to see in real time	• 2030 completion for a New Tunnel 3m in diameter running 3.64km below the River Severn from the upper edge of Ironbridge down to Coalport treatment works. • 2030 completion for Localised grey storage solutions for 6 storm overflows at the extremities of the sewer system.
Shrewsbury	• Implement 441 waterbutts / rainwater planters at household / non-household properties. • the addition of a new surface water system around Cotton Hill. • Install innovative flap valves at all other storm overflows. • Implement smart system to actively manage storm response within the system • create a Bathing Forecasting system for our customers to be able to see in real time	• 2033 completion for a New Tunnel 3m in diameter running 7.46km below the River Severn from the upper edge of Shrewsbury down to Monkmoor treatment works • 2033 completion for Localised grey storage solutions for 6 storm overflows at the extremities of the sewer system.

We have taken proactive steps to ensure we can deliver this investment and have proposed relevant price control deliverables to track delivery with associated penalties to return money to customers in the event of late or under delivery.

We are confident that this proposal represents the best option for customers, by accelerating lower cost interventions to deliver immediate benefits and then progressing the complex fuller solutions through a gated process to ensure we find the best value solutions.

This case should be read in conjunction with representation SVE4.08 Waste WINEP storm overflow changes, which also includes investment in these three areas relating to obligations within our AMP8 WINEP. The costs associated with the gated process are provided in table ADD24a.

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1. The need for investment

1.1 Responding to changes in statutory obligations

Clean, healthy rivers have the potential to support ecosystems, biodiversity, communities, health and wellbeing, and the local and national economy.

Our PR24 business case (SVE 04b Waste WINEP¹), submitted in October 2023, was based on our Water Industry Environmental Improvement Programme (WINEP), focusing on achieving Good ecological status, and the Storm Overflows Discharge Reduction Plan (SODRP), requiring water companies to reduce storm overflows to 10 spills per asset in a typical year.

In May 2024, Defra added 27 new sites to the list of designated inland bathing waters in England² that will be monitored with effect from the 2024 bathing season. Of these, three are inland bathing waters within the Severn Trent region:

- River Teme at Ludlow, Shropshire.
- River Severn at Shrewsbury, Shropshire.
- River Severn at Ironbridge, Shropshire.

The designation of these three inland bathing waters were based on surveys undertaken across two days in 2023, with a requirement for an average of at least 100 bathers a day during the bathing season. In addition, the assessments took account of availability and proximity to facilities such as public toilets, changing facilities, seating, litter bins and cafés, plus together with a consultation, for at least 6 weeks, to get views from local people, businesses and organisations about the proposed designation. The summary of the findings³ being as follows:

- Ludlow – 177 bathers on Sunday 20 August and 215 on Sunday 3 September, with 98.1% of the 206 consultation respondents being supportive.
- Shrewsbury – 102 bathers on Saturday 22 July and 105 on Saturday 5 August, with 97.1% of the 248 consultation respondents being supportive.
- Ironbridge – 104 bathers on Wednesday 16 August and 101 on Wednesday 6 September, with 96.1% of the 150 consultation respondents being supportive.

These consultations did not consider the cost of improvements required to meet the designated standards, nor the willingness of regional bill paying customers to pay the additional costs. In response to the draft determination, we carried out further qualitative and quantitative research with over 1,750 customers. This is set out in full in Section SVE3.01.01 of our representations and summarise it below.

¹ [sve27-04b-wastewater-winep.pdf \(stwater.co.uk\)](#)

² [Summary of responses and government response - GOV.UK \(www.gov.uk\)](#)

³ [Summary of responses and government response - GOV.UK \(www.gov.uk\)](#)

Following the formal designation of three river stretches in our region, this investment is no longer discretionary, and given the significant costs of improvement, we have discussed this with customers through both deliberative research and in our DD response survey.

As we saw in our Affordability and Acceptability research in summer 2023, participants in deliberative research tend to assess business plan on four components, which ladder up to acceptability: the perceived level of ambition, how feasible plans are, the degree of personal relevance and the perceived value for money. The new investment in bathing rivers evokes a somewhat negative reaction – participants in the deliberative workshops (held in Birmingham and Leicester) feel distant from the newly designated sites or are not personally interested in open water swimming. The amount of investment required vs the number of sites and people felt to benefit feels hard to comprehend, and there are also questions about the feasibility of the improvement plans in terms of local disruption and managing other impacts on river quality. Only a few recognise the potential for wider benefits in terms of improvements to river quality and to the local areas.

In our representative survey, this investment is the least important to customers (out of the 7 key enhancements presented), with 76% of customers rating it as either *Important* or *Extremely important* to them and only 30% of customers ranking it as a high priority for investment.

Despite this, feedback from customers on the DD response plan overall (with the bill impact including the costs of this investment) was extremely positive, with 81% of customers finding it acceptable. The main reasons for the plan being found acceptable are that customers support what Severn Trent is trying to do in the long term and the plan focuses on the right services. When informed about what the plan will deliver, as well as the personalised bill impact, 32% of customers find it affordable, with a further 37% saying it is neither affordable nor unaffordable.

As a consequence of these designations, our statutory obligations at these sites have expanded to include the SODRP targets to protect public health in designated inland bathing waters, including:

- Water companies must significantly reduce harmful pathogens from storm overflows discharging near designated bathing waters, by either: applying disinfection; or reducing the frequency of discharges to meet Environment Agency spill standards by 2035.
- It requires all storm overflows near existing, or any newly designated, bathing areas to comply with a rigorous standard for bathing, which sets a limit of 1 or fewer discharges per bathing season for inland water designations.
- For the full year position ensure storm overflows discharge below an average of 10 rainfall events per year by 2050) and screening requirements also apply.

Table 1 below sets out the key changes in statutory requirements for the three newly designated inland bathing waters sites.

Table 1: Key changes in statutory requirements for the three sites, pre and post PR24 submission.

Requirement	Action required pre PR24 submission (WINEP & SODRP)	Action required post PR24 submission (SODRP Bathing Waters)
Ecological health	Storm overflows to be brought down to 10 spills in a typical year following full company prioritisation.	No storm overflow discharging near a designated bathing water spills more than 1 time on average per bathing season (15 May to 30 September).
	Storm overflow discharges to be reduced so there is no ecological harm.	
Human health	Ecological focus only.	Harmful pathogens from storm overflows discharging near bathing waters are significantly reduced.
Bathing Water Quality standards	n/a	Achieve a minimum bathing water standard of 'Sufficient'

Within the SODRP, the Government commits to review the Bathing Water Regulations 2013 by the end of 2024, and to improve the usefulness and timeliness of public information on bathing water quality, in conjunction with the monitoring measures included in the Environment Act 2021.

1.2 Designated bathing water quality standards

Designated bathing waters in England are required to meet bacteriological quality standards that are set by the government, with monitoring and compliance assessments undertaken by the Environment Agency. The targets are expressed as percentile standards using two pathogenic bacterial species which have been identified as good indicator organisms for the presence of microbial contamination that could present a risk to human health. The standards set by the government are as follows, with the minimum acceptable standard for a designated water being 'sufficient';

Figure 1: Minimum acceptable standards for a designated water.

Classification	Thresholds (percentile)
Coastal Bathing Waters	
Excellent	EC: ≤250 cfu/100ml ; IE: ≤100 cfu/100ml (95th percentile)
Good	EC: ≤500 cfu/100ml ; IE: ≤200 cfu/100ml (95th percentile)
Sufficient	EC: ≤500 cfu/100ml ; IE: ≤185 cfu/100ml (90th percentile)
Poor	means that the values are worse than the sufficient
Inland Bathing Waters	
Excellent	EC: ≤500 cfu/100ml ; IE: ≤200 cfu/100ml (95th percentile)
Good	EC: ≤1000 cfu/100ml ; IE: ≤400 cfu/100ml (95th percentile)
Sufficient	EC: ≤900 cfu/100ml ; IE: ≤330 cfu/100ml (90th percentile)
Poor	means that the values are worse than the sufficient

Bathing waters only receive a classification after the first full bathing season post designation, by which time the EA will have taken 20 monitoring samples. Classifications are normally published by

the EA in October of each year, with the classification for each bathing water being based on data collected over the preceding 4 bathing seasons (fewer for new designations). As our three sites are new designations, they do not yet have a formal classification.

Although we do not have a full season's monitoring data for our 3 sites, sufficient data has been collected by the EA to accurately forecast the classification for this year and for all three sites the classification will be poor.

Table 2: Bathing area sampling data May to August 2024.

Site	Total samples taken	Intestinal Enterococci -90th percentile (cfu* per 100ml)	Intestinal Enterococci sample exceedences	escherichia coli - 90th percentile (cfu/100ml)	escherichia coli - sample exceedences
Ludlow	14	3860	4	3550	4
Ironbridge	13	694	4	2800	4
Shrewsbury	13	486	3	1474	3

* CFU = Colony Forming Units

We are forecasting that all three bathing areas will remain at poor status throughout AMP8 as the earliest delivery dates for our proposed improvements are March 2030 so the benefits will only be reflected in the 2030/31 data returns.

As we have not done any customer research on support for achieving good or high status, we are targeting the minimum allowable standard of sufficient. We also note that there will be other, non-water company inputs into these rivers that have not yet been identified. As such we can't make a forecast on the deliverability of a higher classification.

1.3 Responding to customer expectations

Over recent years, we have been tracking significant growth in customers' appreciation for their local environment, and a step change in their expectations of river water quality and access.

- Demand for open-water ('wild') swimming has increased significantly in the last decade. During 2020, the combination of the Covid-19 pandemic and hot summer normalised outdoor swimming in rivers and supervised venues. A dedicated swimming group based in Shropshire recently applied for designated bathing water status for these specific sites within our region. We have actively supported the application, giving information and facilitating insights into water quality data, to ensure proposals aligned with what we have learned from our community engagement for our Green Recovery bathing rivers - including the need for facilities, safe access and avoiding environmentally sensitive areas.
- Customers increasingly value access to nature, telling us in our PR19 research that local green spaces provide opportunities for escapism, relaxation, and time with friends and family. The pandemic has also led people to recognise the value of feeling connected to where they live.
- There is growing awareness of, and momentum against, poor quality rivers – and storm overflows in particular. New and established campaign groups are demanding change, and

high-profile critiques of water companies' performance in this area have gained significant traction over the past few years.

During the public consultation around the designation of the three inland bathing waters sites in Shropshire, the vast majority of stakeholder and customer responses supported the designation, citing the mental and physical health benefits for the public, improvements to the water quality, and benefits for the local community. In Ludlow and Shrewsbury, the fact that the public should have easy access to a bathing water was also frequently cited.

1.4 Implications for Severn Trent

Although there is one existing inland bathing water in the Severn Trent region (Colwick Park – West Lake, Nottingham), these three new designations are the first in our region to be impacted by Severn Trent's wastewater operations.

Our Storm Overflow Action Plan is based on the requirements of the Environment Act 2021 and the Storm Overflow Discharge Reduction Plan (SODRP) requirements to bring all storm overflows down to 10 spills in a typical year by 2045, alongside removing ecological harm. The new bathing waters designations require a step change in expectations for the performance of the storm overflows within the three catchments (one spill per bathing season, 15 May to 30 September) and removal of harm to human health.

While there are not many storm overflows within the officially designated sections of the rivers, there are in total 30 within the 5km upstream and 1 km downstream area. Not all of these 30 storm overflows spill in a typical year; however, there are 21 which are projected to spill during a bathing season. There is also one small treatment works in the upper reaches of the Ironbridge area of influence.

Some of these sites have improvements already planned in AMP8, following the Environment Act 21 EnvAct_Imp2 and Imp4 drivers, this will not meet the required standards for inland bathing rivers, following the EA guidance for a EnvAct_Imp3 (Bathing water) driver. Improvements already specified under these drivers are set out in representation SVE4.08 Waste WINEP Storm Overflow changes.

Our Green Recovery Bathing Rivers Project in the Rivers Avon and Teme includes improvements currently underway within the River Teme at Ludlow designated area with completion due by March 2025. The formal designation as a bathing water of this stretch of the Teme demonstrates the success of the ongoing work with local community groups and interested parties to support the bathing water designation at this location. The improvements in Ludlow followed the coastal bathing water standards (3 spills in a bathing season), as the inland bathing water spill standards had not been set at that time (no more than 1 spill in a bathing season). This means that further improvements will be required in Ludlow in AMP8 to bridge the gap between these two standards.

We also recognise the need to manage our communications about the focus on bathing waters, reassuring customers that storm overflows in non-designated areas are also subject to improvements.

1.5 Management control

We have a long track record of delivery on environmental improvement measures and have been at green status for WINEP delivery in the Environment Agency's annual Environmental Performance Assessment (EPA) in 7 of the last 8 years and attaining an overall 4* rating in 5 successive years (an industry first).

Table 3: Historic Severn Trent EPA scores and WINEP delivery

Year	Overall EPA score	WINEP delivery
2023	4*	Green Status 100%
2022	4*	Green Status 100%
2021	4*	Amber Status 97.2%
2020	4*	Green Status 99.2%
2019	4*	Green Status 100%
2018	3*	Green Status 100%
2017	4*	Green Status 100%
2016	3*	Green Status 100%

Although these are our first official bathing river designations, we are well on track to deliver our non-statutory bathing river projects contained within our Green Recovery programme. This will provide valuable learning to inform delivery of the projects covered by this business case.

The bathing river designation at Ironbridge will be especially sensitive due to its World Heritage Site designation. We will be able to draw heavily upon our experiences on an ongoing upgrade project at Matlock sewage works, which is also within a World Heritage Site, to enable us to engage with planners and the local community on the sensitivities of building in a highly protected location.

Both the Programme Lead and Research Lead on UKWIR's 'Big Question 5' (How will we deliver an environmentally sustainable wastewater service that meets customer and regulator expectations by 2050?) are drawn from Severn Trent. Our representatives have been actively pushing through new research projects on 'Faecal Indicator Organism die off rates in rivers' and 'Efficacy of novel disinfection systems' that will help inform the delivery of these bathing river projects. Through our programme lead links with UKWIR we are also close to a related project on 'Improving real time public bathing water information'. Our representative on the Surface Water Quality and Waste Planning Group's (SWQWPG) Technical Working Group on effluent disinfection co-chairs this group with the Environment Agency's lead representative.

Through our links with external organisations and our green recovery programme, we are rapidly developing our knowledge base and technical expertise necessary to deliver these bathing river enhancements.

2. Best option for customers and the environment

In this section we set out our approach to identifying the optimum scale for and pace for investment to better manage our customers', wider industry and Defra concerns regarding the required additional investment for these inland bathing water storm overflow improvements.

2.1 Option identification

In developing our business case, there are a number of choices around how to balance customer expectations to move at pace with the complex engineering that will be required to meet our statutory obligation of one spill or less during a bathing season each year.

Moving at pace

We have agreed with the Environment Agency (EA) to individually identify the storm overflows impacted by these three inland bathing water designations within the July 2024 WINEP refresh. This is a preliminary assessment and it is possible that additional overflows will need to be added at a later date (e.g. where detailed modelling identifies overflows or sewage works discharges more than 5km upstream that could adversely impact upon water quality). For this reason, the EA have included holding codes for all three locations for potential additions. They have also included formal investigation drivers for delivery by April 2027 which will finalise the improvements needed to discharge our duties. For Ludlow and Ironbridge overflows we have proposed completion dates for March 2030, and Shrewsbury has a proposed completion date of March 2033 – The EA have accepted these proposals. Where possible we will look to improve individual overflows in advance of the agreed backstop dates.

This need to deliver at pace is driven by our customers' expectations of river quality improvements resulting from formal designation and their need to be reassured that they can swim safely in nature for the benefit of their health and wellbeing (see Section 1.2). Lessons learned from other water companies' experience with bathing waters in locations where wastewater assets discharge shows that the best approach is to investigate water quality and make improvements in parallel, rather than wait for final investigation results. Many of the improvements required (such as reducing overflow spill frequencies to <1 per bathing season) can progress without the need for full water quality modelling.

The interventions we have identified for 'at pace' implementation include measures to optimise use of existing system capacity or low cost interventions to separate or attenuate surface water. These interventions will reduce the size and cost of the 'hard engineering' solutions required to meet the <1 spill objective.

Meeting customer expectations

In addition to meeting our statutory obligations for designated inland bathing waters (see Section 3), we have developed three additional criteria for identifying suitable options, based on customer expectations.

1. Our customer research has clearly told us that many customers consider the operation of storm overflows to be unacceptable, no matter how minimal the impact on river ecology. We

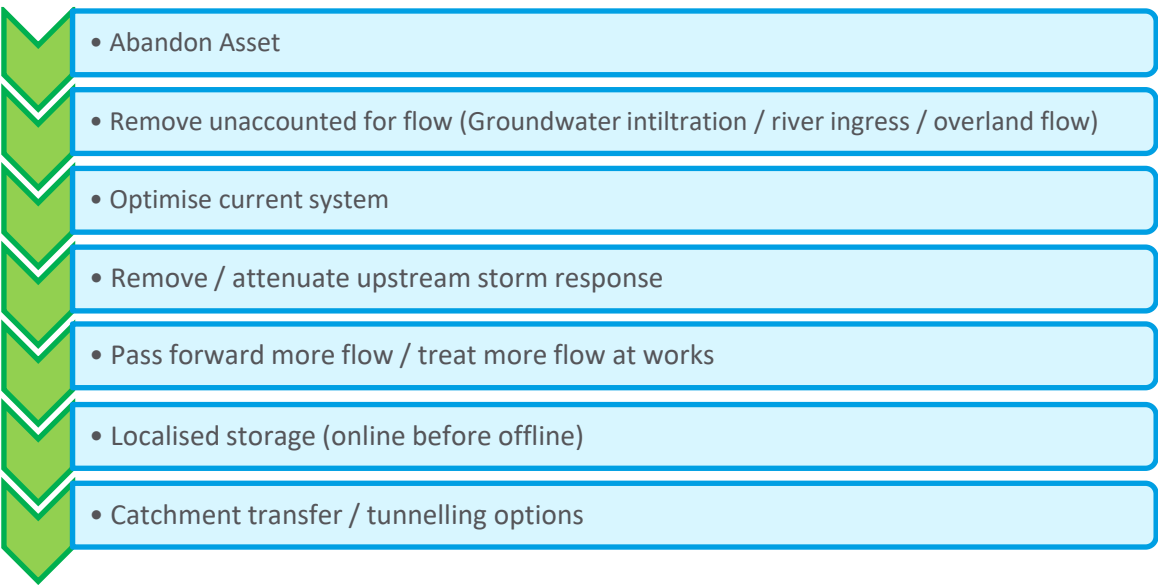
will therefore look for additional ‘at pace’ interventions to reduce storm overflow discharge events in bathing water areas in advance of project delivery dates.

- 2. Based on consultation with swimming groups in our region, we know that many of them aim to swim in the river all year round, not just during the May to September bathing season. We will therefore aim to deliver solutions that minimise spill frequency all year round and not just within the official bathing season.
- 3. There is much to be done to restore customers’ trust in river health. We therefore propose to implement clear, data-driven, independently verified customer communications to demonstrate that improvements have been delivered.
- 4. We will draw upon our green recovery learning and an on-going UKWIR research project ‘Improving Real Time Public Bathing Water Quality Information’ to install advanced water quality monitors that will give water users meaningful water quality information in real time.

Identifying options

To identify options, we have followed our standard hierarchy of solutions (see Figure 2 below) and utilised our catchment experience from the ongoing Green Recovery Bathing Water project and our sewer / treatment works monitoring and modelling.

Figure 2: Hierarchy of storm overflow improvement solutions.



2.2 Option assessment

We have assessed options for two phases of work:

- **‘At pace’ improvements:** ‘no regrets’ interventions over the first two years of AMP8 (2025 and 2026) to improve our system and reduce spills from our assets.
- **Long-term catchment improvements:** implementing the engineering solutions required for the full WINEP obligation at these locations, and reducing storm overflow numbers, across the full 2025-2033 period.

Each of these phases is outlined in more detail below.

‘At pace’ improvements

Table 4 below outlines the options for ‘no-regrets’ improvements that can be carried out in 2025 and 2026. Building on our catchment understanding through sewer models, network monitors and wider external datasets, we have used spills improvement analytics to outline where it is possible to implement a mixture of the following improvements in each catchment.

Table 4: Options for ‘at pace’ improvements.

Option	Explanation
Catchment Engagement	Our River Rangers will support local communities to build robust citizen science assessments of the newly designated bathing waters. This activity will engage the community with our programme and build confidence in the use of the river for recreational activities. Our CaSTCo⁴ River Teme demonstrator has helped establish best practice on how to recruit, train and support volunteers to deliver robust, actionable citizen science for bathing rivers. We have worked with the local Rivers Trust on engagement approaches and provided test-kits and training to volunteers so they can make simple observations and measurements and reporting them in a structured impactful way. Our River Rangers will extend the community engagement approached developed with the local River Trust in the CaSTCo demonstrator to the newly designated sites. We have actively supported communities interested in securing designation by sharing information and facilitating insights into water quality data so that proposals aligned with what we have learned from our community engagement. For example, including the need for facilities, safe access and avoiding environmentally sensitive areas.
Bathing Forecasting System	We intend to implement four measures designed to give customers the best possible information about water quality at our bathing waters:- - Real time continuous water quality monitoring - Enhanced bacterial and water quality sampling (full Lab analysis) - Real time bacterial contamination monitoring - eDNA sampling and microbial source tracking to identify sources of bacterial contamination This is in line with one of the immediate actions to reduce public health risks identified in “Testing the waters Priorities for mitigating health risks from wastewater pollution” published in May 2024 by the Royal Academy of Engineering and the National Engineering Policy Centre⁵.
Optimise the system	Review our current asset base to identify minor enhancements to our system that can reduce storm overflow spills through localised amendments and allow us to decommission some storm overflows without leaving customers at risk of flooding during rainfall events. This includes reviewing if we can increase pump rates in the sewer system to pass more flow forward or amend controls like orifice plates in our network to again pass more flow forward. These reviews have found one storm overflow that can be closed in entirety. While they did not spill during a typical year or bathing season, we still feel it is important to remove these overflows in these areas.
Reduce external factors	Reduce external factors (flows from other drainage owners’ systems from sources we are not bound to receive) impacting sewer capacity availability⁶. This includes reducing river ingress from major storm events and overland flow impact from surface water flows.

⁴ [Catchment Systems Thinking Cooperative \(CaSTCo\) - Ofwat Innovation Fund \(challenges.org\)](https://challenges.org/catchment-systems-thinking-cooperative-castco/)

⁵ [testing-the-waters-priorities-for-mitigating-health-risks-from-wastewater-pollution.pdf \(raeng.org.uk\)](https://raeng.org.uk/testing-the-waters-priorities-for-mitigating-health-risks-from-wastewater-pollution.pdf)

⁶ Note that any reduction of infiltration from our network will be funded from base expenditure.

	These options include adding state-of-the-art, pressure-managed flap valves that restrict the river ingress through the outfalls, but still allow pressure to build up and let controlled storm overflow discharges occur. These are much more resilient than traditional cast iron hinged flap valves. We will add additional reinforcement to our sewer systems near rivers and those below the local water table, to further reduce the impact of external flow entering the sewer system.
Reduce storm response	Through our ongoing spill improvement programme and our Green Recovery Mansfield project, we have built up a suite of surface water separation and source control management solutions that we can implement within these three catchments. This includes: • Working with our customers to install water butts and rainwater planters (or other similar innovative products) on their properties. • Working with non-household customers to install a mixture of rainwater planters alongside detention basins and bioswales which either hold the flow back or infiltrate the flow into the ground where possible. • Working with the Highways Departments and councils to implement new separate highway surface systems, taking this storm response to the river via either grey or green filtration systems to manage pollution impact from road runoff.
Implement smart sewer systems	Reassure customers that our storm overflows are not discharging during the bathing season by installing a control system that would close the overflows during normal working conditions where there is no or low amounts of rainfall, and can alert river users in real time when the overflows are opened. Our approach to date in installing real-time active control systems has been to put additional activated penstocks in our sewer system to better hold back the flow. However, this leaves the overflow still being operated in a passive approach. Our new approach is different, and we believe would be a first for UK bathing waters. A similar system has been installed in Paris as part of the improvements in river water quality in the Seine ahead of the 2024 Olympics. As part of this solution we will install a series of new monitors within our waste system (gravity pipes, pumping stations, rising mains and our treatment works) alongside installing actively managed gates and pumps to dynamically amend our system in a forecast based system.

Long-term catchment improvements

While there are improvements we can make in the near term to help reduce the number of spills in our network, reaching our statutory obligation of one spill or less per bathing season each year will require extensive enhancements to the drainage systems in each of these three catchments.

To develop the options below, we have:

- Used our existing waste system models and optimisation tools to assess the most cost-effective solution for each catchment.
- Utilised the learning from our Green Recovery projects (Mansfield nature-based solution implementation and the Bathing Water grey network spill improvements) to reduce the impact on our customers.
- Focused on reducing the number of storm overflows (sites and spill numbers) in the bathing water areas and surrounding river length upstream and downstream, so our customers can feel confident swimming in these areas.

Table 5 below outlines the options for long-term, place-based catchment improvements between 2025 and 2033.

Table 5: Options for long-term catchment improvements.

Option	Explanation
Reduce storm response	Further reduce storm response from roads and buildings hard standing discharging into the sewer system through: • New surface water systems taking storm response to the watercourse, with appropriate end of pipe treatment in place. • SuDs features that either attenuate flow or allow ground infiltration dependant on local ground conditions. These would be installed on roads, household properties and non-household properties. We will work with local communities to identify the best locations are for these features in their houses, streets and towns.
Increase system capacity	Grey solutions include looking at individual local storage tanks or local capacity increases to transfer flows to the works as well as full-catchment transfers such as building a new tunnel sewer system that takes the storm overflow outfalls flows down to the works in a tunnel sized to manage the peak flows and the total storage required to balance the flows arriving at the works.
Increase conveyance of flows	Improvements will be required at the treatment works to manage the additional storm response reaching the sites. We have undertaken a hydraulic and process review to understand if additional improvements are required on top of our traditional improvements at sites to manage dry weather growth increases.

There may be other options to work in partnership with others, particularly in Shrewsbury where there is an existing River Severn Partnership and look for opportunities for further surface water separation. More work is needed to understand the scale of the opportunity.

3. Summary of the ‘low- and/or no-regrets’ solution

Our proposed solution for each catchment has brought together all the available options (outlined in Section 2), bringing a place-based approach and utilising both traditional grey solutions with newer green solutions like SuDs features. In all cases, we will engage closely with our customers in these areas, building trust by discussing the development of our improvements with them throughout the AMP8 and AMP9 period.

Table 6 below outlines the costs for this programme, driven by changes to our statutory obligations. Our aim is to improve Severn Trent assets and the wider treatment work drainage system between 2024 and 2033 to deliver the new obligations, moving forward at pace for the ‘no-regrets’ elements.

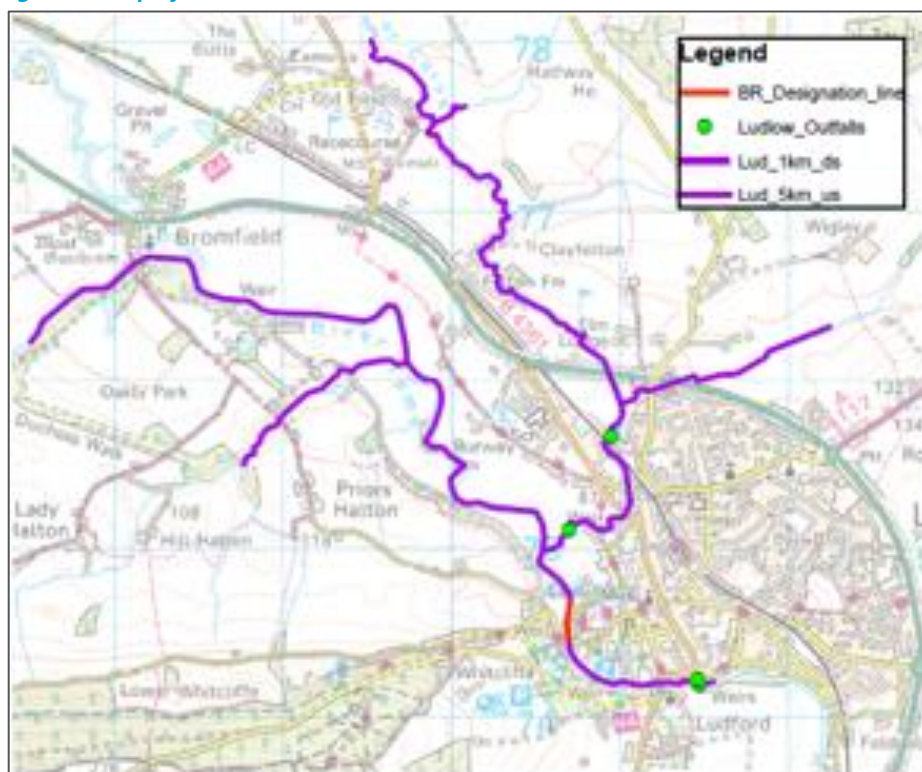
Table 6: Summary of investment (pre efficiency).

Inland bathing water area	At pace	Development costs	Gated costs	Note
Ludlow	0	0	0	SVE4.08 includes WINEP actions to meet inland bathing standards
Ironbridge	£8.8m	£27.2m	£599.95m	SVE4.08 includes investment at CSOs already included in WINEP for other drivers
Shrewsbury	£11.0m	£28.9m	£665.57m	
Programme wide (Monitoring and investigations)	£6.9m	n/a	n/a	n/a
Total	£26.7	£56.1	£1265.5m	

3.1 River Teme at Ludlow

There are four storm overflows that discharge within 5km upstream and 1km downstream of the newly designated bathing area, from the Linney boating pontoon to the Ludlow Mill beach (see Figure 2). There are no wastewater treatment works near the designated bathing water, with the closest wastewater treatment works discharge being Stanton Lacy, approximately 7 km upstream.

There is an additional storm overflow at Temeside pumping station that is just downstream of the outlined bathing region. Taking a place-based approach, we have added this site into our WINEP programme with a EnvAct_Imp4 driver to reduce spills to 10 times in a typical year (see Table 7 below).

Figure 2: Map of the River Teme at Ludlow.**Table 7: WINEP programme additions in the area of the bathing waters at Ludlow.**

WINEP ID	Site Name	WINEP Driver Primary	Spills EDM23	Pre Green Recovery typical year spills*	Pre Green Recovery Bathing Season spills*	Post Green Recovery Annual Spills*	Post Green Recovery Bathing season spills*
EnvAct_Imp3 (Bathing water) driver – 4 overflows							
08ST300010b	LUDLOW - OLD STREET (CSO)	EnvAct_IMP3	16	22.3	8.6	6.5	2.1
08ST300010a	LUDLOW - LUDFORD (SSO)	EnvAct_IMP3	2	8.6	4.2	5.1	2.8
08ST300008a	LUDLOW - THE LINNEY (CSO)	EnvAct_IMP3	7	7.1	3.6	5.1	2.6
08ST100242j	LUDLOW - FISHMORE VIEW (CSO)	EnvAct_IMP3	0	0	0	0	0
EnvAct_Imp2 driver – 1 overflows							

08ST300010c	LUDLOW TEMESIDE (SSO)	-	EnvAct_IMP2	58	73.7	26.1	47.4	17.2
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*model projections from 10 year series set to average year position

In 2021, Ofwat approved our proposals to deliver a suite of Green Recovery schemes to improve the environment and service to customers, including funding to deliver river water quality improvements in the River Teme at Ludlow. We proposed pioneering ozone treatment for the betterment of public health and to enhance the water quality in the river, as well as a reduction in spills during the bathing season.

Whilst these improvements are being delivered, our modelling of a 10-year series of rainfall suggests there are still some spills during the bathing season (two to three at each site). The Green Recovery proposal was designed before the standards for inland bathing waters were published in September 2023, and the improvements were undertaken to meet the standard for coastal bathing waters. This means that further improvements are required to close the gap between the two standards.

Our proposed solution for the River Teme is to build on the Green Recovery work, with our 'at pace' improvements including closing Fishmore storm overflows, installing 400 water butts / rainwater planters, innovative flap valves installed on all overflow outfalls and a smart network system including 8 gates.

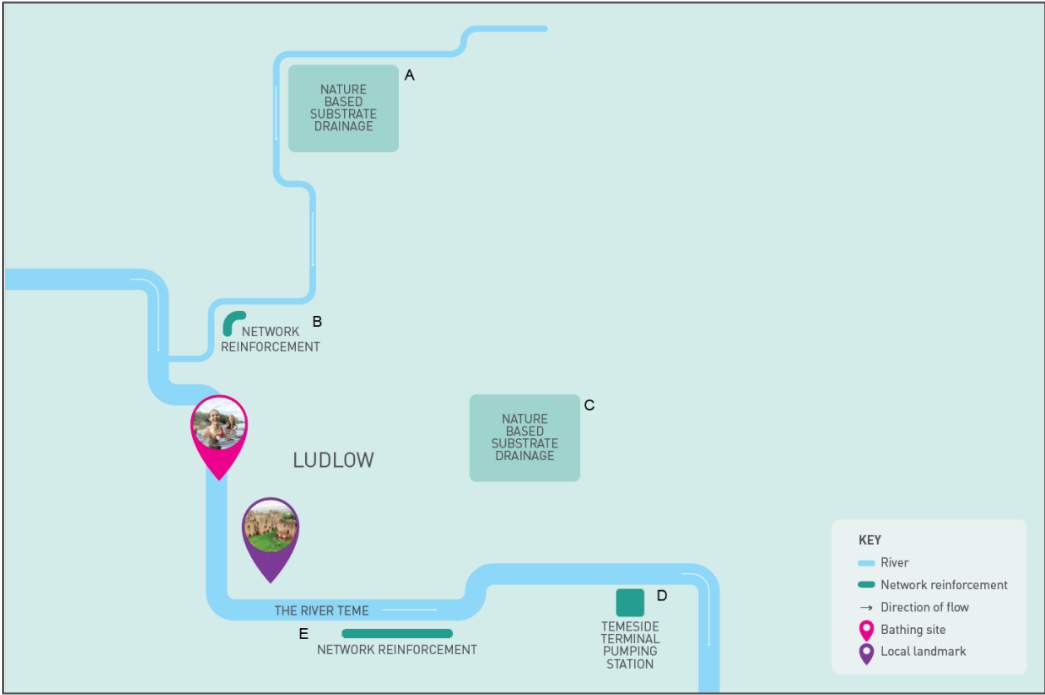
Our longer-term improvements (albeit still by 2030) include the addition of further surface water separation and implementation of SuDs in the upstream networks with additional network improvements at localised system capacities. With the separately funded through growth improvements at the Ludlow treatment works increasing the flow to full treatment for this catchment we will also increase the pump rate at the Temeside pumping station with the addition of storage in our network in the surrounding area to help manage peak storm response in the catchment.

While we have outlined a more holistic solution including a mixture of solution types for Ludlow we have applied the managed equivalent storage within our associated data tables for these sites following the new definition for the associated PCD for all storm overflow improvements within WINEP. These are better developed solutions and therefore included in our AMP8 plan (not within the gated forecast).

The key elements of our long term solution (outlined in Figure 3 below) are:

- A. Surface water separation upstream of the Linney storm overflow
- B. A pipe upsize downstream of the Linney storm overflow
- C. Localised separation upstream of Temeside storm overflow and pumping station
- D. Additional storage at Temeside storm overflow and pumping station
- E. Pump increase at Ludford storm overflow and pumping station

Figure 3: Ludlow solution plan.



3.2 River Severn at Ironbridge

There are 12 storm overflows and one wastewater treatment works (Buildwas – Park View) which discharge within 5 km upstream and 1 km downstream of the designated bathing area at Ironbridge in Shropshire, located around 450m upstream of the Iron Bridge. Ironbridge town discharges down to the Coalport treatment works which serves a larger area (see figure 4). Within this full treatment works area there are 17 storm overflows within the AMP8 WINEP plan. These are outlined in table 8 .

Figure 4: Map of the River Severn at Ironbridge.

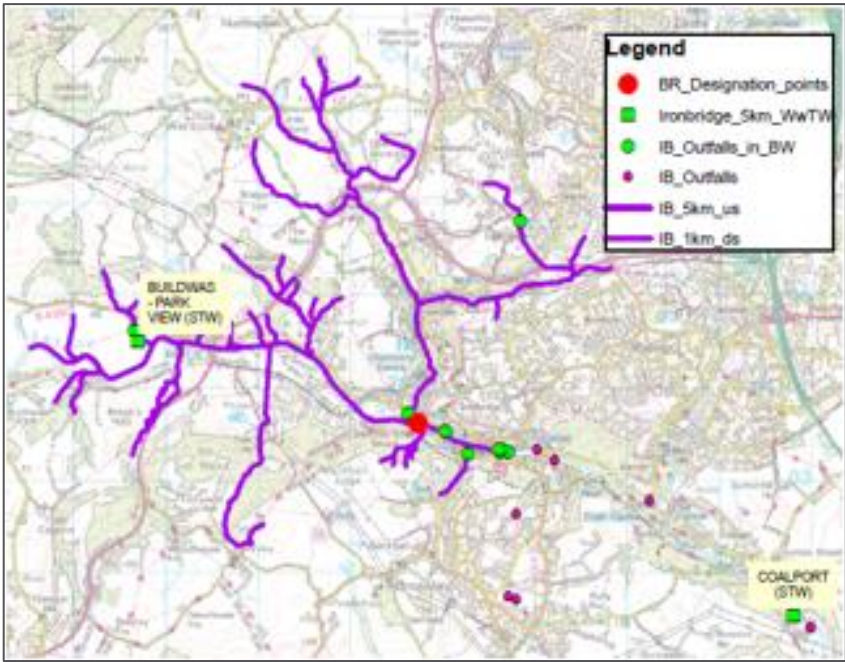


Table 8 below shows the full list of storm overflows within the Coalport treatment works area and the one upstream overflow at Buildwas – Park View STW with an AMP8 WINEP driver. Due to the scale of solution for the bathing water area we have put forward a large scale gated approach to implement the major tunnel solution. This will cover the overflows noted below as being within the gated scheme (Y). The others, while within the same drainage system are on separate drainage ‘legs’ to the treatment works meaning a more standard local solution can be implemented within AMP8.

Table 8: Storm overflow performance at Ironbridge.

WINEP ID	Site Name	WINEP Driver Primary	Within gated scheme (Y/N)	Spills EDM23	Calculated 2024 Baseline position*
EnvAct_Imp3 (Bathing water) driver – 12 overflows					
08ST300014a	DOSELEY - HOLYWELL LANE (CSO)	EnvAct_IMP3	N	20	33
08ST300014b	IRONBRIDGE - DALE END (SSO)	EnvAct_IMP3	Y - Ironbridge	15	69
08ST100203g	IRONBRIDGE - IRONBRIDGE RD (CSO)	EnvAct_IMP3	Y - Ironbridge	1	104
08ST100203e	IRONBRIDGE SHAFT (CSO)	EnvAct_IMP3	Y - Ironbridge	60	52
08ST300011a	BUILDWAS - PARK VIEW STW (CSO)	EnvAct_IMP3	N	1	1
08ST300013b	IRONBRIDGE - NEW ROAD #1	EnvAct_IMP3	Y - Ironbridge	0	0
08ST300013c	IRONBRIDGE - NEW ROAD #2	EnvAct_IMP3	Y - Ironbridge	0	0
08ST300013a	IRONBRIDGE - MADELEY ROAD (CSO)	EnvAct_IMP3	Y - Ironbridge	0	67
08ST300013d	IRONBRIDGE - ST. LUKES ROAD (MH4501)	EnvAct_IMP3	Y - Ironbridge	0	33
08ST100203j	IRONBRIDGE - LADYWOOD (CSO)	EnvAct_IMP3	Y - Ironbridge	19	106
08ST100203b	IRONBRIDGE - WHARFAGE STORM PS (CSO)	EnvAct_IMP3	Y - Ironbridge	No Data in EDM23	20
08ST300013e	IRONBRIDGE - WHARFAGE FOUL PS (CSO&EO)	EnvAct_IMP3	Y - Ironbridge	No Data in EDM23	0
EnvAct_Imp2/U_IMP4 (Spill Frequency) drivers – 5 overflows					
08ST100203c	COALPORT STW (CSO)	EnvAct_IMP2	N	36	33
08ST100203i	MADELEY - PARK AVENUE (CSO)	EnvAct_IMP2	N	7	54

WINEP ID	Site Name	WINEP Driver Primary	Within gated scheme (Y/N)	Spills EDM23	Calculated 2024 Baseline position*
08ST100203d	IRONBRIDGE - WATERLOO STREET (CSO)	EnvAct_IMP2	Y - Ironbridge	3	34
08ST100203h	BROSELEY - DARK LANE (FIELD 7078) (CSO)	EnvAct_IMP2	N	108	109
08ST100203f	BROSELEY - COCKSHUTT LA (FISH HSE) (CSO)	U_IMP4	N	52	50

* The calculated 2024 Baseline Position has been calculated using the average of the EDM2022/23, except where an updated fit for use hydraulic sewer model (using recent 10 year time series rainfall) is available to determine the baseline spill count for an average year.

While we see the need for a gated approach for the full bathing water solution there is a need to implement elements of our plan 'at pace'. These 'at pace' improvements will help our customers enjoy swimming in the water with a level of improvement in place. The 'at pace' improvements for Ironbridge are a smart network system with 20 gates, installing innovative flap valves for all overflow outfalls and 184 localised water butts / rainwater planters to help reduce some of the peak storm response in the system, and hold as much water as possible back in our system prior to a spill occurring into the bathing water of the river.

Our review of options for this catchment has focused on the local geographical and historical risks associated with building within this area. The area is a UNESCO world heritage site due to the Ironbridge structure itself. The bridge was built in 1779 as the world's first cast-iron bridge becoming a UNESCO world heritage site in 1986. This designation covers the wider Ironbridge Gorge area meaning it covers the core assets requiring improvement. Improvements in this area would include working near 4 scheduled monuments (Iron Bridge, Bedlam Furnaces, Coalport Inclined Plane and Coalport Bridge). Ironbridge Gorge has a reported 1 million people visiting every year.

Additionally, the Ironbridge Gorge has a history of geological instability caused in part by mining history. This includes known landslip features at and around our storm overflows. The ground conditions include a high risk of sinkholes occurring while working within this area meaning specific construction methods are required while working in this area.

There is also known river flooding in the town with the EA implementing portable barriers during flooding periods. While this barrier works in most situations it was compromised in 2020 and 2022. Due to these flood risks occurring during the winter months within the gorge we would need to construct during the summer months which is the high tourist period for the area.

As with the historic nature of the Ironbridge town the sewer system for the Ironbridge is a combined network. The UNESCO setting for the town means that undertaking the level of surface water system improvements or SuDs installation at a larger scale would be highly disruptive. Our initial assessment outlines that 33% of the roads are too small in width for another sewer line to be installed alongside the existing utilities within the roads. Rain gardens additionally would impact specific historic elements in the road like the cast iron kerb edging found in this town. While attenuation basins have their

benefits with the large mineshafts in this area there are high engineering risks with installing these larger SuDs features on the available land.

Our long-term solution is therefore to lead with a grey solution for this catchment to increase the capacity of the system, taking the flow from these storm overflows down to the treatment works to be fully treated. This includes adding additional balancing systems at the works to manage the increased flow. While we would continue to review options for localised surface water separation and SuDs features to be installed the design review to date does not show any opportunities in this area.

To manage the risk of undertaking the required improvements within the UNESCO area we would look to build a tunnel in the upstream segment picking up the storm overflow discharges in the bathing river area of interest up to the shaft terminal pumping station. This would create significant disruption to The Wharfage. Construction during the winter months is at risk of flooding to excavations and damage including cost for standing time of plant and equipment. Construction ideally would need to take place during the summer which coincides with the height of the tourist season. All access points onto the tunnel would need to be resilient to flooding to prevent it filling with river water when the river breaks its bank.

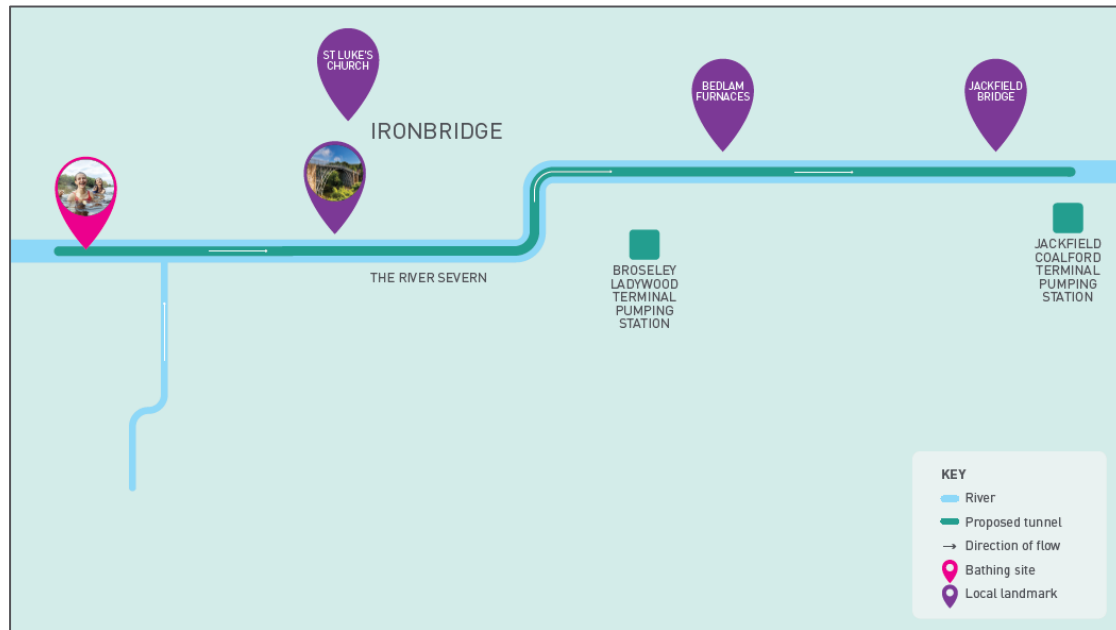
While continuing further downstream with the tunnel would allow further overflows (that are part of our AMP8 WINEP improvement programme due to high priority reasons) to be connected as part of a full catchment solution the risk of tunnelling under the Ironbridge itself is seen as too great a risk and therefore has not been taken forward as our costed solution. These overflows have been taken forward with more localised storage approaches.

At the same time as the improvements within the Ironbridge town and downstream overflows there are two areas of interest in the upstream tributaries of the river Seven. The first being Buildwas where there is a small treatment works and associated storm overflow. We will also upgrade Buildwas – Park View wastewater treatment works to become an all-flow works. The other is the storm overflow in Lightmoor called Holywell Lane. This will have a localised storage solution to reduce the spills down to the required 1 spill in a bathing season.

The Coalport treatment works which receives wastewater flows from the Ironbridge town alongside the wider urban developments of Broseley, Broseley Wood, Coalport and suburbs of Telford. A review of Coalport was undertaken to understand if the current treatment processes can manage the additional flows that will reach the site from the improvements to the Ironbridge catchment. The option selected produces two outcomes, firstly increasing the Flow to Full Treatment (FFT) to allow the works to treat more combined effluent in storm conditions and secondly increasing the storm tank capacity on site. The option assumed for Coalport involves the conversion of the two existing Primary Settlement Tanks (PSTs) to Storm Tanks, building new radial PSTs and additional Final Settlement tanks. Cross site and storm pipework, channels and pumping stations are to be duplicated or upsized. A new inlet works and balancing arrangement will be required to process the assumed new peak flow rates. The chemical dosing lines for Phosphorus removal will be rerouted to a new point of application. Coalport is a constrained site bounded by the steep banks of the River Severn to the North, and a hillside to the south. For these reasons use of nature-based or other alternative methods have been discounted.

See Figure 5 below for details.

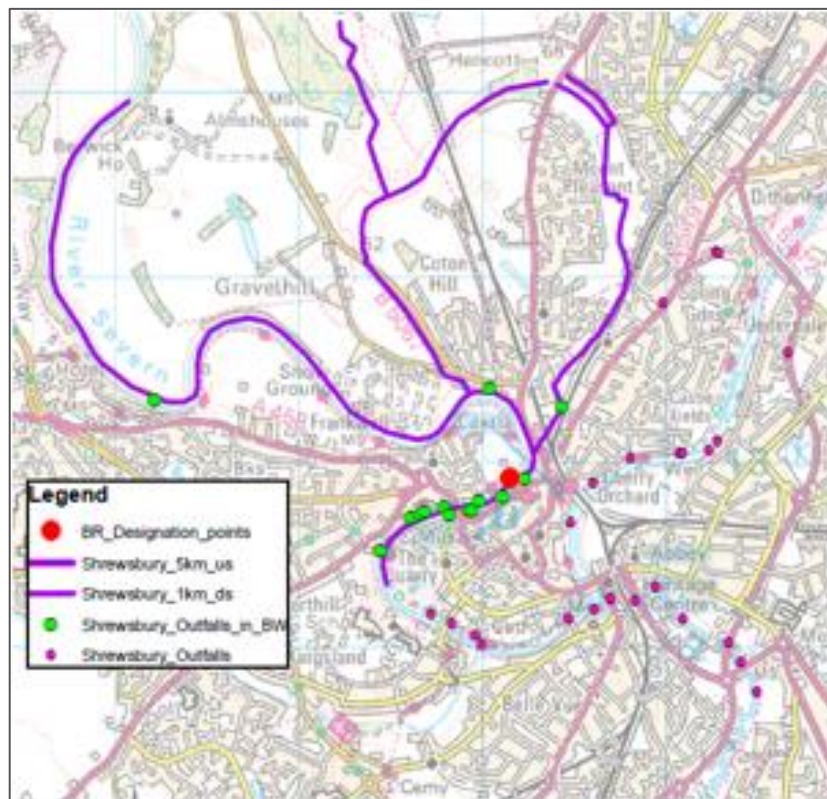
Figure 5: Ironbridge solution plan.



3.3 River Severn at Shrewsbury

There are 14 storm overflows that discharge within 5 km upstream and 1 km downstream of the newly designated bathing area (see Figure 6 below). There are no wastewater treatment works classed as near the bathing water.

Figure 6: Map of the River Severn at Shrewsbury.



The performance of these storm overflows is also impacted by the river flooding within the town of Shrewsbury. This occurs during the heavy rainfall periods in the upstream river catchment, when the river levels reach over the banks and flood the lower levels of the town (See Figure 7). We are working with the EA and the local council on identifying potential solutions to river flooding at the same time as reducing spills from our network.

The River Severn Partnership was formed to address the impacts of flooding in the Severn Basin and its flagship project will address flood risk in the Upper Severn Catchment.

The EA are currently leading the Partnership's development of the £4.5m Severn Vally Water Management Strategy⁷ which aims to manage flood risk through the delivery of natural flood management interventions in the Upper Severn Valley. This strategy will be complete in 2026 so that it can inform the next round of DEFRA funding for flood risk management between 2027 to 2033. The use of NFM measures upstream of Shrewsbury will deliver a wider range of ecosystem services including a potential improvement in water quality in the designated area.

We have therefore aligned our delivery dates for the storm overflow improvements in Shrewsbury to align with the current EA improvement plan of March 2033.

Figure 7: EA predicted fluvial flood risk extents.

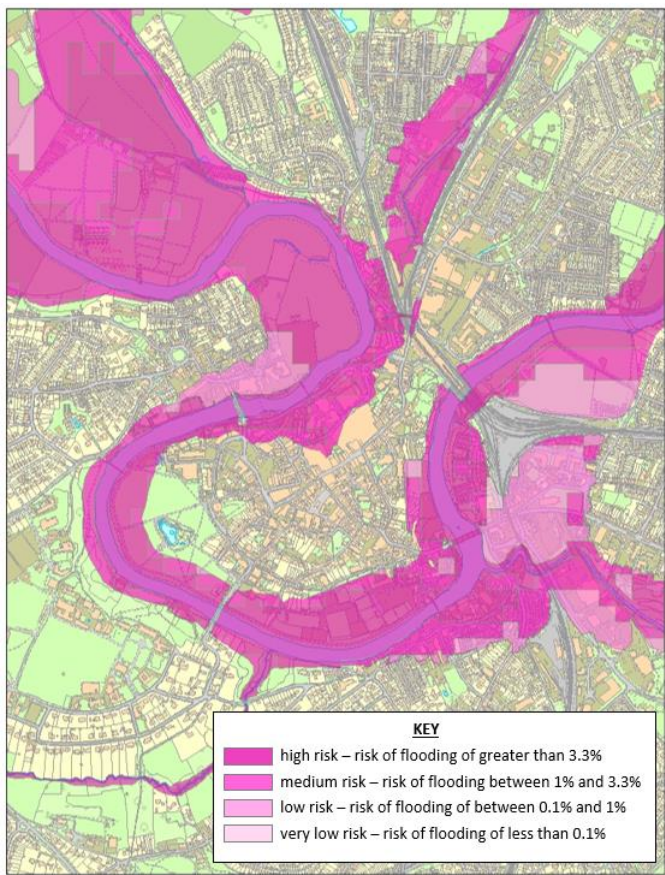


Table 9 below shows the full list of storm overflows within the Shrewsbury (Monkmoor) treatment works area with an AMP8 WINEP driver. Due to the scale of solution that has been put forward for the bathing water area we have put forward a large scale gated approach to implement the solution. This

⁷ [Severn Valley Water Management Scheme | River Severn Partnership](#)

will cover the overflows noted below as being within the gated scheme (Y). The others, while within the same drainage system are on separate drainage 'legs' meaning a more standard local solution can be implemented within AMP8.

Table 9: Storm overflow performance at Shrewsbury.

WINEP ID	Site Name	WINEP Driver Primary	Within gated scheme (Y/N)	Spills EDM23	Calculated 2024 Baseline position
EnvAct_Imp3 (Bathing water) driver – 14 overflows					
08ST300012h	SHREWSBURY - EARLS VIEW HILL (CSO)	EnvAct_IMP3	Y Shrewsbury -	26	65
08ST200108a	SHREWSBURY -THE MOUNT/THORNHILL RD (CSO)	EnvAct_IMP3	N	5	84
08ST200108b	SHREWSBURY - BRIDGE ST/HILLS LANE (CSO)	EnvAct_IMP3	Y Shrewsbury -	27	26
08ST300012e	SHREWSBURY - CASTLE FOREGATE (CSO)	EnvAct_IMP3	Y Shrewsbury -	72	58
08ST200108d	FRANKWELL - WATER LANE (BOATHOUSE) (CSO)	EnvAct_IMP3	Y Shrewsbury -	105	133
08ST300012i	SHREWSBURY - SMITHFIELD RD/MARDOL (CSO)	EnvAct_IMP3	Y Shrewsbury -	12	7
08ST300012b	FRANKWELL - WATER LA (PLAYGROUND) (CSO)	EnvAct_IMP3	Y Shrewsbury -	98	85
08ST300012k	SHREWSBURY -SMITHFIELD RD/ROUSHILL (CSO)	EnvAct_IMP3	Y Shrewsbury -	38	26
08ST300012g	SHREWSBURY - COTON HILL (THE FLASH) (CSO)	EnvAct_IMP3	Y Shrewsbury -	48	48
08ST300012c	FRANKWELL - WHITE HORSE PASSAGE (CSO)	EnvAct_IMP3	Y Shrewsbury -	3	36
08ST300012d	SHREWSBURY - 5 SEVERN TERRACE (CSO)	EnvAct_IMP3	Y Shrewsbury -	103	142
08ST300012j	SHREWSBURY - WATER LANE SPS (CSO)	EnvAct_IMP3	Y Shrewsbury -	0	0
08ST300012a	FRANKWELL - QUARRY VIEW (CSO)	EnvAct_IMP3	Y Shrewsbury -	0	35
08ST300012f	SHREWSBURY - CLAREMONT BANK (HIGH) (CSO)	EnvAct_IMP3	Y Shrewsbury -	8	46
EnvAct_Imp2/U_IMP4 (Spill Frequency) drivers – 19 overflows					

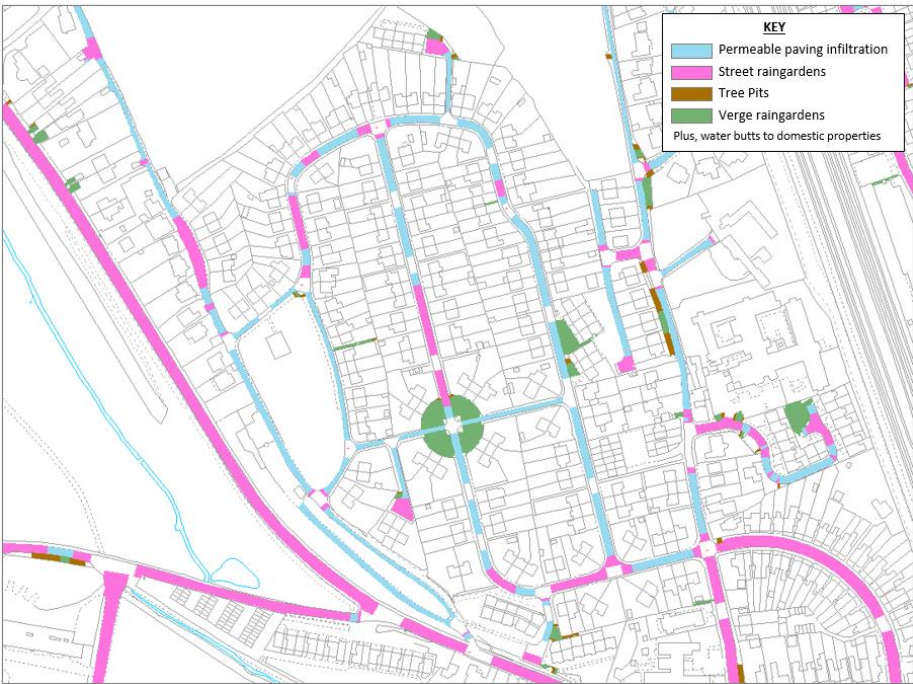
WINEP ID	Site Name	WINEP Driver Primary	Within gated scheme (Y/N)	Spills EDM23	Calculated 2024 Baseline position
08ST100202b	CASTLEFIELDS - BURTON STREET (CSO)	EnvAct_IMP2	Y Shrewsbury -	45	37
08ST100257b	SHREWSBURY - OLD COLEHAM (BRIDGE) (CSO)	EnvAct_IMP2	Y Shrewsbury -	49	43
08ST100257c	SHREWSBURY - OLD COLEHAM (CSO)	EnvAct_IMP2	Y Shrewsbury -	49	36
08ST100202c	SHREWSBURY - QUARRY PK (CSO)	EnvAct_IMP2	Y Shrewsbury -	97	71
08ST100202d	SHREWSBURY - VICTORIA AV (CSO)	EnvAct_IMP2	Y Shrewsbury -	128	120
08ST100202e	CASTLEFIELDS - DANA STEPS (CSO)	EnvAct_IMP2	Y Shrewsbury -	111	71
08ST100202f	CASTLEFIELDS - VICTORIA ST (CSO)	EnvAct_IMP2	Y Shrewsbury -	120	117
08ST100202g	SHREWSBURY - KINGSLAND ROAD (CSO)	EnvAct_IMP2	Y Shrewsbury -	81	131
08ST100257d	SHREWSBURY - SUTTON ROAD 10 (CSO)	EnvAct_IMP2	N	20	20
08ST100202h	SHREWSBURY - VICTORIA AVE/CRES LA (CSO)	EnvAct_IMP2	Y Shrewsbury -	91	68
08ST100202i	SHREWSBURY - VICTORIA AVE (CSO)	EnvAct_IMP2	Y Shrewsbury -	20	52
08ST100202j	MONKMOOR STW (SSTO)	EnvAct_IMP2	Y Shrewsbury -	103	104
08ST200112a	HANWOOD - WEIR ROAD (SSO)	EnvAct_IMP4	N	26	21
08ST200112b	SHREWSBURY - ABBEY FOREGATE 2 (CSO)	EnvAct_IMP4	Y Shrewsbury -	38	20
08ST200108c	SHREWSBURY -SPRING GRDNS/SULTAN RD (CSO)	EnvAct_IMP4	N	6	50
08ST200108f	SHREWSBURY - MILLERS GREEN (CSO)	EnvAct_IMP4	N	32	30
08ST200108g	SHREWSBURY - CLIVE ROAD (CSO)	EnvAct_IMP4	N	55	61
08ST200112c	SHREWSBURY - COLEHAM HEAD (CSO)	EnvAct_IMP4	Y Shrewsbury -	62	52

WINEP ID	Site Name	WINEP Driver Primary	Within gated scheme (Y/N)	Spills EDM23	Calculated 2024 Baseline position
08ST200108h	SHREWSBURY - LONGDEN COLEHAM PS (CSO)	EnvAct_IMP4	Y Shrewsbury -	46	31

Careful consideration is required to put forward a full catchment strategy that aligns the river flooding, the 14 bathing water improvement storm overflow sites and the wider storm overflow AMP8 improvement sites.

While we see the need for a gated approach for the full bathing water solution there is a need to implement elements of our plan ‘at pace’. These ‘at pace’ improvements will help our customers enjoy swimming in the water with a level of improvement in place. The ‘at pace’ improvements at Shrewsbury are a smart network system with 24 gates added into the system, the addition of a new surface water system around Cotton Hill, and 441 localised water butts to help reduce some of the peak storm response in the system, and hold as much water as possible back in our system prior to a spill occurring into the bathing water of the river.

Figure 8: Cotton Hill SuDS Separation Opportunities.



While there are opportunities for further separation and SuDS in the outer areas of the Shrewsbury catchment within the town centre along the riverbank, we see limited opportunities at present due to the river flooding that occurs within the town. We have therefore costed our current option for the catchment based on a fully grey solution which would be more resilient to river inundation.

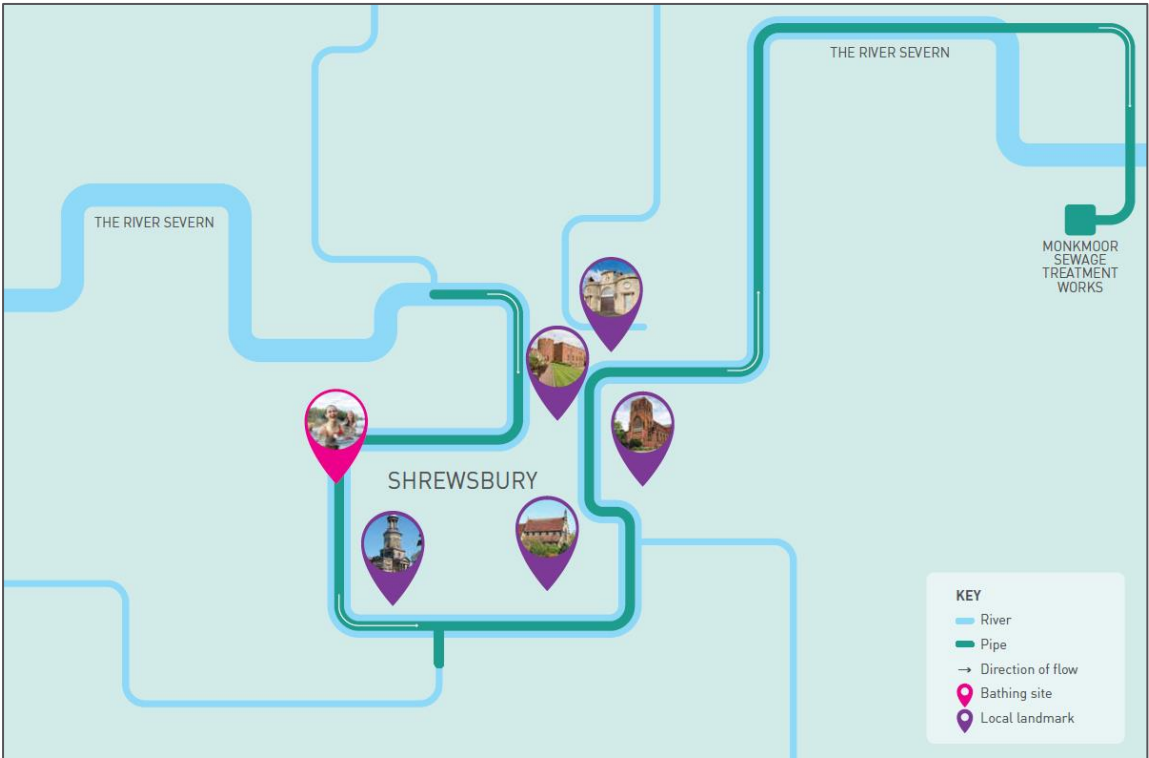
Through a gated approach we would then expand on this option working with the EA, local councils and residents to co-create solutions to reduce the risk of river flooding within the town and reduce the storm overflow spills. The gated approach allows us to develop ‘best value’ and ‘least regret’ actions with a focus on driving catchment SuDs and wider river upstream flow balancing interventions

which reduce the future requirement of investing in grey storage solutions. We have learned, through the Green Recovery Programme, that we need to work flexibly to secure SuDS solutions and supporting partnerships and believe the challenges in Shrewsbury are best suited to a gated approach.

Our long-term solution is to implement a new tunnel system that takes the spill volumes for each of the storm overflows that discharge near or directly into the River Severn through the town of Shrewsbury. This includes the 14 storm overflows within the bathing river area and 19 other storm overflows that are also within our WINEP AMP8 improvement plan for other driver reasons. In total, this scheme will manage 27,666m³ of spill volume that is currently projected to discharge into the River Severn. The scheme will also include flow management between the new tunnel storage and the treatment works inlet and full treatment assets.

Monkmoor WwTW receives the foul and combined flows from Shrewsbury and some of its immediate surrounding villages. The proposed plan to reduce storm overflows in the new bathing area includes increasing the volumes of combined flows to Monkmoor WwTW. Again, as with Coalport the option selected delivers two outcomes, firstly increasing the Flow to Full Treatment (FFT) to allow the works to treat more combined effluent and secondly increasing the storm tank capacity onsite. The option assumed for Monkmoor involves the addition of a second storm tank with the necessary returns configuration, providing addition cross site pipework, increasing interstage pumping capacity, addition of further Final Settlement Tank capacity to allow the works to treat higher flow rates, and upsizing the final effluent pumping station which operates when the River Severn is at a high level. Alternative options to treat the additional storm flows via a nature based or alternative side stream were discounted due to the land availability

Figure 9: Shrewsbury solution plan.



4. Robust & efficient costs

4.1 Cost robustness

Programme elements covered by other business cases

We have a well-established cost estimating approach based upon historic project delivery costs over the last 20 years. For the elements of the proposal that sit outside of the costs requested by this business case we have generated costs through a combination of cost curve and some bespoke, bottom-up estimating (using expert supply chain input where necessary). Where possible, we have also benchmarked our costs through the Draft Determination models.

For completeness we reference in Table 10 the elements of our bathing rivers programme that are captured across other business cases. These elements are all associated with new or amended WINEP obligations. Evidence that our costs are robust and efficient are included within these separate business cases.

Table 10: Programme elements covered by this and other business cases

Item	Pre efficiency £m	RP2	Shown in ADD24?	CWW3 Reference	Business Case (RP2)
River Quality monitoring	4.85	82.83	No	CWW3.88	SVE4.29 Waste WINEP Inland Bathing Waters (this document)
Large Scale - feasibility and design	75.93		Yes	CWW3.88	
Bathing River Investigations	2.05		No	CWW3.103	
Contingent allowance for large scale projects	1189.6	Future	N/A	N/A	
Stand-alone overflow improvements	56.35	76.15	No	CWW3.28-48	SVE4.08 WINEP storm overflow changes.
'At Pace' system optimisation measures	19.8		No	CWW28-48	
Total, £m	1348.5				

Cost derivation – Elements in this Business Case

All costs in the following sections are presented **post** efficiency.

Water Quality Monitoring

There are two programme elements covered by this business case; our proposed water quality monitoring programme and the Feasibility and Design work proposed under the gated project process. The costs of these two elements are summarised in table 12 below.

Table 12: Cost elements

Item	Gated/Non-gated	Totex £m
Feasibility and Design	Gated	75.93
River Quality monitoring	Non-gated	4.67

Bathing River Investigations	Non-gated	2.05
Total, £m		82.83

As outlined in table 4, there are four strands to our river quality monitoring proposal which have been costed at a total of **£4.67m**

- Real time bacterial contamination monitoring
- Real time continuous water quality monitoring (CWQM) – adding FDOM probe
- Enhanced bacterial and water quality spot sampling (full Lab analysis)
- eDNA sampling and MST (microbial source tracking). Environmental DNA sampling to identify sources of bacterial contamination

We have identified 5 locations that would benefit from provision of Continuous Water Quality Monitors that would not be required under Environment Act legislative drivers contained in WINEP. These additional monitors will be placed on tributaries that feed in close to the bathing area but do not have any discharges that require monitoring. In addition, we propose to add an additional FDOM (fluorescent dissolved organic material) probe to 16 water quality monitoring units being installed under WINEP drivers. Although not a direct measure of bacterial contamination, FDOM does provide a very useful proxy that can be monitored in real time. Combining FDOM with spot sample and ColiMinder-type data can improve pollution risk forecasting. Cost forecasting for additional CWQM units is on the same unit cost basis of our WINEP programme, which were shown to be efficient in the draft determination model.

We will install 6 ColiMinder or equivalent units to provide real time quantification of coliform levels in our 3 bathing rivers. One unit will be installed within each designated bathing area and the others will be located approximately 5km upstream, to provide an early warning system of poorer quality water flowing down to the bathing area. We have received an equipment cost from a potential supplier, which has been uplifted using the same costs (for land purchase, Planning Permissions etc) that were used for our continuous water quality monitors.

EDNA and MST. We plan to take 1 sample per month during the bathing season at each of our 3 bathing rivers – 75 samples in total over the course of AMP8. This will provide essential information on the sources of bacterial contamination and of actual water quality. This is a far more sophisticated approach than standard spot sampling as it can identify the presence of a wide range of pathogenic organisms as well as informing where to target measures to address non-water company issues. We have received a supplier quote on £24k per sample upon which to base our estimate.

Spot sampling for Coliforms. We intend to collect spot samples on a bi-weekly basis using the same methodology that the EA use for bathing river classification purposes. We will use our data and the EA's to both provide information to the public and to correlate measured bacterial contamination data with the readings from our proposed FDOM probes to improve pollution forecasting.

We have also made a provision for data communication to the general public.

Table 13: Cost breakdown for our river quality monitoring proposal

Item	Totex £m
Real time bacterial contamination monitoring ('ColiMinder or equivalent)	1.50
CWQM – (addition of FDOM probe)	0.06
Additional CWQM units	0.68

bacterial spot sampling	0.13
eDNA and Microbial Source Tracking	1.8
Data reporting	0.5
Total	4.67

Gated Project feasibility costs

We have requested initial funding of **£82.8m** to cover completion of the first stage of our proposed gated project approach (including monitoring and investigations). This represents 6% of the total programme cost estimate of **£1.3bn**.

We have completed an initial round of option identification in the three months since these bathing areas were designated and completed an initial costing exercise. This has ruled out a solution that is based entirely upon provision of storage to deliver the target of 1 spill per bathing season – this is ruled out because the volumes are so great that capacity limitations within the downstream system would prevent the storage tanks emptying in a timely manner without adverse performance impact on downstream overflows.

We have produced our initial estimate for the proposed Gated Project elements of this proposal using a combination of our standard, cost curve based, estimating process supplemented with some input from our supply chain. However, we are acutely aware that a significant proportion of the overall programme cost is made up of tunnelling work, which is notoriously difficult to price accurately without the benefit of ground investigation survey work. This is especially true of the Ironbridge area, where there are well documented geological land instability issues. The presence of the Ironbridge World Heritage Site is a further complication.

We have also identified that the two sewage treatment works that serve Ironbridge and Monkmoor will require a flow to full treatment increase to ensure that their associated storm tanks are able to meet the Environment Act 10 spills requirement. Initial cost estimates based upon extensions of the existing conventional treatment processes have been completed (using standard cost curves) but we have not had time to consider alternative, non-conventional treatment solutions.

Solution costs are also naturally very dependent upon the outputs of detailed Sewer Hydraulic and Water Quality modelling work. Whilst we have been able to complete a lot of initial modelling to develop initial proposals in the relatively short time since these designations were proposed, a lot more feasibility work needs to be done before costs can be presented with a level of confidence consistent with the scale of investment proposed.

In our view, it is essential that this investment need be put through the Gated Project process to enable the requisite amount of feasibility and option analysis to be undertaken that will underpin the generation of robust and efficient costs.

5. Customer protection – being accountable for delivery

5.1 Our proposed Price Control Deliverables

For the non-gated overflow improvement elements of the programme, we have incorporated the deliverables into our proposed storm overflow improvements PCD and our WINEP delivery PCD that cover the rest of our storm overflow improvement programme. The benefits delivered through overflow improvement measures will also be reflected in our storm overflows average spill count performance commitment.

We have not included a PCD for the gated project as it is our understanding that PCDs will be set once the gated project has proceeded to the point at which options and deliverables have been confirmed.

We note that there is also a common Performance Commitment for bathing waters which we have completed in line with Ofwat's methodology. We have reviewed the 'SVE Backcast' sheet in the PCL model spreadsheet (PR24-DD-PCM_Bathing-water-quality.xlsx) as requested in the Ofwat email of 8th August 2024, which is naturally left blank for our three sites.

Our understanding is that companies are only expected to maintain historical performance from base expenditure, which we are predicting will remain at poor until the improvements proposed under this business case are delivered. With the earliest WINEP delivery dates being March 2030, improvement in the classification will only be delivered for the 2030 bathing water season, so reportable in year 1 of AMP9.

5.2 Impact on our common Performance Commitments

There will be a very marginal impact upon our common performance commitment for storm overflow average spill frequency in AMP8. This change will be due to:-

- Green Recovery overflows in Ludlow being further improved from 3 to 1 spill per bathing season
- 5 Ironbridge Overflows in original WINEP will change from a <10 spills per annum outcome to <1 spill per bathing season
- 8 overflows in Ironbridge being added to WINEP for a <1 spill per bathing season outcome
- 1 overflow in Shrewsbury being added to WINEP for a <1 spill per bathing season outcome

As the total number of overflows impacted is <1% of our total estate and the forecast change in number of spills will be small, overall impact on the annual average spill count will be extremely marginal.

5.3 Deliverability

All solutions are expected to be deliverable by the existing industry supply chain. There will be a need for specialist equipment suppliers for elements of the scope, but the delivery interfaces are expected to be no different from current delivery of the rest of the WINEP programme. We have already sought input from specialist contractors on some of the most challenging aspects of these projects.

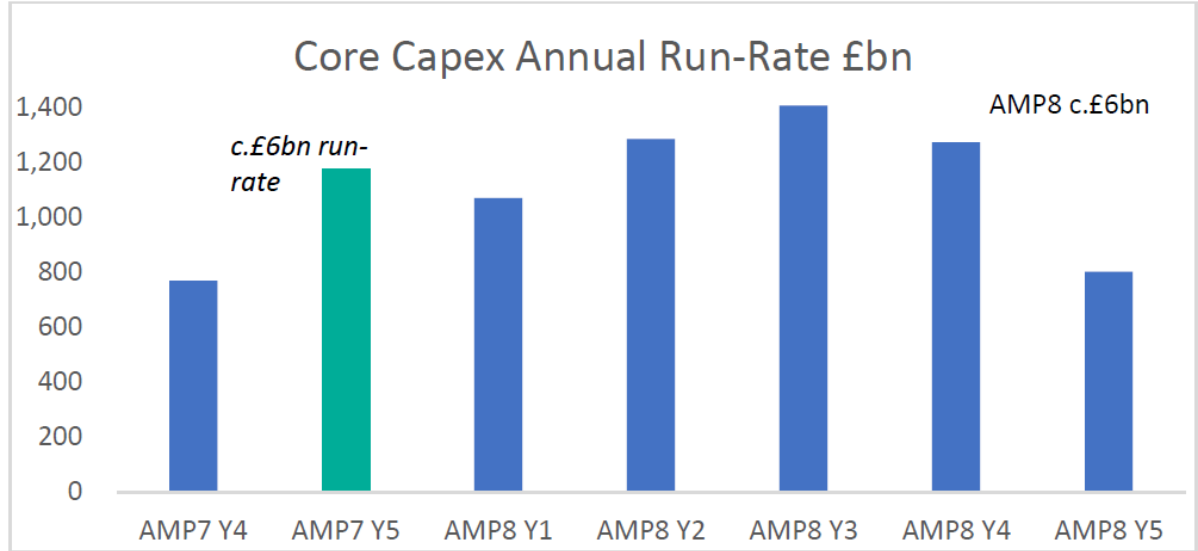
We acknowledge that there are some unique challenges associated with delivering major engineering works within the Ironbridge Gorge, which is a World Heritage Site; an area with exceptional fluvial flooding susceptibility and an area of geological instability. We will draw upon our recent experiences of working in another World Heritage Site (at Matlock), as well as seeking early external specialist input to manage these challenges.

Our plans for AMP8 are ambitious and will be challenging to deliver but we believe we are in a unique situation in terms of deliverability. Our conviction is based on three key differences of our approach:

Demonstrating capacity at the required run rate

Due to the additional Green Recovery capital spend, we are already operating around the equivalent annual capital spend profile to deliver our AMP8 and AMP9 ambitions and we are on track to deliver around £1bn of improvements this year. In October 2023 we announced an acceleration of our AMP8 plans, pulling forward up to £400m of planned AMP8 delivery into 2023-24 to 2024-25. This is made possible by our low gearing and excellent financeability. This means we will be investing at a forecast £1.25bn per year from March 2024, which is consistent with expected run rate throughout AMP8 and into AMP9.

Figure 10: Core Capex Annual Run-Rate



In-house design expertise removes a key bottleneck

In AMP6, we took the decision to insource our design capabilities and we now have access to 280 engineers. This means we are not competing for scarce engineering resource – a significant constraint for other water companies and across wider infrastructure projects. Due to the time window from design to delivery we have also accelerated our process and we are targeting promotion of around 80% of the £6bn capital investment into the delivery teams by the time we exit AMP7.

Confirmed supply chain capacity

We are not competing with the rest of the market for the majority of our capital projects. We plan to source more than 60% of our capital programme outside the current Water UK supplier routes. This means that, although our total spend equates to 13% of sector-wide spending, we will only be drawing on the traditional supply chain for around 6%. Our alternative plan is based on:

- 26% from Severn Trent employed labour;
- 27% from additional supplier capacity that we have developed in our region and upskilled to work in our sector, of which at least 5% will be delivered through a new manufacturing factory facility which we have developed in partnership with the Manufacturing Design Centre; and
- To deliver the world's first waste treatment Net Zero hub we are sourcing suppliers outside the traditional supply chain

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

- We have decided not to patent our new factory facility design expertise and will instead share the learning with the sector, allowing others to gain from our investment and enhance their own routes to delivery;
- Over the next 12 months, we will be insourcing around 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;
- 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 pre-fabricated elements, and digital construction rehearsals as standard practice. Activities such as these improve efficiency and improve safety of the build phase. All these steps mean that our draw on the supply chain will be less, which frees up more resource for others; and
- We have invested heavily in artificial intelligence to reduce rework, and as such reduce capital costs. We aim to share our learning with other companies to help them increase their rate of delivery and so reduce re-work. Wider scale adoption of these tools would reduce pressure on resources for the whole sector.

Annex 1 – Technical summary of proposed solutions

This annex provides additional technical details of the solutions proposed by this case

Developing our understanding of the Designated Areas

Developing detailed insight in the Designated Areas

Our proposal includes a two-year plan for long term data collection activities in the river and sewerage system which will:

- secure a robust year-round picture of the operation and performance of our assets; and
- identify long term trends, seasonality and variability in the condition of the bathing area.

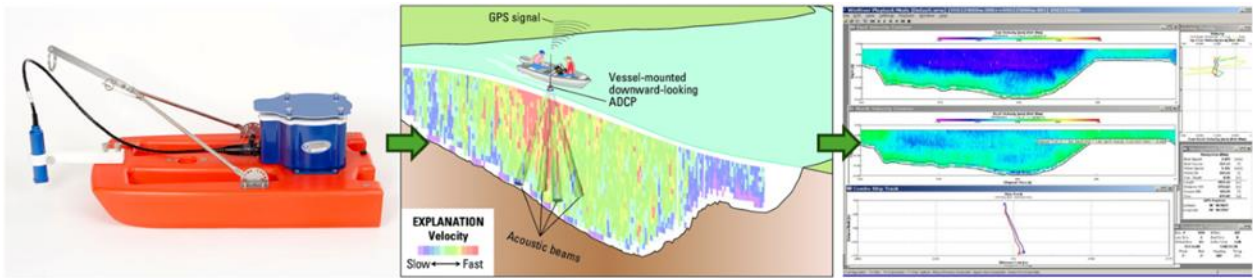
In order to develop the best solutions for customers and the environment will build a suite of integrated models which represent the sewer network and river. This requires detailed insight of the river catchment, an enhancement of the sewerage network model and data to calibrate and verify the predictions.

Our costs include river surveys to establish flow and profile characteristics and bathing forecast model development for the three bathing areas.

River Cross Sections

The integrated bathing area model will require river cross sections to develop the 1D in bank model. As the rivers in the bathing water areas are all more than 35m bank to bank with considerable flow rates we will use Acoustic Doppler Current Profiling (ADCP) to establish the river sections to minimise health and safety risk. A downward facing ADCP will be mounted onto a small remote vessel to traverse the watercourse, collect data and formulate both cross sections and velocity profiling.

Figure A1 – ADCP Process to be utilised within IBW to collect cross section information



In addition to standard bank to bank cross sections any significant structures, such as bridges, which can influence flow patterns, will also need to be represented in the 1D river model.

Across the three bathing areas we will need to collect 222 cross sections and survey 17 structures to build the models. The breakdown of these surveys can be found in Table A1 below.

Table A1 – River Cross Section Strategy

	River Cross Section Sites	River Structures
Ludlow	Complete as part of Green Recovery Programme	
Shrewsbury	67	5
Ironbridge	66	3

River Flow Monitoring

River flow monitoring will be a critical aspect of our long-term monitoring and customer information strategy.

There will be a requirement for both short-term river flow monitoring to support the development of the bathing water forecast model and a longer-term installation in each of the three areas through AMP8 to demonstrate the impact of discharges from the sewerage network and the management of those sites.

The three watercourse reaches are wide so we will use of Acoustic Doppler Flow Monitoring (ADFM) to provide accurate long term profiled flow data. Technology such as the Teledyne ISCO Channel Master has been successfully used to generate flow profiles across the tidal River Wear (circa 93m span). Using this technology will provide high-quality long-term river flow monitoring to support Water Quality Assessment in the three areas.

Across the three areas there is a requirement to place 15 ADFMs to meet the requirements of the IBW water quality assessment (2-year duration) and three long term sites at each of the area (5-year duration). The breakdown of these surveys can be found in Table A2 below.

Table A2 – River Flow Monitoring Strategy

	Short-Term River Flow Sites	Long-Term River Flow Sites
Ludlow	Completed as part of Green Recovery Programme	
Shrewsbury	5	1
Ironbridge	5	1

In Sewer Monitoring

Developing confidence in the performance of the sewer network under a range of conditions in the designated areas is critical to establishing current performance and to develop the longer-term strategy for storm overflows to meet the requirements of the bathing water designation.

Traditional short-term flow surveys are well proven for calibrating sewer models, and we will look to utilise this approach to support the assessment of current catchment performance. One critical requirement, which can be missed by short-term surveys is seasonality and variability in rainfall patterns. To account for this, we plan deliver a two-year survey to establish an extended baseline and understand how performance varies.

We will use both ground truthing rain gauges and RADAR rainfall to support the generation of storm response within the model. This is in line with more traditional approaches to the development and verification of hydraulic models, but also provides confidence in the future application of RADAR rainfall in forecasting.

Across the three designated areas there is a requirement to place 200 Flow Monitors, 30 Rain gauges and 20 Current clamps to meet the requirements of the IBW water quality assessment (2 year duration). The breakdown of these surveys can be found in Table A3 below.

Table A3 – Sewer Monitoring Strategy			
	Flow Monitors	Rain gauges	Current Clamps
Ludlow	Complete as part of Green Recovery Programme		
Shrewsbury	102	12	8
Ironbridge	67	12	8

Sewer Modelling

The STW modelling team, in conjunction with catchment experts in our Sewerage Management Plan Consultants, will deliver any required modelling upgrades in line with the STW SMP Modelling procedures aligned to industry standard guidance including the CIWEM UDG Code of Practice for the Hydraulic Modelling of Urban Drainage Systems.

The sewer model for Ludlow has been upgraded as part of the Green Recovery programme so we will use the existing model with additional contributing area surveys to help with additional surface water separation improvements planned for the catchment.

The other catchment models will be developed to provide robust inputs into the wider river flow and water quality models as part of integrated catchment models to establish water quality performance and refine catchment management strategies.

Across the three designated areas there is a requirement to place 200 flow monitors to meet the requirements of the verification of sewer network models and provide long term assessment of seasonal variation in line with longer term river flow and water quality assessments. The catchment distribution of samples can be found in Table A4 below.

Table A4 – Sewer Modelling Strategy		
	Flow Monitor Verification	Asset Surveys
Ludlow	Completed as part of Green Recovery Programme	
Shrewsbury	102	22
Ironbridge	67	18

River and Water Quality Modelling

Integrating the sewerage network model to the 1D flow model will provide a hydraulic assessment of the systems in each bathing area but to fully inform our customers of the potential risks we will also be developing a water quality model for each the areas to support the bathing forecast system. We have assumed the development of a 'Level 2b Enhanced Standard RIM' which will require the following activities across each of the three designated areas

TableA5 – Enhanced River Modelling Strategy			
	Construction (km)	Calibration (monitor)	Analysis (River)
Ludlow	Completed as part of Green Recovery Programme		
Shrewsbury	12	20	1
Ironbridge	7	24	1

Water Quality Sampling and Real Time Water Quality Sondes

As part of the bathing water designation sampling will be carried out by the Environment Agency on a weekly basis in one location during the bathing season. Whilst this meets the requirement of the designation, we are proposing a more detailed water quality sampling regime to enhance our understanding of the seasonal variations in the areas and support the development of the water quality models.

Auto samplers will be installed upstream and downstream of contributing storm overflows and samples will be taken twice weekly for E-Coli, Ammonia as NH₃, Orthophosphate and Biochemical Oxygen Demand (BOD) assessment. Across the three areas there is a requirement to collect samples at 56 locations to support this assessment.

The proposed on-line monitoring system complements the Environment Act continuous water quality monitoring requirement (covered by the EnvAct_MON4 WINEP driver). The basic requirement of the Environment Act is to provide real-time data for five key parameters specified by legislation: dissolved oxygen, ammonia, pH, temperature, and turbidity. In our bathing areas we will install an extra probe to measure fluorescent dissolved organic matter (fDOM), which can serve as an indicator of biological contamination and poor water quality. Our AMP8 water quality monitoring requirement is to cover 25% of qualifying discharges and we are prioritising our bathing areas. We will use the learning from our Green Recovery creating bathing quality rivers programme to accelerate the installation of these real time monitors early in AMP8 to ensure we have early insight into the river water quality in the designated areas.

The designated area distribution of sampling and monitoring points can be found in Table A6 below.

Table A6 – Water Quality Sampling and monitoring

	Auto Sampler Locations
Ludlow	8
Shrewsbury	28
Ironbridge	20

Aesthetic Assessment and Invertebrate Assessment

An important aspect of the short-term assessment of storm overflow performance is the aesthetic condition at outfalls. Aesthetic assessments will be based on the FR0466 methodology (FWR, 1994) but follow the scoring system detailed within the SOAF Methodology (Environment Agency, 2018). Sites will be visited twice annually, once inside the bathing season (15th May – 30th September) and once outside (1st Oct – 14th May) and will be notionally based on the 50m survey area. This will allow the seasonal variance in impact to be assessed.

Each of the sites will also have an ecological invertebrate assessment undertaken to establish baseline conditions. These will be taken annually for the first two years of the project. This information will feed into the wider water quality assessments within the designated catchments.

Across the three areas there is a requirement to undertake surveys at 28 locations to support the assessment of water quality assessment two years. The catchment distribution of locations and total surveys can be found in Table A7 below.

Table A7– Aesthetic and Invertebrate Assessments

	FR0466 Locations	FR0466 Surveys
Ludlow	4	4
Shrewsbury	14	52

Developing understanding to enhance performance

In addition to the work described above to deliver statutory obligations and optimum solutions work we intend to implement two additional measures designed to give customers the best possible information about water quality and enhance the sector's understanding of asset management in newly designated inland bathing waters. These are:

- Real time bacterial contamination monitoring
- eDNA sampling to identify sources of bacterial contamination

These proposals are in line with one of the immediate actions to reduce public health risks identified in “Testing the waters - Priorities for mitigating health risks from wastewater pollution” published in May 2024 by the Royal Academy of Engineering and the National Engineering Policy Centre⁸.

ColiMinder® real time bacterial monitoring:

We plan to install 2 ColiMinder⁹ monitors on each of our three bathing rivers and make the data available in real time to water users. One monitor will be installed at the designated bathing area and the other will be positioned several Km upstream, enabling us to provide early warning that poorer quality water is moving towards the bathing area.

The ColiMinder® monitor is a fully automated water quality measurement system which is able to measure specific microbiological contamination of liquid samples within 15 minutes. The technology works by measuring microbiological contamination in the water through the specific enzymatic activity of the respective target organism.

Figure A2 ColiMinder Instrument



eDNA Monitoring Innovation Trial:

Environmental DNA (eDNA) sampling¹⁰ is a well establish technique can differentiate between coliforms (and other pathogenic bacteria) that are of human origin and those that derive from livestock and other Fauna. We aim to conduct an eDNA monitoring trial to establish if combining the

⁸ [testing-the-waters-priorities-for-mitigating-health-risks-from-wastewater-pollution.pdf \(raeng.org.uk\)](https://raeng.org.uk/testing-the-waters-priorities-for-mitigating-health-risks-from-wastewater-pollution.pdf)

⁹ [Automatic Water Quality Monitoring Device System | ColiMinder CMI-02](#)

¹⁰ [eDNA Species Detection & Biodiversity Surveys \(naturemetrics.com\)](https://naturemetrics.com/eDNA-Species-Detection-Biodiversity-Surveys)

approach with the on-line water quality sondes data and other river health data can create health profiles for rivers.

We will also trial event-triggered, high-volume sampling techniques to capture detailed understanding of the water quality during events which is currently poorly researched and understood. We have identified novel eDNA sampling equipment¹¹ which will instigate sampling in response to data from the river water quality sondes and believe this will significantly improve our understanding of bathing risks. We intend to investigate the applicability of this technique in a river environment where eDNA flows through designated areas to establish if you can distinguish the most significant point source of elevated E.coli and Enterococci during events in a designated bathing area.

This comprehensive approach will allow us to:

- Fulfil our regulatory obligations regarding the chemical monitoring of rivers
- Take more representative and consistent samples
- Sample in response to events when environmental conditions are likely to prevent spot sampling
- Undertake microbiological sampling in response to changes in water quality
- Validate results obtained using real time microbiological assessment with ColiMinder against those obtained using standard lab analysis
- Use ColiMinder instruments to undertake regular automated analysis for E. coli and Enterococci with confidence
- Trigger high frequency sampling prior to predictable events (such as storms) and abnormal events detected by the river quality monitors to provide previously unknown information on the behaviour of microbiological loads
- Use all the data collated to determine if the bacterial water quality can be estimated from any of the determinants measured by the online monitors thus giving high frequency, real time microbiological data without the need for actual laboratory analysis.

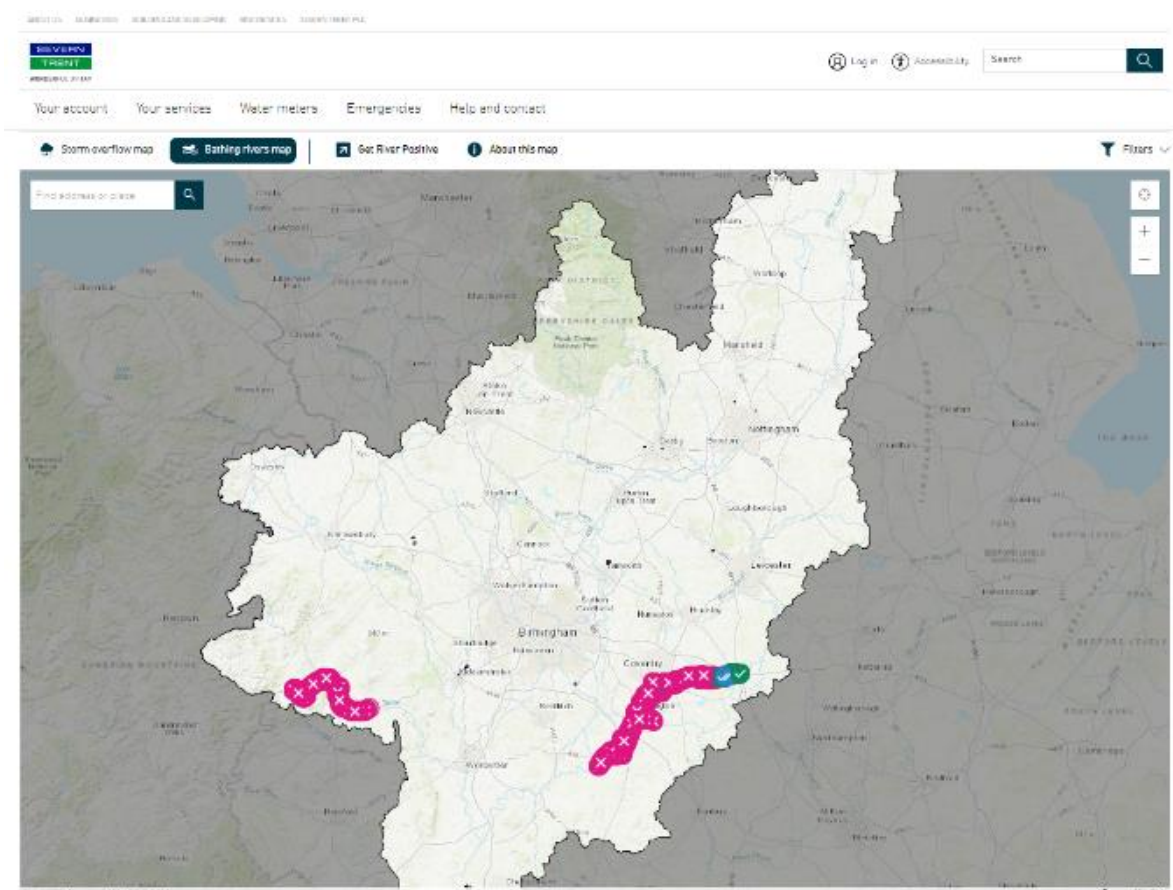
¹¹ [Home | Platform Kinetics](#)

Bathing Forecasting System

Through our Green Recovery ‘creating bathing quality rivers’¹² programme we have understood the importance of providing reliable information about water quality in designated bathing water areas.

We have worked with community groups and river users to develop a prototype bathing rivers risk forecasting map which provides people with access to information about river quality and safe access to bathing areas in an accessible and transparent format.

Figure A3 Prototype Bathing Indication Map



This forecast tool uses a model of our network, water quality sample information and weather data to simulate what the bathing water quality assessment could be at any point selected on the river. The objective of the map is to provide useful bathing water quality indication information that can be used alongside our Storm Overflow map. It aims to allow river users to make an informed risk assessment for their water activities.

This engagement tool complements the EA’s ‘Swimfo: Find a bathing water service’ by providing a forward looking three-day forecast of the river’s water bathing potential rather than a historic view of water quality.

¹² [Creating bathing quality rivers | Green recovery | Wonderful on Tap | Severn Trent Water \(stwater.co.uk\)](#)

At Pace Solutions

While the improvements required to meet the new statutory obligation are major in scale, we understand that our customers are looking for improvements to be completed at pace.

The interventions we have identified for 'at pace' implementation include measures to optimise use of existing system capacity or low cost interventions to separate or attenuate surface water. These interventions will reduce the size and cost of the 'hard engineering' solutions required to meet the <1 spill objective.

These solutions are 'no-regrets' interventions which can be delivered in the first two years of AMP8 to reduce spills from our assets and make up less than 3% of the overall costs

Improving the resilience of our networks

As there is a higher risk of pollution impact in these areas, we want to increase the resilience of our network by providing additional monitoring and enhancing our incident response capability

- **Pumping Station Telemetry Upgrade:** We've costed the upgrade of telemetry systems for all pumping stations located near each of the designated bathing waters. This upgrade includes the installation of flow meters and pressure monitoring equipment. With telemetry in place, we'll receive early warnings of any issues with these pumping stations. This proactive approach allows us to respond promptly and prevent potential pollution incidents.
- **Manhole Level Monitors:** Manholes located within 60 meters of the river will be equipped with level monitors. These monitors serve as an early warning system, alerting us to any issues within the network. By identifying blockages and potential spills early, we can take preventive measures to safeguard water quality.
- **Incident Response Base:** To enhance our pollution prevention efforts, we have included an Incident Response base to serve the pumping stations within the three bathing water areas. The base will provide tankering services, spare pumps, and generators so we can quickly mitigate pollution risks arising from equipment breakdowns or power outages in these sensitive areas.
- **Installation of innovative flap valves on our outfalls:** As part of a staged approach to reduce the impact on the sewer system from the river flooding, we have installed at pace as part of our transitional investment initial pressure induced flap valves on our outfalls. At the same time, we have reviewed if any further sealing of our system in low lying locations is possible.

Creating a Smart Sewer System

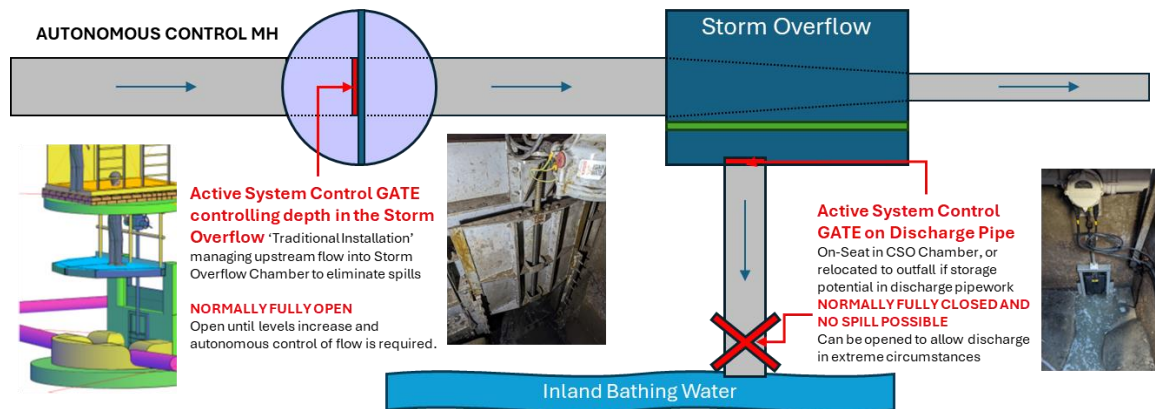
To give our customers confidence our storm overflows are not discharging apart from under exceptional circumstances we are proposing to install autonomous active control so that they remained closed during normal operational conditions.

The 'closed' status of the storm overflows will provide a positive message to customers using the bathing waters that Severn Trent storm overflows are not physically able to discharge under normal circumstances and that they will only operate after existing latent storage in the network has been utilised and the system is hydraulically overloaded.

The proposed Autonomous Active System Management (AASM) is innovative and untried in the UK. It will use a 'smart' autonomous control system to manage control gates at the overflow (closed under

normal operating conditions) and in the upstream network to modulate flow into the storm overflow chamber. The principle of this is illustrated in Figure A4.

Figure A4 – Delivering Closed Storm Overflows with the AASM system



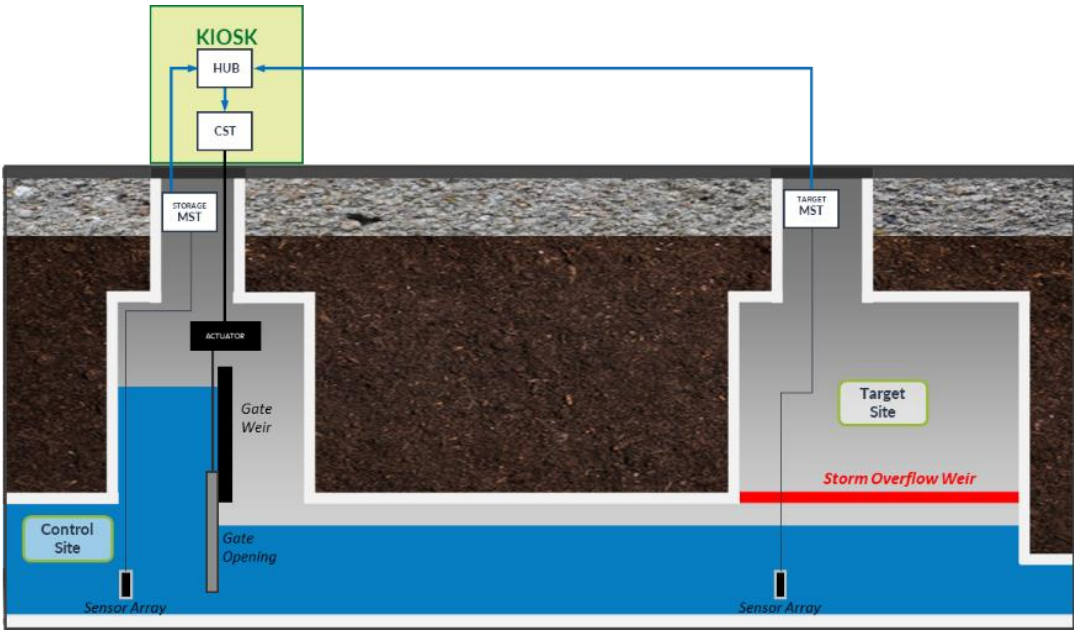
During normal operation the in-network flow will be dynamically controlled by flow control gates. The AASM controller will regulate the flow depth in the storm overflow chamber to prevent spills by altering the level control gate upstream to ensure existing storage in the upstream network is fully utilised. These in network flow control gates are normally fully open, controlling flow only when needed in real time.

At each overflow, the discharge pipe from the storm overflow is controlled with a closed control gate under normal operation, delivering a measurable 'It is Closed' confirmation. The AASM Controller can open the gate when required under peak hydraulic conditions.

The AASM controller can manage multiple flow gates and the overflow gate for an overflow system. It provides real-time, locally based management built on network observations. By managing all the gates for an overflow system, the AASM controller delivers optimal performance at the storm overflow without impacting upstream customers.

The AASM comprises actuated penstocks in flow management manholes and level monitoring technology in the storm overflow chamber. The monitoring system conveys level information, via a local proprietary radio network, to a ASSM Control Hub. Based on the levels observed the fuzzy logic in the ASSM Control Hub will alter the position of the flow control gates in the upstream system to control flows into the storm overflow chamber and ensure the overflow gate is 'closed to the watercourse unless there are extreme hydraulic conditions and risk to upstream customers. The process is autonomous, dynamic and locally focused on the specific overflow the system it is set up to manage. The system is simply visualised within Figure A5.

Figure A5 –AASM system configuration



The active control of flow using AASM has already been undertaken in several catchments across the UK in AMP7 and it can be introduced into network pipes of any diameter. This proposed ‘Closed Overflow’ approach builds on our experience of ASSM by incorporating an additional CSO control gate as part of the local system.

The system responds to what is happening and will respond to any change in level, meaning the system is dynamic and responsive to any system stressors that generate flow into the storm overflow chamber. For example, a burst watermain may have resulted in an unpermitted dry weather flow spill in a passive system but the AASM system would manage the impact.

We have developed new sewer modelling techniques to identify optimum locations for the control gates. The techniques can be incorporated in standard sector network models allowing us to identify available latent network storage, optimum locations for the control gates and the impact of other network improvement activities.

As we already have examples of the AASM system in catchments in our region, we can use our existing supply chain and insight to deliver the ASSM programme across the bathing water areas at pace.

We have assumed that all the network storage control gates would be installed in a new manhole as this is the most effective approach to construction and commissioning of the system.

Our experience of the system and out approach to delivery means we are confident we can start delivering control systems in Year 1 of AMP8.

Table A8 outlines our initial assessment of ASSM system requirements in the three bathing water areas:

Table A8 – Control Gate Distribution

UID	Site Name	EDM 2023 Spills	Outfall Gate	Storage Gate
1800	Ludlow - Old Street (CSO)	16	1	1
1808	Ludlow Ludford (SSO)	2	1	1
1813	Ludlow - The Linney (CSO)	7	1	2
1816	Ludlow - Fishmore View (CSO)	0	1	0
714	Doseley - Holywell Lane (CSO)	20	1	1
719	Ironbridge - Dale End (SSO)	15	1	1
730	Ironbridge - Ironbridge Rd (CSO)	1	1	1
731	Ironbridge - Shaft (CSO)	60	1	0
732	Ironbridge - New Road #1 (CSO)	0	1	1
733	Ironbridge - New Road #2 (CSO)	0	1	1
736	Ironbridge - Madeley Road (CSO)	0	1	1
745	Ironbridge - St Lukes Road (MH4501)	0	1	1
746	Ironbridge - Ladywood (CSO)	19	1	2
3672	Buildwas - Park View (CSO)	1	1	1
2773	Shrewsbury - Earls View Hill (CSO)	26	1	2
2775	Shrewsbury - The Mount/Thornhill Rd (CSO)	5	1	1
2780	Shrewsbury - Bridge St/Hills Lane (CSO)	27	1	1
2784	Shrewsbury - Castle Foregate (CSO)	72	1	1
2785	Frankwell - Water Lane (Boathouse) (CSO)	105	1	0
2791	Shrewsbury - Smithfield Rd/Mardol (CSO)	12	1	1
2798	Frankwell - Water Lane (Playground) (CSO)	98	1	0
2804	Shrewsbury - Smithfield Rd/Roushill (CSO)	38	1	1
2808	Shrewsbury - Coton Hill (The Flash) (CSO)	48	1	1
2813	Frankwell - White Horse Passage (CSO)	3	1	1
2820	Shrewsbury - 5 Severn Terrace (CSO)	103	1	1
2849	Shrewsbury - Water Lane SPS (CSO)	0	1	0
2851	Frankwell - Quarry View (CSO)	0	1	0
2856	Shrewsbury - Claremont Bank (High) (CSO)	8	1	0

The systems will be integrated into our telemetry system with individual outstations positioned in the ASSM kiosk. This will allow us to monitor system performance and network levels.

Local Operations Teams are already familiar with the AASM technology and how to maintain them. We will maintain the systems via combination of proactive and reactive interventions:

- **Actuator and Control Gate – Exercise –** The system will set up a regular exercise of the penstocks remotely, ensuring free movement. This will be undertaken at a time when flow is lowest, not during an active control phase.
- **Actuator and Control Gate – Maintenance -** 6 monthly visits to maintain actuator and control gate. This will allow a manual open and closing of the gate as well as standard maintenance activities
- **Sensor and System Hardware – Alerting –** There is a robust set of alarms which result in maintenance, repair and replacement of components of the system. This will ensure that system

operation is maintained for the duration of the programme and reactive maintenance can be undertaken in a timely manner.

- Remote Cameras – ATEX approved cameras fitted to visualise the AASM system will enable targeted reactive maintenance and specific response across the system

The costs for the proposed AASM is summarised in table A9 including the CAPEX for implementation of the systems and the OPEX for AMP8.

Table A9 ASSM System Costs by catchment		
	CAPEX (£m)	OPEX (£m)
Ludlow	2.418	0.511
Shrewsbury	7.027	1.533
Ironbridge	5.837	1.277

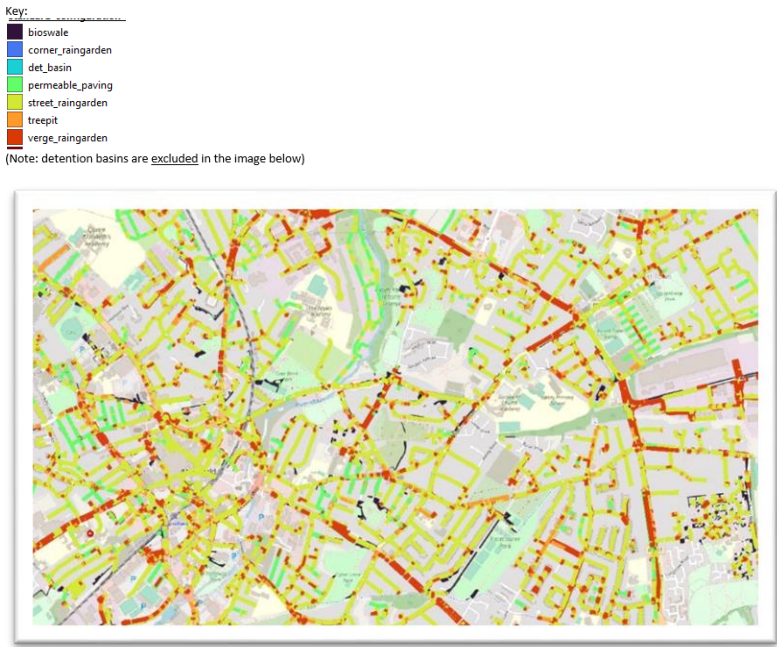
Reduce storm response

Through our Green Recovery sustainable flood resilience programme in Mansfield¹³ we have developed a suite of digital tools to assess the potential for sustainable surface water separation using a range of interventions such as water butts, rain gardens and swales.

Opportunity spotting

They use a range of earth observations, asset data and physical constraints to identify solution opportunities and accelerate the assessment of real separation opportunities in a catchment. Figure A6 show an unconstrained assessment for part of the Mansfield catchment.

Figure A6 SuDS intervention opportunity assessment



¹³ [Mansfield sustainable flood resilience](#) | [Green recovery](#) | [Wonderful on Tap](#) | [Severn Trent Water](#) (stwater.co.uk)

These tools have been used to optimise our proposals for the new three bathing water areas.

Water Butts and HurButts

Our Mansfield programme has also developed new design and delivery standards for separation interventions, and we are confident we can deploy this know-how to deliver at pace and in partnership with local authorities and communities. Due to the pace wanted for these catchments we have initially focused on some more simpler elements to install like water butts and rainwater planters but have also included wider surface water separation within the Shrewsbury catchment.

As part of our wider transitional AMP8 improvements we have started installing hundreds of attenuation water butts (or more locally called HurButts) Figure A7 shows the ethos of how these assets will work and Figure A8 shows one of our first HurButts installed within this programme. These were originally developed in 2014 but we are accelerating their deployment to reduce spills.

Figure A7 Difference between a Normal Water Butt and a HurButt

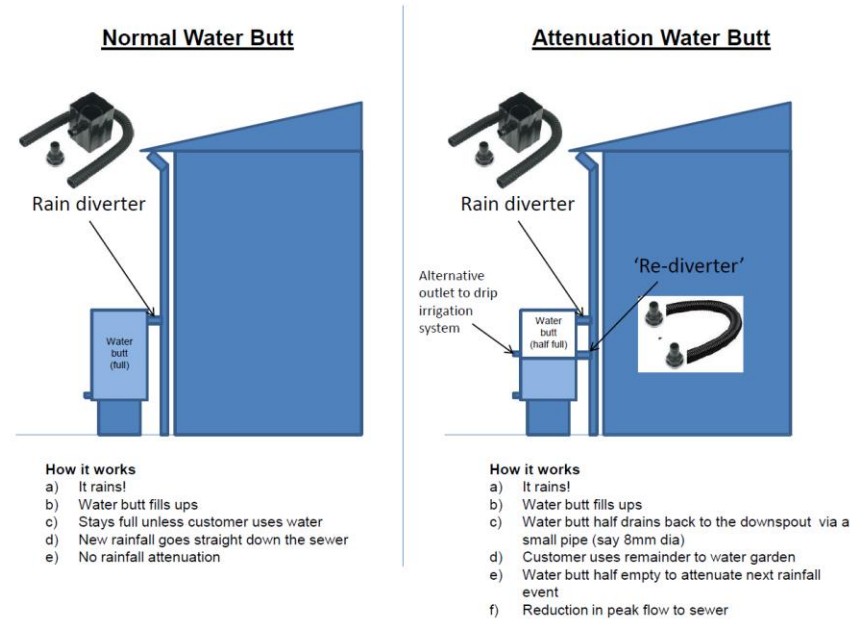


Figure A8 Example of one installed within Severn Trent



Long-term catchment improvements

While there are improvements we can make in the near term to help reduce the number of spills in our network, reaching our statutory obligation of one spill or less per bathing season each year will require fundamental changes to the drainage systems in each of these three catchments.

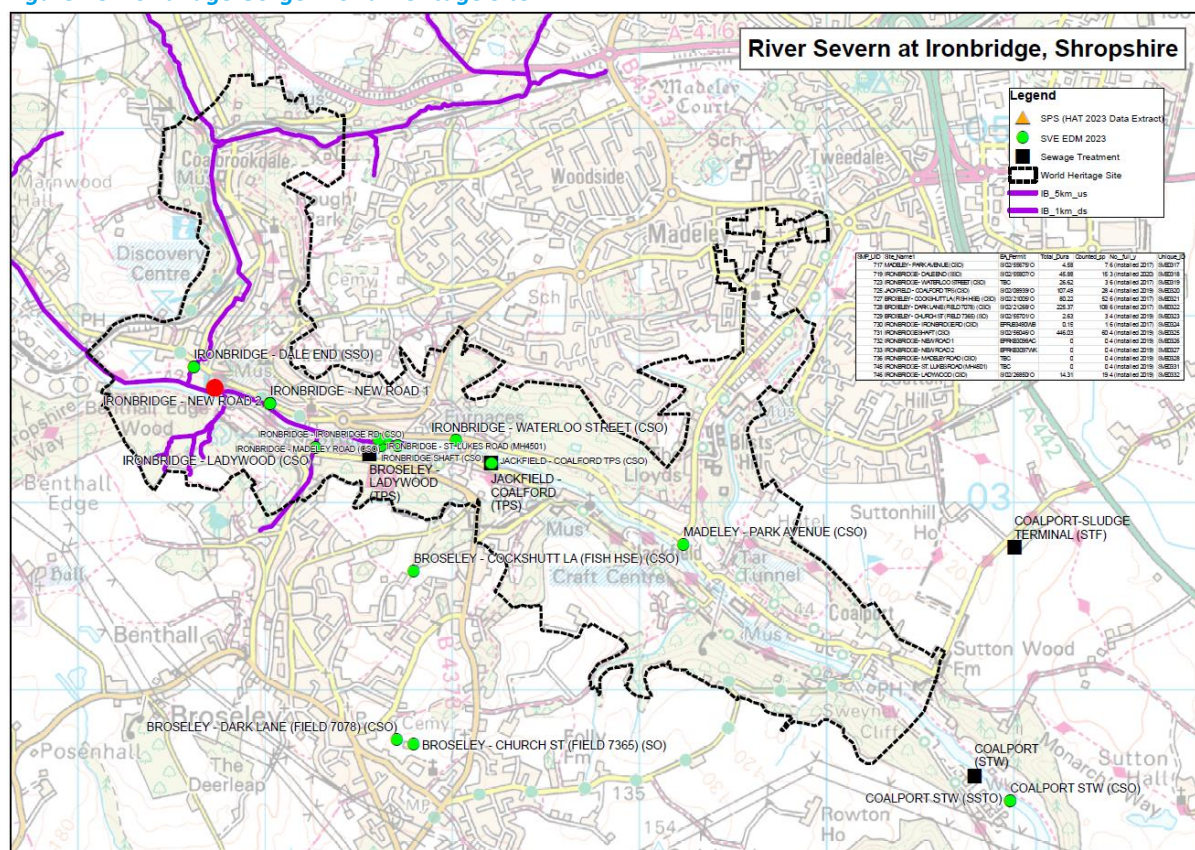
To develop the options below, we have:

- Used our existing waste system models and optimisation tools to assess the most cost-effective solution for each catchment.
- Utilised the learning from our Green Recovery projects (Mansfield nature-based solution implementation and the Bathing Water grey network spill improvements) to reduce the impact on our customers.

Ironbridge

Iron bridge gorge is a UNESCO world heritage site widely celebrated as a symbol of the Industrial Revolution. It contains all the elements of progress that contributed to the rapid development of this industrial region in the 18th century. This makes the catchment unique and the delivery of interventions to improve the network performance challenging. The Gorge has an estimated one million tourists visiting every year.

Figure A9 Ironbridge Gorge World Heritage Site



We have carried out an initial feasibility assessment for the catchment which concluded:

- Retrofitting surface water separation and sustainable drainage features would be highly disruptive for the UNESCO world heritage site. It would require almost 11.5km roads on the northern side of Ironbridge (excluding Coalbrookdale) to be excavated to lay new sewers (representing only a small proportion of the overall catchment that would require separation to achieve the required spill reduction). A high-level assessment indicates insufficient road space for a third of the 11.5km of roads to install another sewer due to the existing services (gas, electricity, telecoms and the existing combined sewer) and size of the road. Surface water separation would also have significant implications for the historical buildings due to the property level modifications required.
- The sustainable drainage features such as roadside rain gardens would impact on the unique cast iron kerb edging found lining some of the roads in Ironbridge and many of the side roads have insufficient space for building roadside rain gardens. Attenuation basins have been discounted due to a lack of available space in a suitable location. Many of the green spaces in Ironbridge Gorge are associated with disused mine workings which introduces significant engineering risk for SuDS features which infiltrate rainwater. the gorge has a history of geological instability caused in part by it's mining history and our assessment is that the introduction of additional groundwater is likely to be undesirable.

These constraints have led us to consider two tunnel sewer options

Alternate solution - Tunnel from Coalport WwTW to Dale End SPS

To minimise disruption to the local community this option proposes a Tunnel from Coalport wastewater treatment works to Dale End SPS situated in Dale End Car Park west of Ironbridge. This solution involves a number of drop shafts at CSO and pumping stations to collect flow from the combined sewer network and transfer it to Coalport WwTW.

Our initial assessment of this options suggests there are significant risks:

- Passing under the designated ancient monument of Iron Bridge would require monitoring points to check for any surface settlement and would require special consent.
- Drop shafts and access shafts would need to be constructed in areas of high landslide risk. A specialist contractor has indicated that reinforced secant piled shafts with structural linings would be required to resist land movement.
- Tunnelling would need to be deep to avoid worked coal. Coal mining risk reports and extensive ground investigation will be required to understand this risk. Filling and capping of mine shafts may be required to stabilise the ground and prevent sinkholes occurring.
- Geological risk caused by faulting and differing ground conditions would need specialist Tunnel Boring Machine.
- Potential need to work from the River Severn or close to the bank at Severnside sewage pumping station introduces the need for non-standard enabling works possibly in the form of cofferdams or anchored pontoons.
- Embargos on working in the highway during certain times of the year due to the importance of tourism for the area's economy.
- Working within the SSSI impact risk zone of the Tick Wood and Benthall Edge SSSI, Lincoln Hill (SSSI) and Lydebrook Dingle (SSSI)

- Working in visibility of scheduled monuments – Iron Bridge, Bedlam Furnaces, Coalport Inclined Plane and Coalport Bridge.
- Flood Risk zones of the River Severn
- The hydraulic model is currently being upgraded to improve accuracy.
- Potential UXO risk. Documentation suggests that bombs were dropped in the area and potentially landed outside of the working area. Additional surveys will be required to better understand this risk.

The tunnel would be able to pick up the majority of CSOs next to the River Severn and in the Bathing River area. The benefit of a tunnel along this length, if feasible, is it would enable all spills to be prevented both during and outside of the bathing season in the Bathing River area.

However, at this stage we consider that passing under the Iron Bridge with a tunnel would be insurmountable risk for the project and the tunnel would need to be terminated East of the Iron Bridge at The Shaft terminal pumping station.

Proposed Solution – Tunnel from Coalport STW to Ironbridge The Shaft TPS.

This solution still holds a significant risk due to a lack of working space at both Bower Yard and Wharfage sewage pumping stations and it would create significant disruption to The Wharfage.

Construction during the winter months is at risk of flooding with associated damage to the works and the additional cost for standing time of plant and equipment. Construction during the summer would coincide with the height of the tourist season and cause major disruption for the local community.

The gorge is a known flood risk hotspot and all access points onto the tunnel would need to be resilient to flooding to prevent inundation when the river breaks it's bank.

This solution will increase the network's level of resilience against landslides as many of the existing rising mains pass through the most badly effected landslide area. This proposal will remove the rising mains eliminate the risk of bursts occurring.

Combined sewer overflows in Broseley, Doseley and Madeley would require shaft tanks to reduce spills. There is also potential for flow from the CSOs at Broseley to be conveyed down to the tunnel. However, the landslide risk means that much of this route may require stabilisation to reduce the risk of destabilising the land whilst installing a much larger sewer.

Coalport WwTW

Coalport is a constrained site bounded by the steep banks of the River Severn to the North, and a hillside to the south and construction activity will be challenging

The closure of the Storm overflows and transfer to Coalport WwTW will require the upgrade of the capacity of the works. We have assessed the ability of the existing works to process the additional estimated flow rates and found that without intervention it would:

- take a significant time to process the additional flows unacceptable deterioration to spill counts and duration from the WwTW storm overflow and settled storm overflow; and
- potentially impact Dry Weather Flow (DWF) compliance.

Our most likely option to address these issues comprises two interventions; increasing the Flow to Full Treatment (FFT) capacity of the WwTW to allow it to treat more combined effluent in storm conditions and increasing the storm tank capacity on site.

The option a involves the conversion of the two existing Primary Settlement Tanks (PSTs) to Storm Tanks, building new radial PSTs and additional Final Settlement tanks. Cross site and storm pipework, channels and pumping stations are to be duplicated or upsized. A new inlet works and balancing arrangement will be required to process the assumed new peak flow rates. The chemical dosing lines for Phosphorus removal will be rerouted to a new point of application.

Shrewsbury

The historic town of Shrewsbury has multiple flood risk challenges which the River Severn Partnership¹⁴ are aiming to improve through the Severn Valley Water Management Scheme¹⁵. The Environment Agency are currently leading a £4.5m strategy development for the Upper Severn catchment to establish the potential of natural flood management interventions in the Upper Severn valley to reduce flood risk along the River Severn. It is hoped these nature-based interventions will deliver a range of ecosystem service enhancements including improved water quality in addition to reducing flood risk. The EA currently expect the development of a strategy for the Upper Severn catchment to be completed in 2026. The subsequent development of business cases and ultimate delivery of a programme of work will depend on a number of factors, which include the number, scale and type of intervention proposed together with the proposed funding mechanisms.

This important work could have significant impact on the newly designated bathing area, and we will align our programme to ensure we secure the best value outcome for our customers and the environment.

Another important factor in our assessment has been the importance of Tourism to the Shrewsbury economy where seasonal events and shopping in its historical centre are key feature of the town.

We have carried out an initial feasibility assessment for the catchment which concluded:

- Increasing pump rate from Coleham pumping station without improvements to the downstream network this will result in increased flood risk or spills from downstream CSOs. And deliver very little benefit to the upstream system.

Site investigation boreholes found on the British Geological Society website along the line of the main drainage system on Victoria Avenue indicate this sewer was likely to have been constructed on the 1950s. It seems likely that it was constructed to intercept combined flows that once discharged directly to the River Severn. The sewer was probably designed to no more than six times dry weather flow and therefore soon becomes overwhelmed during storm events resulting in spills.

- This historic sewer network serving the centre of Shrewsbury is a combined network. There are some pockets of surface water that drain directly to the River Severn but there appears to be little opportunities for separating surface water sewers that connect into the combined network.
- Separation would result in large disruption to the centre of Shrewsbury with separation being delivered at an individual property level.
- Surface water would need to be attenuated prior to discharge into the River Severn because of flood risk issues and provision of storage the main green area in the centre of Shrewsbury (Quarry Park) is likely to be challenging as it is used for events and is a registered park and garden.

¹⁴ [River Severn Partnership](#)

¹⁵ [Severn Valley Water Management Scheme | River Severn Partnership](#)

Underground storage in Geo-cellular crates may in this location may also be at risk from flooding or elevated groundwater levels.

- Retrofit sustainable drainage features to centre of Shrewsbury will cause significant disruption and will not address the spill frequency without supporting traditional grey solutions as the indicative volumes of water that need attenuating to reduce spills exceeds 12,000m³
- The lack of capacity in the combined sewer network and spill volumes makes shaft tank solutions difficult to implement in the centre of Shrewsbury:
 - The sewers would need upgrading to convey flow to the shaft tank location.
 - It would be difficult to construct a shaft tank with sufficient volume to hold back spills to bathing water standards
 - The risk associated with back-to-back events may be high due to a lack of system capacity to drain down a large capacity shaft tank without resulting in a spill from a downstream CSO.
 - The main location where a shaft tank could be constructed is within the Quarry Park. Temporary construction leaving minimal surface features such as manhole covers may be acceptable in this setting. Siting a kiosk required to pump down a large shaft tank would be difficult and potentially unsightly in the Quarry Park.
 - Many CSO locations have no open space located close enough and some of the sewers are in difficult locations to construct due to restricted space.
 - Outside of the centre of Shrewsbury, shaft tanks are likely to be a more suitable solution to implement.

If the existing sewers in Shrewsbury were upsized, it would require the upgrade of more than 8.4km of sewer of which 1.1km is now located in customer's gardens. The upgrade would need to deliver a new route with associated planning issues and use high-cost delivery methods such as pipe jacking or auger boring.

Proposed solution – Tunnel and Shaft Tanks

Our preferred solution involves constructing a 7.4km segmentally lined tunnel from Monkmoor Wastewater Treatment Works (WwTW) to Coton Hill that will connect the main sewer and 20 sewer overflows along the bank of the River Severn. We believe the solution will minimise disruption to customers and addresses the long-term resilience of several assets such as the Shrewsbury - Ditherington Syphon.

However, the solution has the following risks:

- Tunnelling under two masonry arched bridges and a rail bridge serving a Transport for Wales line towards Hereford and Birmingham and West Midlands Railway line to Birmingham.
- SevenSOs are close to the water's edge with poor access and working space. These may require cofferdams or pontoon working in the watercourse to provide working area for drop shafts onto the tunnel below to be constructed. This will also require double handling of material.
- Archaeological risk associated with the drop shaft and shaft locations, particularly near to listed buildings in the conservation area.
- Utility diversions and potential embargos on working in the highway during seasonal events.

- Shrewsbury Conservation area. A significant number of CSO's lie within the Shrewsbury Conservation which may impose restrictions on some of the enabling work required to construct the underground assets.
- Flood Risk Zone of the River Severn.
- Work outside Shrewsbury Police Station (shaft tank location).
- Work on existing sewers using open cut techniques at greater than 4m deep.
- Work at Coleham pumping station, a grade II listed building.
- Hydraulic model accuracy.

The capacity of the tunnel provides greater resilience to climate change and other future drivers such as reducing flood risk and population growth in the catchment.

Monkmoor WwTW

Monkmoor WwTW receives the foul and combined flows from Shrewsbury and some of its surrounding villages. The proposed plan to reduce storm overflows in the new bathing area includes increasing the volumes of combined flows to Monkmoor STW.

We have assessed the impact on Monkmoor WwTW and concluded that the performance of the works storm overflow and settled storm overflow would significantly deteriorate and our Dry Weather Flow (DWF) compliance would be at risk because of the time taken to treat combined flows stored within the proposed tunnel solution.

The option selected delivers two outcomes:

- increasing the Flow to Full Treatment (FFT) to allow the works to treat more combined effluent; and
- increasing the storm tank capacity onsite.

The option involves the addition of a second storm tank with the necessary returns configuration; providing additional cross site pipework, increasing interstage pumping capacity, addition of further Final Settlement Tank capacity to allow the works to treat higher flow rates, and upsizing the final effluent pumping station which operates when the River Severn is at a high level.

Alternative options to treat the additional storm flows via a nature based or alternative side stream were discounted due to the land availability and the need to ensure space is available for an AMP9 or AMP10 growth scheme due to the anticipated population increase within the Monkmoor WwTW catchment.

Ludlow

Our Green Recovery programme 'Creating Bathing Quality Rivers'¹⁶ identified the designation potential of the River Teme near Ludlow and we have made great progress in identifying and implementing solutions to reduce storm overflow spill frequency and in providing the local community with the insight it needs on the newly designated bathing water.

We have used our detailed knowledge of the Ludlow catchment to develop our proposals and applied new digital tools to accelerate our initial feasibility work.

¹⁶ [Creating bathing quality rivers](#) | [Green recovery](#) | [Wonderful on Tap](#) | [Severn Trent Water \(stwater.co.uk\)](#)

We have used utilised an Artificial Intelligence optimisation technique known as a Genetic Algorithm (specifically NSGA-II; Non-dominated Sorting Genetic Algorithm II) coupled with the catchments hydraulic model (Innovyze's InfoWorks ICM).

This tool enables identification of network upgrades that optimally balance system performance against the cost of implementation by efficiently searching through thousands of potential solutions in search of best value. The scope of improvement works proposed, builds on and complements the ongoing Green Recovery Programme which seeks to reduce the impact of overflows on the River Teme.

These additional proposals ensure that storm overflow performance within the designated inland bathing water meet the bathing season spill count requirements.

We have four operational storm overflows within (either) 1km downstream and 5km upstream of the designation. The storm overflow at Temeside Terminal Pumping Station (TPS) falls shortly outside of this area (>1km downstream) but becomes an integral part of the holistic catchment solution as the station ultimately controls performance of the trunk sewer and conveys flows over the River Teme and towards Ludlow Wastewater Treatment Works (WwTW). Temeside TPS is within the AMP8 Water Industry National Environment Plan (WINEP) with a spill frequency driver (EnvAct_IMP4).

We have explored a range of design options by trialling the upgrade of many asset configurations, including conduit upsizing, pump upsizing, offline storage creation and surface water removal. We have capitalised on our insights from the recent Green Recovery project to ensure our proposals are deliverable and in context with the ongoing program of work there.

The outline solution(s) for the four storm overflows within the designated bathing water consists predominantly of localised network improvements, increasing the ability to pass forward more flow, away from the bathing water designation, downstream and onto the WwTW. Several pockets of impermeable area have been identified for surface water management and sustainable drainage type interventions, aiming to reduce the amount of rainfall runoff entering the system during times of wet weather. Where additional offline storage is required, we will look to deliver this in green open space away from the town's commercial and historical areas with an aim to minimise disruption.

At Temeside TPS, we will look to increase the pump rates and the stations' ability to transfer flow effectively towards the WwTW, where ongoing work through the Green Recovery and Growth project(s) are significantly increasing Flow to Full Treatment (FFT) capacity as well as implementation of additional storm storage.